[Course Overview](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live)

[Course Overview](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live)

[Hello. My name is Deborah Kurata, and I'd](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=0) [like to welcome you to my course, C# Best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=5.777777777777778) [Practices: Improving on the Basics, from](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=12.277777777777773) [Pluralsight. When I first started out in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=14.785714285714288) [my software development career, I quickly](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=17.285714285714292) [learned that there is a big difference](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=19.33333333333333) [between knowing how to write code and how](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=21.666666666666654) [to write code well, and therein lies the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=24.352941176470587) [challenge. Once you learn the fundamentals](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=27.176470588235283) [of C#, where do you go from there? If you](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=29.294117647058805) [are learning carpentry, there would be a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=32.28571428571428) [step between learning how to use a saw and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=34.28571428571427) [building a well-designed and constructed](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=37.400000000000006) [house. That step is called an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=39.73333333333335) [apprenticeship. Think of this course as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=42.53333333333336) [your apprenticeship. In this course, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=45.14285714285715) [cover the how. How to build good classes,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=47.47368421052633) [fields, properties, and methods, and how](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=50.42105263157899) [to use new C# 6 features such as the null](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=52.63157894736848) [conditional operator and string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=57.5) [interpolation. It covers the when,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=59.5) [including when to use static classes,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=61.882352941176464) [singletons, lazy loading, and expression](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=64.70588235294116) [bodied members. It defines the why, such](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=67.05882352941174) [as why use method overloading or method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=70.69230769230766) [overriding? And, it covers best practices](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=74.4615384615384) [for using the basic C# features. These](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=77.27272727272727) [topics guide you on the path from](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=80.38461538461539) [apprentice to skilled C# developer. From](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=83.0769230769231) [here you can continue your learning with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=85.5) [these other Pluralsight courses: C# Best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=89) [Practices: Collections and Generics,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=92.27272727272728) [Object-Oriented Programming Fundamentals](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=94.81818181818184) [in C#, and Defensive Coding in C#. I hope](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=96.72727272727276) [you'll join me on this journey through C#](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=100.77941176470584) [Best Practices: Improving on the Basics, from Pluralsight.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m0&clip=0&mode=live&start=103.95588235294109)

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If you were learning](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=7.894736842105262) [carpentry, there would be a step between](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=11.142857142857146) [learning how to use a saw and building a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=13.142857142857151) [house. That step is called an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=15.71428571428573) [apprenticeship. Think of this course as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=18.3076923076923) [your apprenticeship. Welcome to C# Best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=21.07692307692306) [Practices: Improving on the Basics from](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=24.181818181818187) [Pluralsight. My name is Deborah Kurata,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=27.454545454545467) [and this course covers best practices for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=29.842105263157894) [using basic C# features, guiding you on](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=32.42105263157895) [the path from apprentice to skilled C#](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=35) [software developer. So what is an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=39.66666666666665) [apprentice? A student, one that has](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=42.77777777777777) [ability, but has yet to achieve all](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=45.44444444444443) [knowledge, someone who wants to know more.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=48.55555555555553) [Are you a C# apprentice? Want to advance](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=52.27272727272728) [your skills beyond the fundamentals? Want](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=56.235294117647065) [to go beyond the how and understand when,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=58.705882352941195) [why, and best practices? Want to review](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=62) [key concepts in preparation for an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=64.54545454545456) [interview, or at the start of a new](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=66.72727272727272) [project? If so, then this course is for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=69.6363636363636) [you. This course covers the basic features](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=74.375) [of C#. For each basic C# feature, we'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=77.40000000000003) [review the how, then focus on the when,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=80.60000000000008) [why, and best practices for using that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=84) [feature. Where appropriate, we'll compare](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=87.5) [and contrast similar features, so you can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=90) [confidently use the appropriate technique](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=93.5) [in the appropriate situation. For example,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=96) [when talking about implementing methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=98.8235294117647) [later in this course, we'll look at when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=100.88235294117644) [to use method chaining, method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=104.17647058823522) [overloading, and method overriding. In](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=107.14285714285712) [this module, we'll start with the course](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=110.3529411764706) [prerequisites and suggestions for getting](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=112.82352941176475) [the most from this course, including how](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=114.58823529411772) [to find the starter files if you want to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=117.07142857142858) [code along. We'll conclude this module](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=120.28571428571433) [with an overview of the remainder of this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=122.53846153846155) [course. Let's begin with the course prerequisites.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=0&mode=live&start=125.61538461538464)

[Prerequisites](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live)

[This course assumes that you have some](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=3.029) [basic knowledge of C# and Visual Studio.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=6.029000000000001) [You don't need to have much experience,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=9.029) [but have a working knowledge of each. I'm](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=11.529000000000003) [using C# 6. 0, released with Visual Studio](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=14.429) [2015, but this course is equally](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=17.628999999999994) [applicable if you are using C# 5. 0 with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=20.028999999999986) [Visual Studio 2013. When this course](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=23.594217391304344) [covers a C# 6. 0 feature, I'll be sure to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=25.94204347826086) [call it out. To create our C# application,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=29.85508695652172) [we'll use Visual Studio. I'm using Visual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=33.8415) [Studio 2015 Enterprise edition, but you](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=37.779) [can use any edition of Visual Studio,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=40.886142857142865) [including the free Community edition. You](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=43.88614285714288) [can find out more about the Visual Studio](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=46.397421052631586) [2015 editions and download the free](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=49.344789473684244) [Community edition at the link shown here.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=51.55531578947374) [If you are using Visual Studio 2013, that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=54.42900000000001) [will work as well. You just won't be able](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=58.16233333333336) [to try out the new C# 6. 0 features. This](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=61.814714285714274) [course does not cover the fundamentals of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=65.41788888888888) [C# syntax or program flow, ifs and loops,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=68.14011111111108) [for example. If you are completely new to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=71.25122222222217) [C#, you may want to first check out an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=74.279) [introductory C# or. NET course from the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=77.654) [Pluralsight library. For example, "C#](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=80.279) [Fundamentals with Visual Studio 2015. "](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=82.22900000000001) [But don't worry if you don't follow](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=84.62900000000005) [everything in that course. We'll review](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=87.42900000000009) [and elaborate the basics throughout this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=89.779) [course. Another option is the "Becoming a.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=92.029) [Net Developer" course, or search the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=94.654) [Pluralsight library with the key words](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=97.69566666666665) ["C#" and "Fundamentals. " If you've never](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=100.89566666666664) [used Visual Studio before, you may want to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=103.92899999999999) [check out the Pluralsight library for a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=106.32899999999997) [course on your version of Visual Studio.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=108.42899999999995) [Visual Studio 2013 courses are shown here.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=111.94566666666664) [The Visual Studio 2015 courses are due out](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=116.029) [in the fall of 2015. Now let's look at a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=118.46378260869562) [few tips for getting the most from this course.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=1&mode=live&start=121.50726086956516)

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[I have set up a public GitHub repository](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=2.829) [specifically for this course. It is called](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=6.1623333333333346) [CSharpBp-Basics, short for C# best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=9.928999999999998) [practices basics. You can find it at this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=13.428999999999995) [URL. This GitHub repository contains the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=16.929000000000002) [starter files for this course if you want](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=19.02900000000001) [to code along with the demos. I'll also](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=21.829) [add notes and reference materials here as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=25.329) [needed. If you're new to GitHub, simply](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=28.3915) [click this button to download the code as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=30.946647058823523) [a zip file. Note that these are only the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=33.77017647058822) [starter files and not the completed source](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=37.29958823529413) [code for this course. Thoughts, comments,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=40.181941176470616) [or questions as you watch this course?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=42.629) [Feel free to use the Discussion tab to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=45.42899999999999) [leave your feedback. Though you may not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=48.62899999999998) [see all of the options shown here, you can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=50.781380952380964) [find the link to the discussion on the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=52.92423809523813) [Pluralsight page for this course. I check](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=54.829) [the course discussion page often. It would](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=58.329) [be great to hear your thoughts on the best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=61.460578947368425) [practices presented here, and any](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=64.30268421052634) [additional tips you have to share with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=65.88163157894736) [other developers. Now, let's finish up](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=70.829) [this introductory module with a look at the course outline.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=2&mode=live&start=76.829)

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[The focus of this course is learning best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=2.929) [practices when using basic C# language](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=6.662333333333334) [features. Just about everything we create](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=9.462333333333333) [with C# is in a class. The hard part is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=11.59566666666667) [defining the proper classes for each layer](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=14.92900000000001) [of the application. We'll examine common](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=17.3665) [application layering, and look at the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=19.9915) [different types of classes we can create,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=22.6165) [UI classes, domain classes, library](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=25.775153846153838) [classes, and so on. We'll also look at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=28.082846153846138) [unit testing. The next step is building](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=31.775153846153852) [good classes. We'll examine the code that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=35.005923076923075) [belongs in a class and look at namespaces,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=37.98782352941178) [static classes, and singletons. Classes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=41.28194117647062) [don't do anything until we actually use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=43.35005263157895) [them, so next we'll look at best practices](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=46.29742105263156) [for using classes, including object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=49.665842105263124) [initialization, lazy loading, and the new](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=52.019909090909096) [null conditional operator. Within a class,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=55.292636363636376) [data is stored in fields. We'll examine](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=58.32900000000001) [how to define fields appropriately,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=61.59566666666669) [including backing fields, constants, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=63.929) [read-only fields. Once we have data in our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=65.69370588235297) [fields, we want to protect those fields](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=68.51723529411773) [with properties. We'll cover best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=71.5443846153846) [practices for using auto-implemented](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=74.23669230769227) [properties, access modifiers, and the new](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=76.3905384615384) [expression-bodied properties. Methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=80.50042857142854) [provide the operations for a class, so the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=82.279) [majority of the code we write will be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=85.07899999999995) [within those methods. We'll look at the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=87.8789999999999) [when, why, and best practices for creating](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=90.679) [good methods, including method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=93.7415) [overloading, method overriding, method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=95.4915) [chaining, and the new expression-bodied](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=97.59566666666667) [methods. Most methods require some data,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=100.37344444444446) [and that data is often passed into the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=103.1165) [method through parameters. We'll look at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=106.6165) [best practices for specifying clear method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=109.3136153846154) [parameters, including named arguments,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=112.0828461538462) [enum parameters, optional parameters, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=113.929) [ref and out parameters. The majority of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=116.70677777777779) [data in an application is stored in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=120.26233333333333) [strings, so we'll cover best practices for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=123.37344444444443) [handling strings, including null checking,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=126.48455555555553) [string formatting, the new string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=129.08284615384616) [interpolation feature, and StringBuilder.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=131.7751538461539) [The final words in this course include a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=133.929) [look at clean code, a brief review, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=137.3290000000001) [pointers to additional information. Let's get started.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m1&clip=3&mode=live&start=140.72900000000018)

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[Defining proper classes in the appropriate](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=0) [layer of an application can be a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=3.428571428571428) [challenge. Following best practices when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=7.428571428571426) [defining classes helps us put appropriate](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=10) [code in appropriate places, making](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=13) [development, debugging, testing, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=15.642857142857142) [maintenance easier. Welcome back to C#](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=18.21428571428571) [Best Practices: Improving on the Basics](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=21.33333333333333) [from Pluralsight. My name is Deborah](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=24.08333333333332) [Kurata, and this module covers best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=27.266666666666666) [practices for defining C# classes. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=30.666666666666664) [focus of this course is on basic C#](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=33.857142857142854) [language features, but to talk about best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=36.71428571428569) [practices, we need to put those language](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=39.214285714285666) [features into context. Laying out the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=42) [application architecture will give us that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=44.823529411764696) [context, and provide the foundation for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=47.47058823529409) [our application. We'll come back to this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=50.11764705882348) [architecture shortly. First, let's outline](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=53.058823529411775) [what we will cover in this module. This](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=55.11764705882355) [module lays the foundation for this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=58.411764705882355) [course. We'll start with an overview of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=60.882352941176485) [basic C# application architecture to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=63.76470588235297) [provide the big picture view of a C#](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=65.9090909090909) [application. Next we'll define what a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=69.54545454545453) [class is. We'll look at the different](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=71.74999999999997) [types of classes we can create, UI](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=74.19999999999993) [classes, domain classes, and so on. Then,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=76.64999999999989) [we'll take a brief look at unit testing.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=79.14285714285717) [Any course on C# best practices would be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=82) [incomplete without unit testing. We'll use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=85.33333333333337) [unit tests throughout this course to run](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=87.76923076923077) [the code we write. We'll conclude with a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=90.46153846153848) [set of frequently asked questions. These](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=93.26315789473682) [are the types of questions that you may](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=95.15789473684205) [see in a C# programming interview. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=97.6842105263157) [start with a look at a common C#](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=100.50000000000003) [application architecture to put classes into context.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=0&mode=live&start=103.8333333333334)

[Application Architecture](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live)

[In Visual Studio, our application is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=2.857) [presented in a hierarchy. The top level is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=5.482) [a Solution. The solution is the single](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=8.982) [container for the entire application. In](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=12.357) [this example, the solution is named](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=15.209941176470588) [AcmeApp, because it is the primary](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=17.327588235294115) [application for our fictitious company,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=19.445235294117637) [Acme Incorporated. Acme Incorporated sells](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=21.457) [two types of products, custom products](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=24.457000000000008) [that it makes, and off the shelf products](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=28.057000000000016) [that Acme buys from its approved vendors.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=31.94033333333334) [This application tracks the set of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=34.857) [approved vendors and the products that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=37.32758823529413) [Acme purchases from those vendors. Under](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=39.79817647058826) [the solution is one or more projects. A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=42.2945) [project defines a component of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=45.7945) [application. Each project is compiled into](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=48.4195) [a separate executable, or DLL. In all but](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=51.079222222222214) [the most trivial of applications, we'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=54.63477777777776) [want to create more than one project in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=57.21414285714285) [the solution for our application. Ignoring](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=60.071285714285686) [our two test projects hidden in the Tests](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=62.32366666666667) [folder, we have six projects here. Each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=66.05700000000002) [project maps to a component of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=69.22542105263157) [application. When building a C#](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=71.8043684210526) [application, the first step is to define](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=73.64647368421048) [the components appropriate for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=76.257) [application, and then create a project for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=78.25700000000003) [each one. To make it easy to create, find,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=81.05700000000007) [and maintain the code in our application,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=83.85700000000004) [it is important to put each bit of code we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=85.85700000000008) [write into its appropriate component. As](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=89.19033333333333) [the saying goes, a place for everything](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=91.85699999999999) [and everything in its place. To help](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=94.96811111111109) [determine what code goes where, let's look](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=98.10700000000001) [at this application's six components a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=101.25700000000003) [little differently. Here is the same](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=103.95700000000005) [application arranged into architectural](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=107.07922222222223) [layers. On the left are the components](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=109.30144444444446) [that display the user interface for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=111.99985714285717) [application. In this example, there are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=114.4998571428572) [three different user interface components.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=117.357) [There is one for Windows Forms. This](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=119.857) [component could be an older UI that helps](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=122.52366666666666) [the user manage the approved vendors. One](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=125.5712857142857) [for WPF. This component could be a newer](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=128.232) [UI for ordering products from those](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=131.232) [vendors. And one component is for a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=133.482) [web-based user interface, which could](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=136.38331578947376) [allow offsite sales people to check](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=138.48857894736855) [product inventory. With UI components, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=141.0148947368423) [decision on how many components to create](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=143.607) [is often made for us. Visual Studio won't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=146.6695) [let us mix technologies in one project, so](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=150.09229411764704) [if the application was developed using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=153.38641176470583) [Windows Forms, that has to be its own](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=155.857) [project. If we then create some newer](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=158.52366666666674) [features using WPF, that has to be its own](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=160.85700000000014) [project. And, of course, if our users](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=163.85700000000003) [request a web user interface, that has to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=166.19033333333343) [be its own project as well. If our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=168.85700000000017) [application needs only one type of UI,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=171.67518181818187) [such as only WPF, then we may only need](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=174.2206363636365) [one component for the UI, which maps to a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=177.49336363636385) [single Visual Studio project. Bottom line,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=181.19033333333326) [the number of Visual Studio projects](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=183.63477777777777) [required for the UI of our application](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=185.96811111111109) [depends on the technologies used, one](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=188.69033333333329) [project for each different technology. It](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=191.357) [also depends on the size of application.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=194.357) [For very large applications with large](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=197.857) [development teams, we could split the UI](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=200.482) [into multiple projects, even if it is all](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=203.5445) [the same technology. The business logic](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=207.07922222222228) [components are in the business logic](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=209.74588888888903) [layer. It is here that we put the majority](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=212.41255555555577) [of the logic for our application. For](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=215.14271428571422) [example, the code to add a new vendor to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=217.1178695652174) [the approved vendors list, or the code to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=219.46569565217405) [send an order to a vendor to order more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=221.5526521739133) [product inventory. Why should we put](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=224.357) [business logic into its own component? If](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=226.607) [in this example we had put the business](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=229.207) [logic into the same component as the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=232.00699999999995) [Windows Forms user interface, as we later](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=234.4569999999999) [add support for additional technologies,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=236.64647368421055) [some of that business logic code would](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=237.9622631578948) [need to be cut and pasted into the WPF or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=239.80436842105274) [web projects. By putting the business](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=243.6805294117647) [logic into a separate component, that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=246.5040588235294) [business logic can be used and reused by](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=249.357) [any user interface component, no repeated](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=253.357) [code. Instead, each UI component can use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=256.357) [the code in the business logic layer.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=259.1646923076922) [Business layer components are created as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=261.857) [class library projects. With the business](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=264.4284285714287) [logic layer, we have complete control over](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=266.99985714285737) [the number and content of the components,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=269.4359473684211) [so we can decide how the business logic](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=271.64647368421066) [functionality is divided up. We could put](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=274.24588888888894) [all of the business logic for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=276.96811111111134) [application in one component, as shown](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=279.69033333333374) [here. For larger applications and larger](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=281.8043684210527) [teams, it may be easier to work with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=283.699105263158) [code if it is separated into smaller](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=286.541210526316) [components. So if an application managed](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=289.482) [both customers and vendors, we could](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=292.107) [define one component for customer related](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=294.657) [business logic, and define vendor related](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=297.05699999999985) [business logic in a separate component.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=299.4569999999997) [Down here is a library component. Library](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=302.58427272727283) [components are for common code, not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=306.3185384615385) [directly related to any particular layer.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=309.0877692307692) [For example, we could have common logging](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=311.857) [code or email generation code. Just like](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=315.357) [the business layer components, library](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=318.7141428571429) [components are created as class library](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=320.85700000000014) [projects. We have control over the library](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=323.4284285714288) [components, so we can decide how to divide](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=326.55699999999996) [up the library of common code. Our data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=330.15699999999987) [access component is in the data access](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=333.52366666666666) [layer. The data access component provides](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=335.85699999999986) [all of the communication with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=337.85699999999974) [database. Like the business layer and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=340.05699999999996) [common code library, the data access](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=342.4569999999998) [component is created as a class library](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=344.857) [project, so we control whether we want all](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=347.3070000000002) [of the data access code in one component](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=350.10700000000037) [or multiple components. We can't talk](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=353.1903333333334) [about a data access component without](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=355.85700000000014) [mentioning Entity Framework. Entity](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=358.5236666666669) [Framework is an object relational mapper](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=360.32366666666667) [built into. NET for working with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=363.1236666666665) [relational data. It eliminates the need](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=365.92366666666635) [for most of the data access code. So if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=368.4125555555557) [you are using Entity Framework, you may](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=371.9125555555559) [not need a separate data access component.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=374.607) [This course does not cover Entity](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=377.232) [Framework, but there are several courses](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=379.482) [in the Pluralsight library if you are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=381.62170588235307) [interested in finding out more. Julie](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=384.0922941176473) [Lerman's "Getting Started with Entity](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=386.357) [Framework 6" is a great place to start.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=388.857) [Now that we've looked at the layers and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=392.857) [identified the components of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=395.6570000000002) [application, where do we put the classes?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=397.4070000000003) [Before we answer that, let's take a moment and review what exactly a class is.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=1&mode=live&start=399.857)

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[A C# application works with things, visual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=2.755) [things, such as forms or web pages that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=6.255) [are displayed at runtime. Business logic](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=10.254999999999999) [things, such as products and vendors and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=13.255) [orders. These are often referred to as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=16.755) [domain entities. At runtime, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=20.255) [application may store a set of these](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=22.06269230769231) [things in memory. Data associated with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=23.9473076923077) [each of these things is used for displayer](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=25.990294117647053) [edit, and business logic associated with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=29.284411764705865) [these things provide needed application](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=31.755) [operations. There are application things,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=34.5675) [such as logging and email generation. At](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=37.38) [runtime the application uses code provided](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=41.1925) [in these things to log activities or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=43.8175) [generate email, and there are data access](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=46.88) [things, such as DataSets or Entity](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=50.0626923076923) [Framework's DbContext. At runtime, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=52.83192307692306) [application uses these things when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=54.955) [retrieving or updating data from a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=56.95499999999999) [database. When running a C# application,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=59.35499999999998) [the application creates each of these](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=61.69944444444443) [things as needed, but how does the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=64.03277777777775) [application know what the former web page](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=66.755) [should look like and behave? How does the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=69.6716666666667) [application know what data to retain for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=72.80499999999998) [each domain entity, and what business](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=75.25499999999994) [logic it can perform? How does the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=77.3549999999999) [application know how to log, email, or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=79.61214285714287) [work with a database? All of this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=81.61214285714291) [information is detailed in a class. What](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=84.42166666666667) [is a class? A class is a template or mold](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=88.205) [that provides the specification for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=92.70500000000003) [things or objects that the application](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=95.40500000000004) [works with at runtime. As a metaphor,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=98.155) [think about building with blocks. At](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=101.42166666666668) [runtime, or playtime, we want a set of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=104.12342105263157) [blocks to build with. Before we can build](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=107.07078947368417) [with blocks, someone needs to specify what](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=110.01815789473677) [a block looks like, basically identifying](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=112.42166666666664) [its traits, and they need to define how it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=114.42166666666661) [will behave, basically identifying its](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=117.68833333333333) [operations. To do this, they create a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=120.02166666666668) [mold. This mold defines a brick with a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=123.28833333333336) [specific size, eight pegs, and an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=127.02166666666668) [interlock behavior. They then use this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=129.8216666666667) [mold to create a set of blocks, each with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=132.02772727272725) [a defined size and pegs and with interlock](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=134.89136363636356) [behavior. Once we have those blocks](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=137.43681818181807) [created, we can use them as needed.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=139.97722222222228) [Applying these concepts to an application,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=143.08833333333348) [at runtime we want a set of things or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=145.755) [objects to work with. Before we can work](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=148.4550000000001) [with those things, we need to specify what](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=150.8550000000002) [the things look like and how they would](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=153.18357142857138) [behave. We do that by creating a class. If](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=155.4692857142856) [the application needs to display a form,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=158.42166666666674) [we create a class that lays out that form](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=160.75500000000014) [and responds to form events. And if the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=163.98227272727271) [application needs to work with vendors, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=167.25499999999997) [create a Vendor class. That class lays out](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=170.1186363636363) [the data to be stored in memory for each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=173.02772727272725) [vendor, and the business logic associated](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=175.89136363636356) [with the vendor. So a class is code we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=177.80045454545444) [write at development time that defines a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=181.15500000000003) [template for things or objects our code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=183.95500000000007) [creates at runtime. This template](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=186.755) [specifies all of the data and operations](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=189.42166666666665) [for our application. We can define a class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=193.15499999999997) [then as the specification of a set of data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=196.57318181818187) [and the operations that act upon that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=199.84590909090923) [data. Now let's look at the types of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=202.39136363636385) [classes we can create and where they fit into our architecture.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=2&mode=live&start=209.755)

[Types of Classes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live)

[There are many different types of classes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=2.745) [that we can create in a C# application.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=5.078333333333333) [We'll look at user interface or UI](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=7.745) [classes, domain entity classes for our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=11.797631578947371) [business logic layer, and library classes.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=15.27131578947369) [Here again is the architecture of a C#](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=18.745) [application. It divides the application](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=22.47833333333332) [into components. We'll build UI classes in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=24.811666666666646) [the UI layer, domain entity classes in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=27.62) [business logic layer, and library classes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=30.62) [in the common library component. We won't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=32.745000000000005) [spend time on data access classes in this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=35.078333333333354) [course, because if you are using Entity](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=37.745) [Framework, you may not need those classes.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=40.74500000000001) [And if you aren't using Entity Framework,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=43.745) [the data access classes will depend on the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=46.07833333333335) [data access strategy you are using. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=48.74500000000003) [start with the UI classes. By default,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=51.108636363636364) [when we add a form to a UI component, such](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=53.65409090909093) [as a Windows Forms, WPF, or Web Forms](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=57.2904545454546) [project, Visual Studio automatically](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=60.52277777777777) [creates a form class for us, so our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=62.30055555555554) [application will have one class for each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=65.85611111111109) [form. The form class should contain code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=68.32394736842103) [that responds to form events by calling](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=70.53447368421047) [the business logic layer to perform needed](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=72.745) [processing, and it should include error](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=75.62735294117644) [handling for any errors that could occur.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=78.09794117647053) [There is another type of class that you](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=80.69954545454544) [may find in the UI layer, and that is a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=83.24499999999995) [VM, or view model class. A view model is a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=86.42681818181808) [class that manages the data interaction](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=90.42681818181816) [for a single form called a view. This is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=92.8813636363636) [often used in cases where the user](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=96.345) [interface can bind directly to data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=98.44499999999998) [defined in the view model class, such as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=100.24499999999996) [with WPF. For more information about view](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=103.41166666666668) [model classes, search for information on](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=107.30055555555558) [the MVVM, or Model View/View Model coding](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=110.63388888888892) [pattern in the Pluralsight library. Now](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=114.245) [let's move on to the business logic layer.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=117.07833333333333) [When thinking about defining classes for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=119.74499999999996) [the business logic of an application, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=121.94500000000002) [can define a domain model. A domain model](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=124.74500000000006) [identifies the basic business entities](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=127.91166666666666) [that need to be managed by the application](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=129.8561111111111) [and how they are related. For example, if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=132.96722222222218) [Acme Inc needs a feature to order more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=135.95552631578954) [product inventory, we can define a domain](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=138.90289473684226) [model that includes an order, the product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=141.50690476190476) [to order, so the order has a product, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=144.17357142857142) [a vendor from whom the company buys that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=147.60214285714284) [product, so the product has a vendor. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=150.8283333333333) [can use the domain model as a starting](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=154.06078947368422) [point for defining the classes in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=156.58710526315798) [business logic component. We'll need a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=158.79763157894752) [class to manage each order, a class to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=160.69236842105266) [manage product information, and a class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=163.21868421052642) [that manages each approved vendor.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=165.11342105263174) [Defining the domain model helps us](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=166.74500000000003) [consider all of the different bits of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=168.7450000000001) [logic that the application will require](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=171.0783333333335) [and organize that logic into appropriate](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=174.2904545454545) [classes. So we define domain entity](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=178.10863636363626) [classes in the business logic layer. Also](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=180.58710526315795) [in the business logic layer we may want](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=183.16605263157908) [repository classes. Repository classes are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=186.27833333333334) [responsible for managing the in memory](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=188.945) [repository of data for the application.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=192.14499999999998) [For example, when the user requests](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=194.98029411764705) [display of a specific vendor and the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=197.45088235294114) [products purchased from that vendor, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=200.33323529411757) [repository classes are responsible for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=202.62) [getting that data, tracking the state of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=204.495) [that data, for example, whether it has](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=207.16605263157896) [been changed, and saving that data using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=210.11342105263168) [the data access layer. Moving on to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=213.0607894736844) [common code in the library component, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=216.15676470588232) [can determine whether specific](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=218.62735294117638) [functionality goes into a library](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=220.0391176470587) [component by looking at the other](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=221.98029411764705) [components. If the functionality is common](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=224.45088235294114) [across layers, then it may be better in a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=226.92147058823522) [library component. For example, code that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=230.32394736842113) [provides logging or sends out email. So we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=232.53447368421067) [define different types of classes in each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=235.6680769230769) [layer of the application. When is it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=238.89884615384608) [appropriate to divide an application into](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=241.87) [components and define classes such as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=244.12) [these? Maybe always. Even if we are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=246.37) [developing a prototype, way too often that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=249.3164285714285) [prototype becomes the basis of our real](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=252.31642857142842) [application. By breaking the application](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=255.31642857142833) [into a set of components early on in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=257.0081578947369) [development cycle, we start with a strong](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=259.85026315789486) [foundation that can support the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=262.17357142857145) [application as it grows and changes over](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=264.3164285714287) [time. Let's look back at the Visual Studio](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=267.3164285714288) [project structure. Notice that each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=270.62735294117664) [component we identified is a project in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=272.6861764705885) [the solution for the application. But](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=275.4508823529412) [there is one thing we have not yet](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=277.56852941176487) [discussed. What about this Tests folder?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=280.39205882352974) [That folder contains the unit tests for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=283.0783333333332) [our application code. Let's finish up this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=286.3449999999997) [module with a look at unit testing and jump into our first demo.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=3&mode=live&start=291.745)

[Unit Testing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live)

[Unit testing tests the behavior of a unit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=3.145) [of code. Often that unit of code is a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=6.0923684210526305) [single method, so unit testing does not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=9.40815789473684) [test features; rather, it tests individual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=12.478333333333333) [methods in our application. Unit testing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=15.278333333333334) [is not performed by a person running the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=17.944999999999997) [application; rather, it is automated.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=21.144999999999985) [Hence, unit testing is sometimes referred](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=23.145) [to as automated code testing. As we'll see](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=25.87227272727272) [shortly, Visual Studio can run our tests.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=29.250263157894736) [Unit tests are created with code, so unit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=31.829210526315787) [testing involves writing more code to test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=34.77657894736844) [our code. The goal of unit testing is to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=37.3555263157895) [identify errors in our algorithms or logic](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=40.67131578947374) [to help improve the quality of our code.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=43.31166666666666) [For example, say our application has a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=46.422777777777746) [CalculateDiscount method that takes in a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=49.145) [discount percentage and calculates a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=51.77) [discount on an order total. The unit tests](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=53.9575) [can confirm that the discount is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=57.345) [calculated correctly when given valid](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=59.74499999999999) [inputs, such as 10 and 100. And the unit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=61.74499999999998) [tests can confirm that the code fails](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=65.34500000000001) [cleanly when given invalid inputs, such as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=68.14500000000005) [200, 0, or null. Notice that we don't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=70.94500000000001) [currently have code in this method to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=74.14500000000005) [handle these invalid inputs, so those unit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=76.94500000000009) [tests will fail. We'll need to enhance](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=79.59954545454544) [this code for all of our unit test cases](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=82.14499999999995) [to pass. There are many benefits to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=85.41772727272719) [writing unit tests for our code. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=87.53388888888885) [look at a few of them. Code tested with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=89.47833333333325) [unit tests have a higher degree of code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=92.14499999999998) [quality. There are several reasons for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=94.81166666666661) [this. First, we have to write our methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=96.81166666666664) [in a way that make them readily testable.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=99.47833333333327) [This means things like no global variables](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=102.145) [that could complicate the tests. Second,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=105.0616666666667) [we have to think through the test cases.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=107.4607894736842) [This often brings to light scenarios that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=109.98710526315784) [we may not have coded for. In the prior](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=112.19763157894728) [CalculateDiscount example, we didn't have](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=115.26264705882356) [any code to correctly handle a passed in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=117.02735294117653) [percentage greater than 100%, so just](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=119.895) [thinking through the test cases brought](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=122.145) [out missing functionality in the code.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=124.395) [Lastly, the test will point out any code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=126.99115384615386) [failures. Executing the tests helps us](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=130.68346153846153) [find any bugs or logic errors immediately.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=133.2283333333333) [The result is code that is of a higher](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=136.145) [quality. Unit tests can make it faster and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=138.8450000000001) [easier to debug our code, so even if the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=141.27543478260878) [unit tests add a little time to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=144.0145652173915) [development of our code, they can save us](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=146.44500000000002) [time when they help us more quickly find](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=148.8450000000001) [and fix errors. For example, say that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=151.2450000000002) [there is a problem with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=153.74500000000003) [CalculateDiscount code we showed earlier.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=156.14500000000007) [Without a unit test, we would have to go](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=158.145) [through the entire user interface,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=161.32147058823523) [launching the application, logging in,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=163.08617647058813) [entering data, just to get to the code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=165.00214285714284) [that calculates the discount. If we then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=168.43071428571417) [modify the code and want to try again,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=171.09954545454545) [we'd have to again go through the entire](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=173.64499999999995) [interface to get to that code. With unit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=176.19045454545446) [tests, we can run the test for the one](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=178.7239473684211) [method that has a problem. We can set](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=181.56605263157908) [breakpoints and do debugging directly from](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=184.39499999999998) [the test execution. This can save us a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=186.89499999999992) [significant amount of time. Unit tests are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=190.3672222222223) [repeatable. Update the code, rerun the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=193.4575) [tests, enhance the code, rerun the tests,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=196.0825) [maintain the application over time, rerun](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=199.145) [the tests. If you have ever fixed some](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=201.03973684210533) [code only to have it break something else,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=203.56605263157908) [you can see the benefits of this approach.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=206.5086363636364) [Higher code quality, faster and easier](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=210.145) [debugging, repeatable over the life of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=212.7164285714285) [application. These three reasons alone](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=215.71642857142842) [make unit testing a key best practice.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=217.96318181818188) [With Visual Studio, unit testing is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=221.145) [simple. Unit testing is provided as part](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=224.145) [of Visual Studio. The built-in testing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=227.645) [tool is called MSTest, but Visual Studio](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=230.4575) [also supports other unit testing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=233.52) [frameworks, such as NUnit. The steps for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=235.7075) [building unit tests are first, define the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=238.54500000000004) [test scenarios. Identify the test cases](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=241.34500000000008) [you need to fully test the method.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=243.70055555555555) [Normally this includes testing with valid](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=246.42277777777775) [data, sometimes called happy path tests,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=248.75611111111107) [and it should include testing with invalid](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=251.14500000000004) [data to ensure that the code fails](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=253.94500000000008) [cleanly. Next, generate the test. There](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=256.74500000000006) [are new features in Visual Studio 2015 to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=259.4979411764707) [make this process easier, as we'll see](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=263.26264705882386) [later in this course. Lastly, execute the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=266.4307142857143) [tests using Visual Studio. If you want](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=269.43071428571443) [more detailed information on unit testing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=272.2038235294118) [in Visual Studio, check out the Automated](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=274.32147058823546) [Code Testing module of the Defensive](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=276.7920588235297) [Coding in C# Pluralsight course. Now let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=279.08944444444455) [jump into a quick demo and see how to run](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=281.81166666666695) [unit tests from Visual Studio. Here we are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=286.36722222222215) [in Visual Studio. I'm using Visual Studio](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=290.3802941176471) [2015 Enterprise edition, but any version](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=293.26264705882375) [of Visual Studio 2015 would work,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=295.733235294118) [including the free Community edition.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=298.645) [Visual Studio 2013 would also work for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=301.145) [most of the demos in this course. You just](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=303.6449999999998) [won't be able to try out any of the new C#](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=306.77) [6. 0 features. I have already downloaded](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=310.2075) [the starter files from my public GitHub](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=312.70055555555564) [repository as discussed in the prior](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=315.42277777777804) [module. Here is the Windows Forms project.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=317.7561111111115) [Here is the WPF project. Both of these are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=320.54499999999985) [part of the UI layer. Here is the common](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=324.14499999999964) [code library component project. And here](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=327.7920588235295) [is the business logic layer component](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=330.26264705882375) [project for our business logic. In this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=332.733235294118) [course, we will focus primarily on this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=335.61558823529424) [business logic layer component. Inside](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=338.4979411764709) [that project is a vendor class that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=340.5735714285714) [represents the approved list of vendors.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=343.57357142857154) [The vendor class has a method called](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=346.145) [SendWelcomeEmail. This method sends a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=349.0273529411766) [welcome email message to a vendor,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=351.0861764705885) [including the Hello text and the name of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=353.56166666666667) [the vendor company. This method has a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=356.89500000000015) [simple error. Do you see it? Let's let our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=359.5450000000001) [unit tests find the error for us. In the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=362.6950000000003) [Tests folder are the unit tests. We can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=365.8116666666666) [open the folder for the business logic](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=368.4783333333331) [layer, then open vendor tests to view the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=370.8116666666663) [existing tests. Notice that we have test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=374.2561111111112) [cases for a ValidCompany name, an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=377.3672222222224) [EmptyCompany name, and a NullCompany name.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=380.395) [Each test is broken up into three steps,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=384.145) [Arrange to set up the test, Act to call](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=389.145) [the method under test, and Assert to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=393.4081578947367) [assert the result. We'll talk more about](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=396.7239473684208) [these steps in the next module when we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=399.395) [create our own tests. To run all of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=401.895) [tests in this file, right-click in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=405.79205882352926) [class and select Run Tests. To see the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=409.49794117647025) [results of the tests, open the Test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=413.645) [Explorer window. Go to Test, Windows, Test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=417.145) [Explorer, and we'll pin the Test Explorer.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=420.645) [Here we see that one test failed and two](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=424.3214705882351) [tests passed. Click on the failed test to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=429.0861764705878) [see more information here at the bottom of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=432.02) [the window. We can see that the test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=434.52) [expected Hello, space, ABC Corp, but the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=438.3028947368422) [actual result didn't have the space. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=441.98710526315807) [look back at the code. We can see that we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=445.52) [are indeed missing the space. Let's fix](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=449.27) [that and rerun the tests. We can select](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=452.2878571428571) [Run, Repeat Last Run. Now our first test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=456.85928571428553) [passes, but the prior two tests fail.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=460.5995454545455) [Click on one of the failed tests to see](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=463.1450000000001) [that now there is an extra space after](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=466.41772727272746) [Hello. Let's trim the space and try one](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=469.77) [more time. We'll put parentheses around](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=473.27) [the string and call the. Trim method. This](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=475.96318181818174) [will remove any leading or trailing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=479.6713157894737) [spaces. Run one more time, Run, Repeat](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=482.8292105263159) [Last Run, and now our three unit tests all](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=486.51342105263177) [pass. Notice how quickly the unit tests](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=490.7449999999999) [found our errors, and how quickly it was](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=493.54499999999973) [for us to debug our code and rerun with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=496.74499999999955) [the unit tests. We'll be using unit tests](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=500.3449999999998) [throughout this course to test the code we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=503.5449999999996) [write. Now let's conclude this module with some frequently asked questions.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=4&mode=live&start=509.145)

[Frequently Asked Questions](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live)

[As a review, let's look at some frequently](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=2.25) [asked questions. These are the types of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=5.222000000000001) [questions often used in job interviews.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=7.8225000000000025) [Why is a layered architecture important? A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=10.437) [layered architecture separates the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=13.937) [application into logical components that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=15.937) [are easier to create, change, extend, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=18.437) [maintain, and it makes the code and those](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=21.937) [components easier to reuse. What is a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=25.536999999999995) [class? A class is a template for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=28.336999999999986) [objects our code creates at runtime. This](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=31.536999999999974) [template specifies the data and operations](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=34.7605294117647) [for each entity or thing in our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=37.584058823529396) [application, so a class is a specification](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=40.75518181818181) [of a set of data and the operations that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=43.618818181818156) [act upon that data. What are the benefits](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=47.300636363636315) [of unit testing? Higher code quality,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=50.71477777777777) [faster and easier debugging, and the tests](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=53.381444444444426) [are repeatable over the life of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=56.492555555555526) [application, which helps us to protect the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=59.05464705882352) [code from multiple developers and from the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=61.52523529411763) [ravages of time. We'll see more of these](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=64.27033333333333) [questions as we progress through the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=67.82588888888887) [course. In this module, we laid a firm](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=70.49255555555553) [foundation. We started with a look at the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=73.38699999999996) [architecture for a C# application. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=76.18699999999991) [defined a class as a template that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=78.35805263157894) [specifies the data and operations for each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=81.30542105263156) [entity in our application. We then looked](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=84.25278947368417) [at the different types of classes we can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=86.98699999999998) [define and where they fit into the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=89.78699999999994) [application architecture. Form classes and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=92.2369999999999) [view model classes in the user interface](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=94.22271428571429) [layer, domain entity classes, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=97.2227142857143) [repository classes in the business logic](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=99.3745) [layer, and library classes in the common](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=101.9995) [library component. Lastly, we looked at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=105.062) [unit testing and saw our first demo. So](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=107.62121052631578) [we've covered how to define a class. Now](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=110.98963157894734) [let's look at best practices for building classes.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m2&clip=5&mode=live&start=114.937)

[Building Good Classes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live)

[Introduction](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live)

[Classes hold most of the code for our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=0) [application. Following best practices when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=4.705882352941177) [building classes helps us get more from](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=7.64705882352941) [our classes; more quality, more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=11.750000000000002) [reusability, and more maintainability.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=14.666666666666671) [Welcome back to C# Best Practices:](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=17) [Improving on the Basics from Pluralsight.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=20) [My name is Deborah Kurata and this module](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=23) [covers best practices for building good C#](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=27.5) [classes. The code we write for a class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=31.4375) [includes the class signature, defining the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=34.882352941176485) [class name and accessibility, fields,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=37.352941176470615) [properties, methods, and constructors.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=39.6) [Adding one more term here, together these](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=42.00000000000001) [are often referred to as members. So the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=46.20000000000002) [phrase class members refers to all of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=50.749999999999986) [fields, properties, and methods of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=55.14999999999996) [class. In this module, we'll build a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=58.449999999999946) [class, examining the code, and considering](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=62) [best practices. We'll define a set of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=65) [constructors for the class, and we'll take](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=67.5625) [a look at namespaces. Next we'll build a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=69.75) [static class and see how it is different](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=72.5) [from a non-static class. We'll look at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=75.5) [what a singleton is and how to define one.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=77.99999999999999) [We'll conclude with a set of frequently](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=80.99999999999994) [asked questions. These are the types of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=83.33333333333324) [questions that you may see in a C# programming interview. Let's get started.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=0&mode=live&start=86.00000000000003)

[Building a Class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live)

[Building a class starts with a class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=2.634) [signature. Classes are declared using the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=5.900666666666667) [class keyword, followed by the class name.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=8.700666666666667) [By convention, class names are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=11.739263157894735) [Pascal-cased, meaning each word of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=13.84452631578947) [name is capitalized. Often there is also](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=16.37084210526315) [an accessibility modifier. By default,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=19.634) [classes are only accessible from within](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=22.134) [the component, which is the project they](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=25.134) [are defined within. In C#, this is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=28.634) [referred to as internal accessibility.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=32.134) [Prefix the class name with public to make](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=34.634) [the class publicly accessible to any](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=38.134) [application code. Though not technically a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=40.759) [part of the signature, it is always best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=43.15780952380952) [practice to add XML document comments for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=46.205428571428556) [the class. The summary comment documents](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=48.87209523809521) [the purpose of the class. These comments](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=50.96733333333334) [are used by Visual Studio to assist with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=53.30066666666669) [IntelliSense, as we'll see in the upcoming](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=56.134) [demo. XML document comments are identified](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=59.634) [with three slashes, as shown here. A class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=62.634) [defines a template that specifies the data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=67.30066666666666) [and the processing for each entity in our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=69.63399999999996) [application. The purpose of fields in a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=72.30066666666659) [class is to hold that data. A field is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=74.91971428571428) [simply a variable in the class. It holds](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=78.3482857142857) [the data values for each object created](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=81.37084210526315) [from the class. This is a simple product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=83.94978947368418) [class with variables for our productId and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=86.89715789473678) [productName. When we create product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=89.98694117647058) [objects from that class, each has their](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=92.33988235294116) [own set of data values held in the class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=95.634) [fields. Notice that the fields are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=99.49114285714288) [prefixed with a private accessibility](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=102.06257142857146) [modifier. This ensures that no outside](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=104.20542857142861) [code can get or set the field values. They](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=106.17246153846153) [are managed exclusively by this class. If](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=109.05505263157895) [the fields are private, how do the other](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=112.00242105263156) [classes in the application access this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=115.37084210526312) [data? For example, we want to display this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=117.58854545454544) [data on a form and allow the user to edit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=120.13399999999994) [it. How can the form get this data if the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=123.31581818181807) [fields are private? Well, that's the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=128.134) [purpose of properties. Properties are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=131.134) [simply getter and setter functions that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=133.384) [guard access to the fields of the class.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=135.634) [They encapsulate the field so that no](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=138.634) [other code can access the fields, except](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=141.43400000000003) [through the property getter or setter.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=144.23400000000007) [Looking at the productName property as an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=146.634) [example, the getter here returns the value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=149.3562222222222) [from the productName field. The setter](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=152.0784444444444) [here sets the value of the productName](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=154.45752941176468) [field. Where did this value variable come](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=157.33988235294112) [from? It is implicitly defined to be the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=160.22223529411755) [value assigned to this property. It is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=162.96733333333339) [generally accepted best practice to define](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=165.33399999999997) [a property for each field in the class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=167.43399999999994) [that needs to be accessed from outside of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=170.2339999999999) [the class. Hence, these types of fields](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=173.18955555555553) [are often referred to as backing fields,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=175.91177777777773) [because they provide the backing in-memory](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=178.634) [storage of the data exposed by the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=181.20542857142848) [properties. We'll talk more about fields](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=184.2054285714284) [and properties, including best practices,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=187.4911428571429) [later in this course. Methods are just](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=190.34828571428582) [functions containing the logic for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=193.63400000000001) [class. The methods of a class define the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=195.63400000000007) [behavior and operations appropriate for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=198.3006666666668) [the class. For example, a product class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=200.18955555555553) [could have a method to calculate the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=202.91177777777773) [quantity on hand. We'll talk more about](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=205.634) [methods, including best practices, later](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=209.3673333333333) [in this course. Before moving on, let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=212.03399999999996) [look at some generally accepted best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=215.634) [practices for building classes. When](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=218.634) [naming a class, do define a meaningful](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=221.0625714285714) [class name. Do use a noun. Since a class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=224.06257142857132) [defines the template for a specific thing,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=227.77685714285712) [use the name of that thing, such as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=230.44352380952378) [product or vendor. Do use PascalCasing and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=233.49114285714282) [capitalize the first letter of each word](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=236.06257142857143) [in the name. Avoid using abbreviations in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=238.56257142857146) [the name. Avoid prefixes. At one point in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=241.10768421052634) [time, it was common to prefix a class with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=244.05505263157906) [C for class. That is no longer](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=247.57517647058822) [recommended, and avoid using underscores](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=250.86929411764703) [or other non-alphanumeric characters in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=253.2222352941176) [the name. Do add XML document comments.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=255.33399999999997) [They help us remember the purpose of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=257.7840000000001) [class as we use it now and in the future,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=260.5840000000003) [and they are used by Visual Studio to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=263.9673333333332) [display information about the class when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=266.63399999999973) [using the class. Do use properties to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=268.634) [encapsulate the fields that hold the data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=271.51635294117665) [for the class. This ensures that the class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=274.3987058823533) [controls access to that data. Do use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=277.77685714285724) [methods for the logic and operations in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=280.77685714285735) [the class. Do ensure that each class has a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=283.77685714285747) [well-defined purpose. State that purpose](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=287.7451111111112) [in the XML documents comments of that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=289.9673333333335) [class to keep that purpose clear](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=292.94169230769234) [throughout the life of the application.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=294.78784615384626) [All of the code in that class should be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=296.634) [focused on that purpose. Do create one](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=299.7840000000002) [class per code file. This makes it easier](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=302.2340000000004) [to locate and work with the files in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=304.7768571428571) [application. Do add properties at the top](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=307.3482857142856) [of the class, and the methods below them.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=309.776857142857) [This makes it easier to locate and work](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=312.634) [with the code in the class. Avoid large](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=315.4911428571427) [classes. If a class starts to get too](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=318.33988235294123) [large, it may be doing too much.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=321.1634117647061) [Reconsider the purpose of the class and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=323.634) [determine if the class can be separated](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=326.72223529411764) [into multiple classes. Now that we've](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=329.81047058823526) [covered some best practices for building a class, let's jump into a demo.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=1&mode=live&start=334.134)

[Building a Class - Demo](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live)

[Here we are in Visual Studio. Let's create](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=2.774) [a Product class. Where should that class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=6.274) [go? If you said the business logic](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=9.3365) [component, you are correct. Right-click on](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=12.774) [the Acme. Biz component and select Add](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=15.774) [Class. We'll call the class Product. Click](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=19.274) [Add. Notice that Visual Studio created a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=21.984526315789473) [file for us and defined the Product class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=24.563473684210525) [in that code file. Visual Studio generated](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=27.774) [the class signature for us. Notice that it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=31.274) [has no accessibility modifier, so by](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=35.009294117647066) [default, this class can only be accessed](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=37.479882352941196) [internally within this Acme. Biz](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=40.36223529411768) [component. We want to use our class in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=42.29780952380952) [other parts of the application, such as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=45.345428571428556) [from a Form, so we'll add the public](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=48.01209523809521) [keyword to this signature. Every class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=51.5975294117647) [should have XML document comments, so](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=54.42105882352939) [let's add that right away. In front of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=57.16288888888889) [class signature, type three slashes and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=60.66288888888886) [press Enter. The default structure of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=62.99622222222217) [XML document comment appears. We can then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=65.87926315789473) [type in a description of the class. Now](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=68.82663157894734) [that the class is created, let's add our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=72.15861538461539) [fields and our properties. We'll start](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=75.23553846153848) [with a productName field. We could just](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=77.374) [type in the declaration for the field and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=79.47399999999998) [then type in the associated property, but](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=81.87399999999995) [Visual Studio provides a snippet for us](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=84.524) [that can do that automatically. Just type](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=87.5865) [in propfull tab tab and Visual Studio](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=90.71517647058823) [creates both the field and the associated](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=94.00929411764704) [property. Now we can type in the data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=97.30341176470586) [type, the productName is a string, tab tab](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=100.1073333333333) [and type in the field name. Field names](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=102.77399999999993) [are CamelCase and start with a lowercase](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=105.66288888888889) [letter. Tab again to type in the Property](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=108.77399999999999) [name. Property names are PascalCase and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=112.32955555555553) [start with a capital letter. Usually the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=114.44066666666664) [field name and the property name are the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=116.77399999999994) [same, except for the casing. Press Enter,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=119.66288888888889) [and we are ready to create the next one.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=122.77399999999999) [I'll add two more fields with their](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=126.774) [associated properties. Propfull tab tab,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=129.65635294117644) [let's add another string for the product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=131.71517647058818) [description. Description, Description,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=135.18576470588238) [Enter, propfull tab tab, and we'll define](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=137.30341176470594) [an integer for the productId. ProductId,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=142.24458823529426) [ProductId, and there we have it. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=146.19505263157896) [snippets provide a very quick way to build](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=149.14242105263168) [out our fields and their associated](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=152.51084210526335) [properties. Next let's add a method. By](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=155.18576470588235) [convention, methods are defined after all](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=158.47988235294116) [of the properties in the class, so we'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=161.30341176470586) [add it down here. To keep things simple,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=164.51313043478265) [we'll just add a test method called](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=167.6435652173914) [SayHello. We want the method to be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=170.38269565217405) [publicly accessible, so we start with a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=173.399) [public accessibility modifier. The method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=176.4615) [returns a string, and the method is called](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=178.61610526315792) [SayHello. The body of this method simply](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=181.9845263157896) [returns Hello and the value of our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=184.9318947368423) [properties. To try out our method, we'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=187.9615) [use a unit test. Right-click on the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=191.024) [SayHello method and select Create Unit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=194.274) [Tests. Note if you are using Visual Studio](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=197.274) [2013, you won't have this option, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=201.274) [you'll need to create your unit test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=203.91685714285717) [manually. The resulting dialog allows us](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=206.4168571428572) [to define where and how the unit test is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=208.44066666666671) [generated. We're using MSTest as the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=211.4406666666668) [testing framework. But if we wanted to use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=213.71844444444443) [another framework, such as NUnit, we could](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=216.82955555555552) [use this link to get an extension for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=219.51084210526318) [other framework, and then select that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=222.82663157894748) [framework here. We already have a test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=225.03715789473702) [project that we saw in the last module.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=227.59218181818187) [We'll put this test in that same test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=230.50127272727286) [project. But if we didn't have a test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=233.41036363636385) [project, we could create one by selecting](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=236.24458823529406) [new test project. We want a new test file.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=238.71517647058812) [Each class should have its own unit test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=242.17400000000004) [file. We'll use the defaults for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=245.37400000000008) [remaining fields and click OK. This](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=248.44066666666674) [generates the basic structure for our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=251.1073333333335) [first test for the SayHello method. One](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=253.774) [common structure for a unit test is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=257.4798823529411) [Arrange, Act, Assert. First, we arrange or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=261.1857647058821) [set up for the set. To access the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=264.2285454545455) [properties or call a method, we first need](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=267.1376363636365) [to create an instance of the class. So](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=270.0467272727275) [let's start by defining a variable to hold](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=273.24458823529426) [that class instance. We'll call that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=276.53870588235327) [variable currentProduct. We create a new](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=278.9168571428572) [instance of the class using the new](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=281.2025714285717) [keyword and the class name. Notice that as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=283.86923809523853) [we type, IntelliSense locates the class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=287.02400000000006) [name for us. Recognize this? It is our XML](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=289.52400000000017) [document comment. Notice that we don't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=293.30031578947376) [have to define the type of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=295.8266315789475) [currentProduct variable on the left, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=298.774) [just use the var keyword. The var keyword](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=302.04672727272737) [tells C# to use implicit typing. Since we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=306.1073333333334) [are assigning the currentProduct variable](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=309.66288888888903) [to a new instance of product, C# can infer](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=311.8851111111113) [that the currentProduct variable must be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=315.8365) [of type product. We can see that when we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=318.4615) [hover over the variable. This brings up](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=322.024) [another important point. Just as C# has](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=324.649) [built-in data types, such as int and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=327.6687368421052) [string, the classes we create define data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=330.9845263157893) [types. So this currentProduct variable is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=334.3003157894734) [of type product. Now let's set the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=337.274) [properties for the currentProduct. To do](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=340.774) [that, we use the object variable we just](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=343.44066666666663) [defined. Notice that when we type in dot,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=346.10733333333314) [IntelliSense gives us the list of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=348.774) [accessible properties and methods, so we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=351.59752941176487) [can set the ProductName property and the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=354.42105882352973) [ProductId property and the Description](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=357.774) [property. Then, let's define the expected](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=360.274) [result of calling the method. We expect](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=363.274) [that the SayHello method will return Hello](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=366.774) [Saw and the saw details. How did we define](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=370.274) [this string? Well, if we look back at the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=374.24768421052624) [product class, it will return Hello, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=377.5634736842103) [ProductName, the ProductId in parentheses,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=380.1628888888889) [and the Description, which is exactly what](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=382.1073333333335) [we have here as our expected value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=384.8295555555559) [returned for our test. Next, we act by](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=387.9168571428571) [calling the SayHello method. Lastly, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=392.48828571428555) [assert that the expected value we defined](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=395.59752941176475) [matches the actual value returned by the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=398.4798823529414) [method. So instead of asserting a failure](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=401.362235294118) [as was provided by the generated code, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=404.30031578947376) [assert that the expected matches the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=407.66873684210543) [actual value returned. Now we are ready to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=410.224) [run the test. We can run one specific test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=413.8239999999999) [by right-clicking in the test and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=417.8739999999998) [selecting Run Tests. As shown in the last](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=420.57399999999996) [module, we can open the Test Explorer](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=424.17399999999986) [window. The green checkmark here means](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=427.3239999999998) [that the test was successful. We now have](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=429.8328235294119) [a working product class. We have the class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=433.1269411764709) [signature, we defined three fields with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=436.30341176470586) [their associated properties using a Visual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=438.59752941176464) [Studio snippet, and we created our first,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=440.8916470588234) [albeit overly simple, method. Next up, let's add constructors.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=2&mode=live&start=447.274)

[Defining Constructors](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live)

[Another important feature of a class is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=2.964) [its constructor. A constructor is a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=5.686222222222224) [special method in the class that is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=8.01955555555556) [automatically executed every time we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=10.73323076923077) [create an instance of the class. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=12.656307692307696) [constructor must always be named the same](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=15.297333333333334) [name as the class. That is what identifies](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=17.630666666666663) [this method as the constructor. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=20.611058823529405) [constructor with no parameters, as shown](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=23.081647058823513) [here, is called the default constructor.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=25.552235294117622) [Constructors are not required. If we don't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=29.297333333333338) [define a constructor in a class, C# will](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=33.130666666666656) [define and execute an implicit default](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=36.24177777777774) [constructor. However, as soon as we add a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=38.575111111111056) [constructor to the class, C# will no](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=41.76399999999999) [longer add the implicit default](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=44.56399999999998) [constructor. If we want to provide the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=46.56399999999997) [option to initialize each object instance](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=49.17452631578949) [with data when that instance is created,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=51.385052631578986) [we can define a parameterized constructor.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=53.964) [A parameterized constructor defines](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=57.65630769230768) [parameters to initialize the object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=60.11784615384613) [instance. For example, if we want to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=62.964) [initialize each product instance with a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=66.464) [productName, we could define a constructor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=69.464) [with a productName parameter. Defining two](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=71.72870588235297) [methods with the same name and different](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=73.84635294117653) [parameters is called overloading. We'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=76.43066666666667) [talk more about method overloading later](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=78.76400000000001) [in this course. To prevent repeated code,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=81.56400000000002) [the parameterized constructor will often](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=85.11784615384613) [invoke the default constructor. This is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=87.8101538461538) [done using the this keyword. So in this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=90.7875294117647) [example, the parameterized constructor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=94.08164705882348) [first calls the default constructor to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=95.72870588235287) [perform any default processing, and then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=98.464) [the parameterized constructor will do its](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=101.464) [work. This process is called constructor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=104.464) [chaining, because it chains the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=107.04733333333336) [constructors together. Using constructor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=109.13066666666671) [chaining can minimize repeated code. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=111.29733333333334) [see this in action. Here we are back in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=115.29733333333337) [Visual Studio with the Product class open.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=119.8687619047619) [In the Product class, let's add a default](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=122.53542857142855) [constructor. By convention, constructors](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=125.58304761904759) [are defined after class fields and before](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=127.71399999999998) [class properties. However, because of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=131.79733333333337) [way Visual Studio generates the field with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=134.714) [its property when using snippets, I tend](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=137.7765) [to leave the field definition directly](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=140.7973333333333) [above its associated property. So I'll put](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=143.29733333333326) [the constructor above the properties and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=146.21399999999997) [their associated fields. We could type in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=148.7139999999999) [the code for the constructor, but Visual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=151.23672727272725) [Studio provides a snippet for us that can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=153.46399999999994) [do that automatically. Ctor, short for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=156.00945454545445) [constructor, tab tab. Visual Studio then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=158.76399999999998) [generates the default constructor for us.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=162.36399999999995) [In the constructor, we'll call Console.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=165.964) [WriteLine to simply write out some text to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=168.214) [the console. That way we can see when this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=171.214) [constructor is invoked. Now let's execute](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=174.82763636363634) [the unit test we created in the last demo.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=177.28218181818178) [In the Explorer window, right-click on the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=180.964) [SayHello test and select Run Selected](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=184.464) [Tests. We can see that our test still](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=187.464) [executes successfully. If we click on the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=190.2973333333334) [test, we can see test details here at the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=192.6306666666668) [bottom of the Test Explorer window. Click](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=195.74177777777777) [on Output to view any output to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=198.46399999999997) [console. We can see that it wrote out our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=201.57511111111106) [message. So without changing any code in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=204.63066666666674) [our test, the code that created the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=206.96400000000014) [instance of the class automatically](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=209.51955555555554) [invoked the constructor. Now let's add a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=212.29733333333326) [parameterized constructor. In the Product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=215.714) [class, let's add a constructor that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=217.9015) [initializes each of the product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=220.5265) [properties. We can again use ctor tab tab.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=223.40844444444446) [Then we can add the parameters. We don't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=228.29733333333337) [want to repeat the code we have in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=232.53542857142855) [default constructor, so we can use this to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=235.10685714285705) [tell our parameterized constructor to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=237.39257142857127) [invoke the default constructor. In the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=239.2765) [body of the constructor, we'll set the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=241.9015) [product class properties to the values](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=244.964) [passed into the constructor. Notice that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=247.964) [the property names are PascalCased, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=250.73323076923077) [start with a capital letter. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=253.0409230769231) [parameters use the same names, but are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=255.364) [CamelCase and start with a lowercase](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=258.1639999999999) [letter. Let's also display another message](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=260.56399999999974) [to the console. Let's take a moment and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=262.86876190476204) [talk about another use of the this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=265.9163809523813) [keyword. We are using the this keyword](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=268.58304761904816) [here to invoke another constructor. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=271.69127272727263) [could also the this keyword to qualify our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=274.3528888888889) [class members. For example, we could](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=277.4640000000002) [prefix the properties here with the this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=279.7973333333337) [keyword. When used in that way, this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=282.64821052631584) [refers to the current instance of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=285.59557894736855) [class. One benefit of using this is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=288.54294736842127) [IntelliSense. We could type this. and see](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=291.964) [the list of class members. Using this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=295.464) [makes it clear that we are referring to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=298.78752941176475) [the class members and not the parameters.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=302.08164705882376) [So let's prefix each of our property names](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=304.964) [here with this. And a little editor tip,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=307.6306666666665) [say we want to edit all three of these](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=310.29733333333303) [lines to include this. Just place the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=313.43768421052624) [cursor at the beginning of the first line,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=316.01663157894717) [hold down the Alt key, and drag down to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=318.964) [each line to be edited, then type this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=322.4640000000002) [dot. Notice how it edited all three lines.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=325.57511111111154) [Cool, huh. By using the this keyword here,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=328.63066666666685) [we are now making it clear that we are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=331.6782857142861) [referring to the properties of the current](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=335.71399999999994) [product object. Now we need a unit test to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=339.79733333333314) [try out our new constructor. Let's copy](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=342.96399999999994) [the test we already have for the SayHello](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=344.9639999999999) [method and paste it to create a second](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=347.589) [test. We'll call this new test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=352.589) [SayHello\_ParameterizedConstructor. In this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=356.339) [test, we'll use the parameterized](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=357.964) [constructor. So we'll change this line of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=360.464) [code to pass in each property. We then no](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=363.964) [longer need to set the properties](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=368.2765) [manually. The expected value remains the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=370.9015) [same. Now we can run our new test by](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=373.5265) [clicking on it and selecting Run Tests,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=376.746608695652) [and we can see that it is successful.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=379.1813913043475) [Click on the test to view the test result](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=381.964) [details. Click Output, we can see that the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=384.5354285714285) [code first called the default constructor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=386.8211428571427) [and wrote that message. Then it executed](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=388.839) [the code in the parameterized constructor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=391.9015) [and wrote that message. This demonstrates](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=394.5265) [the constructor chaining. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=398.089) [parameterized constructor first invokes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=400.464) [the constructor defined here, which is our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=402.464) [default constructor, and then performs its](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=405.964) [own processing. Let's look back at our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=408.8101538461538) [unit tests. Notice in our first test that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=412.040923076923) [we used the default constructor and then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=415.2973333333335) [manually set each property value. In the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=418.0195555555559) [second test, we initialized the property](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=420.8870769230769) [values with the parameterized constructor.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=423.6563076923076) [Which technique do you think looks easier](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=425.964) [to read? Before moving on, let's look at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=428.6862222222224) [some best practices when using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=431.7973333333337) [constructors. Do consider providing a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=434.964) [default constructor for each class. Even](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=437.8463529411766) [if the constructor contains no code now,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=440.66988235294144) [adding a default constructor can make the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=443.964) [code easier to maintain over time. Do](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=446.6563076923075) [consider providing a parameterized](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=449.464) [constructor that initializes the minimum](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=451.464) [properties require for a valid object. Do](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=453.964) [name the constructor parameters with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=457.4015) [same name as the related property, but](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=460.0265) [with CamelCasing. That makes it clear](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=463.089) [which property is initialized with which](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=465.4185454545455) [parameter. Avoid putting too much work in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=467.60036363636374) [the constructor. Limit the code in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=470.17452631578936) [constructor to storing any passed in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=472.7534736842103) [values or setting default values. There](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=474.964) [should be nothing that causes a delay in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=477.78752941176487) [constructing an instance. Constructors are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=481.552235294118) [a great way to initialize the objects](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=483.8870769230769) [created in our application. So we've now](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=487.1178461538461) [covered each of the parts of a class. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=490.01400000000007) [class signature, backing fields to store](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=493.16400000000027) [the object data, properties to encapsulate](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=495.2640000000004) [those fields, methods for the logic and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=498.09733333333344) [operations, and constructors to initialize](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=501.83066666666696) [each object created from the class. Next,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=504.964) [let's look at what namespaces are and why they are important.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=3&mode=live&start=511.964)

[Namespaces](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live)

[You may have noticed that when Visual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=3.43) [Studio created our class file, it added a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=6.008947368421052) [namespace around the class. Visual Studio](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=8.956315789473683) [automatically adds a namespace around](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=11.329999999999998) [every class, and by default, names it the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=13.579999999999995) [same name as the project. Namespaces are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=17.17999999999999) [used to provide a unique address for a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=20.38238095238095) [class and to organize the application](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=24.191904761904745) [classes into a logical hierarchy. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=27.04904761904759) [look more closely at each of these uses. A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=29.874444444444443) [class name is like an address. If we want](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=33.81095238095238) [to access 123 Main Street, we may have a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=37.239523809523796) [big problem. Which 123 Main Street do we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=40.66809523809521) [want? The one in Springfield, the one in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=44.13000000000002) [San Francisco, the one in Houston? So it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=47.73000000000004) [is with an application. If we want to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=51.13) [access the Product class, which Product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=53.930000000000014) [class do we want? The one in the Biz](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=56.03000000000002) [component, the one in the WPF component,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=59.27210526315791) [or the one in the Model component? We can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=61.85105263157899) [use a namespace to provide a unique](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=65.28714285714287) [address for locating the class. So to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=68.28714285714288) [access the Product class in the Biz](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=71.31888888888889) [component, we can reference it as Acme.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=74.42999999999999) [Biz. Product. And if we want to access the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=77.54111111111109) [Product class in the WPF component, we can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=81.09666666666666) [reference it as Acme. Wpf. Product and so](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=84.1442857142857) [on. This is especially helpful when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=87.59666666666666) [working with large applications. Another](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=91.09666666666664) [purpose of namespaces is to divide the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=93.805) [classes of our application into a logical](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=96.43) [hierarchy. This makes it easier to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=99.055) [understand and navigate the classes in our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=101.35307692307694) [application. Our application is small, so](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=104.04538461538465) [our namespace hierarchy is rather flat.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=107.15727272727274) [For larger applications, the namespace](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=110.43) [hierarchy may be more complex. Here there](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=112.93) [are additional sub namespaces to further](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=116.43) [divide the application classes. Both the.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=119.43) [Wpf and. Biz namespaces are further](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=122.48263157894738) [divided into. Cm for customer management](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=125.64052631578949) [and. Pm for product management. Let's look](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=128.79842105263157) [again at our code. We are back in Visual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=132.0966666666667) [Studio with the Product class open. Since](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=135.43000000000004) [this class is in the Acme. Biz project,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=138.23000000000008) [Visual Studio automatically defined the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=141.43) [namespace to Acme. Biz. If we want to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=143.48882352941175) [change the default namespace that Visual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=146.78294117647053) [Studio uses, we can modify it in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=149.43) [Project properties. Double-click on the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=153.43) [Properties node under the Project in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=155.7936363636364) [Solution Explorer. This opens the Project](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=158.5209090909092) [properties. Ensure that the Application](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=161.29666666666668) [tab is selected on the left. Here is the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=163.63000000000002) [default namespace that Visual Studio uses](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=167.43000000000004) [each time we create a class in this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=169.4300000000001) [project. It is set to the project name,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=172.09666666666683) [but we can change it here as needed. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=174.7633333333334) [could add. Pm for project management, for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=177.805) [example. Changing it here won't change any](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=180.43) [existing namespaces in our code. It will](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=183.055) [only change the default used when creating](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=185.76333333333332) [new classes in this project. We don't need](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=188.48555555555552) [this extra namespace, so I'm going to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=191.35307692307697) [change it back. Going back to the Product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=193.50692307692321) [class, we can change the namespace of any](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=196.24818181818188) [class to anything we want by simply](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=199.15727272727287) [modifying it. Here we could change the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=201.7027272727275) [namespace to Acme. Biz. Pm for Product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=205.12230769230774) [Management. We immediately see errors](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=208.89153846153857) [here, because now our unit test can't find](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=210.76333333333338) [the Product class. We could fix those](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=213.43000000000012) [references, but let's just change the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=216.09666666666664) [namespace back. As an example of a complex](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=218.59666666666658) [namespace hierarchy, consider the. NET](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=222.43) [Framework System namespace. Notice here](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=224.93) [that the code is using System.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=227.72411764705885) [Collections. Generic, System. Linq,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=231.60647058823537) [System. Text, System. Threading. Tasks. By](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=234.19470588235305) [grouping functionality into logical](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=237.805) [namespaces, we can more readily find the.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=239.305) [NET Framework classes that we want to use.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=241.93) [We'll talk more about this using directive](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=245.03000000000003) [in the next module. Before moving on,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=247.83000000000007) [let's look at some best practices when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=250.83) [defining namespaces for our classes. When](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=254.0966666666667) [defining the namespace names, do follow](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=257.03000000000003) [this generalized template. Start with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=260.63000000000017) [company name. This ensures that the class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=263.21947368421047) [name in our code won't conflict with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=265.0615789473682) [anything in. NET or from any third-party](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=266.90368421052597) [components we may use. Then specify the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=270.09666666666675) [technology name, or if the application is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=273.20777777777795) [something you sell, use the application](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=275.805) [name, such as Microsoft Office in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=278.055) [second example. Next, use the feature](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=280.68) [name, and add any additional sub](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=283.2761538461538) [namespaces as needed. If your project name](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=286.04538461538453) [doesn't match this structure, use the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=288.6931578947369) [project properties as we saw in the prior](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=290.5878947368422) [demo to change the default namespace. Do](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=293.11421052631596) [use PascalCasing where each word of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=296.60647058823514) [namespace name is capitalized. Avoid using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=300.31235294117613) [system in your namespace name. System](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=303.3633333333333) [should be reserved for. NET Framework](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=306.1633333333331) [namespaces. Avoid using the same name for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=308.96333333333297) [a namespace and a class within that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=311.82999999999987) [namespace. Otherwise, the fully qualified](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=314.6299999999997) [name of the class becomes something like](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=317.00333333333333) [this, which is confusing. When used well,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=320.4566666666667) [namespaces can make it easier for other](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=323.48882352941183) [developers to discover, navigate, and use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=325.9594117647061) [the classes in your application. Next, let's look at static classes.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=4&mode=live&start=328.07705882352974)

[Building a Static Class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live)

[A static class is basically a cohesive set](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=2) [of services provided by a set of methods,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=5.782857142857141) [often without any internal data. A static](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=9.56571428571428) [class looks and acts much like a normal](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=12.73) [class with three key differences. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=15.930000000000003) [static keyword is included in the class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=18.3675) [signature. The class can only include](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=21.43) [static members, meaning that fields,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=24.055) [properties, and methods in the class must](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=26.129999999999995) [also use the static keyword. And we cannot](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=28.929999999999986) [instantiate a static class. This means](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=32.03526315789474) [that we can't create an instance of a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=34.24578947368423) [static class using the new keyword. How](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=37.19315789473689) [then do we call the members of the static](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=39.92999999999999) [class? We use the class name, as we'll see](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=43.52999999999998) [in the upcoming demo. A static class acts](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=46.73000000000001) [like a container for properties and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=49.53000000000002) [methods, mostly methods that provide](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=52.041111111111114) [utility features. For example, logging or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=54.8188888888889) [email generation. Here we are back in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=59.26333333333334) [Visual Studio. The most common place to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=62.59666666666668) [use static classes is in the common code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=64.93) [library. I have already defined several](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=67.59666666666664) [classes here in the library. Let's open](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=70.59666666666666) [the LoggingServices class. Let's change](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=74.32999999999998) [this class to a static class. Any class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=76.59666666666666) [can be changed to a static class by simply](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=79.26333333333329) [adding the static keyword to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=82.26333333333325) [signature. As soon as we made this change,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=84.53000000000003) [we see an error in the class method.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=87.73000000000008) [LogAction cannot declare instance members](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=90.93) [in a static class. This is because every](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=92.87444444444444) [member of a static class must also be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=95.98555555555552) [static, so we need to add the static](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=99.13000000000002) [keyword here as well. Now let's open the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=102.33000000000007) [associated unit test. We can see the unit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=105.64428571428573) [test here. Notice that we have several](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=109.07285714285717) [errors here, including an error where we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=111.87444444444444) [created an instance of the class. Cannot](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=114.59666666666664) [create an instance of the static class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=117.305) ['LoggingService. ' Now that the class is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=119.93) [static, we can't create an instance of it.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=122.555) [So how then do we reference a static](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=125.9925) [class? We'll use the class name directly.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=129.4925) [So we can delete the line that creates a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=131.73000000000008) [new instance, and where we're calling the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=134.43000000000018) [LogAction method, we simply use the class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=136.93) [name. So that fixes our error here. If we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=140.43) [look at the error list, we see a few more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=144.7126086956522) [errors. This is because the email service](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=148.62565217391312) [uses the logging service. So let's fix](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=151.36478260869578) [that as well. Again, we can delete the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=153.98) [code that creates an instance of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=156.77999999999994) [logging service and use the class name to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=159.2299999999999) [call the LogAction method. To ensure](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=162.14052631578954) [everything is still working, let's run all](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=164.35105263157908) [of our tests by simply selecting Run All](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=166.93) [here. We'll pin the window, and we can see](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=169.93) [that all of our tests are passing. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=173.305) [look back at the logging service. Here we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=176.2984210526316) [saw that adding the static keyword to a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=179.2457894736843) [class signature changes the class to a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=182.19315789473703) [static class. Static classes can only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=184.77210526315795) [contain static members, so we had to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=186.9826315789475) [change the method to be static as well.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=189.56157894736862) [And since static classes cannot be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=192.6522222222222) [instantiated with the new keyword, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=194.98555555555552) [changed the code that called the static](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=197.2829411764706) [method to reference the class using the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=199.75352941176465) [class name. Before moving on, let's look](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=202.2241176470587) [at some best practices when building](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=205.62230769230774) [static classes. Do use static classes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=208.85307692307703) [sparingly. Static classes should only be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=212.04764705882354) [used as supporting classes for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=215.22411764705885) [application. Static classes don't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=218.40058823529415) [participate well with other object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=220.2936363636364) [oriented programming features. For](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=222.56636363636375) [example, a static class cannot have](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=224.48555555555555) [parameterized constructors. A static class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=227.8188888888888) [can't implement an interface, and we can't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=230.13000000000002) [inherit from a static class. Avoid using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=232.93000000000006) [static classes as a miscellaneous bucket](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=236.02090909090907) [of ad-hoc methods. Every class should have](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=239.29363636363627) [a purpose, and the members of the class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=242.18) [should support that purpose. Do use static](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=244.68) [classes in common code library components](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=247.2936363636364) [when needed. Okay, so static classes don't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=250.0209090909092) [allow creating any object instances. What](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=253.92999999999998) [if we have an entity class and we want to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=257.2633333333333) [provide only one instance of that class?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=260.59666666666647) [Instead of a static class, we could use a singleton. Let's see what that is.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=5&mode=live&start=262.93)

[Defining a Singleton](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live)

[A singleton is a class that provides only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=2.837) [one instance. This is different from a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=6.037000000000002) [static class in that a static class cannot](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=8.837000000000003) [provide any instances. For example, say we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=12.248764705882353) [want a user class that manages information](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=15.542882352941177) [about the currently logged in user. With a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=18.837) [desktop application, there is only one](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=21.78436842105263) [user logged in at that desktop at one](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=23.994894736842102) [time, so we could define the user class as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=27.12271428571428) [a singleton. That would ensure that there](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=30.979857142857124) [was only one instance of the class defined](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=33.836999999999996) [during the entire execution of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=37.036999999999985) [application. There are two basic steps to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=39.436999999999976) [defining a singleton. First, change the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=42.087) [accessibility modifier on the constructor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=44.337) [from public to private. This allows the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=46.337) [code in this class to create an instance,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=49.837) [but ensures that no other code can create](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=53.837) [any additional instances of the class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=56.94811111111109) [using the new keyword. Second, add a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=59.2814444444444) [static property that creates and provides](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=62.337) [the one instance. Here is the backing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=65.337) [field for the instance. The code in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=68.36080952380952) [static property checks whether an instance](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=71.40842857142856) [has been created. If not, it creates an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=73.69414285714284) [instance. It then returns that instance.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=77.10972727272727) [Any code that needs to access user](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=79.837) [information can then simply call user.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=82.9481111111111) [Instance to obtain the single instance of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=85.61477777777776) [the class and then use that instance to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=88.55128571428573) [call the class members. This is a very](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=91.40842857142862) [simplistic view of a singleton just to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=94.337) [give you the general idea. For more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=96.962) [information about singletons, check out](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=99.76007692307694) [the Design Patterns Library on](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=102.06776923076927) [Pluralsight. This library includes a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=104.37546153846161) [detailed discussion of the singleton](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=106.43700000000003) [pattern. If that course seems a bit too](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=108.43700000000005) [much, start out with the Design Patterns](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=111.8995) [On-Ramp course. Let's look at the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=114.962) [advantages of using a singleton over a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=117.68315384615387) [static class. A singleton has an instance,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=120.91392307692314) [so that instance can be passed to other](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=123.3995) [code as needed. A singleton can have child](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=125.8995) [objects associated with it. For example, a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=128.89582352941176) [singleton defined to manage a single user](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=131.7781764705882) [instance can have a set of roles](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=134.50366666666667) [associated with it. A singleton supports](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=136.83700000000007) [object-oriented programming features. A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=139.337) [singleton can implement an interface, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=141.337) [we can inherit from a singleton, so only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=144.25805263157895) [use a static class when creating common](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=147.62647368421062) [code library classes when you don't need](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=150.57384210526334) [any of these features. If you only want a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=153.437) [single instance, consider using a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=157.03700000000006) [singleton instead. In all other cases, a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=159.0370000000001) [normal class will do. Now let's conclude](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=164.837) [this module with some frequently asked questions.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=6&mode=live&start=171.837)

[Frequently Asked Questions](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live)

[As a review, let's look at some frequently](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=3.264) [asked questions. These are the types of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=6.31161904761905) [questions often used in job interviews.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=8.97828571428572) [What is the difference between a property](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=11.264) [and a method? Properties are the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=14.211368421052628) [gate-keepers, providing access to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=16.73768421052631) [data. Methods are the operations. What is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=18.842947368421054) [a constructor? A method executed when an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=22.10610526315789) [instance is created from a class. A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=25.421894736842095) [constructor is often used to initialize a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=28.65288888888889) [class with data. What is the purpose of a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=31.375111111111114) [namespace? Namespaces are used to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=34.87511111111109) [organized classes into a logical](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=37.264) [hierarchy. This makes the resulting](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=39.764) [classes more discoverable and easier to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=42.61694117647058) [access, and namespaces prevent class name](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=46.14635294117645) [collisions. What is a static class? A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=49.67576470588232) [class that cannot be instantiated. It is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=52.96400000000002) [best for use with common code libraries.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=56.11400000000004) [What is a singleton? A class that provides](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=59.264) [a single instance of itself. It is best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=62.3409230769231) [for use in cases where you want to ensure](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=65.35490909090908) [you have one and only one instance of a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=68.62763636363631) [class. What is the difference between a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=71.90036363636355) [static class and a singleton? A static](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=74.38164705882356) [class cannot be instantiated. A singleton](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=76.85223529411772) [can instantiate itself and provide that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=79.10610526315789) [instance to other code that needs it, so a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=81.63242105263156) [singleton can still leverage](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=85.42189473684206) [object-oriented programming techniques. In](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=87.86399999999999) [this module, we built our first class. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=90.69257142857143) [created fields to hold the data and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=94.12114285714287) [properties to encapsulate those fields.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=97.12114285714289) [Code using this class can only access the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=99.264) [field values through the property getters](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=102.264) [and setters. We then created a method to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=104.514) [define an operation our class could](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=107.57169230769232) [perform. After we successfully tested our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=109.87938461538464) [class with a unit test, we covered](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=112.18707692307693) [constructors. We saw that we could define](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=114.87938461538464) [a default constructor with no parameters.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=117.76400000000002) [When an instance of the class is created](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=120.264) [with a new keyword, the constructor is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=123.264) [executed. We then built a parameterized](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=125.889) [constructor, so we could pass in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=128.5716923076923) [initialization values. And we saw how to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=131.34092307692302) [use constructor chaining to minimize](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=133.93066666666672) [repeated code. Then we looked at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=135.59733333333344) [namespaces and why they are important.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=137.59733333333338) [Next, we built a static class and saw how](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=139.59733333333344) [to use the class name to access the static](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=142.59733333333352) [members of the static class. Lastly, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=146.06400000000005) [looked at what a singleton is and saw some](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=148.8640000000001) [basics on how to create one. So we've](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=152.21854545454545) [covered how to create a class; next, let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=154.76399999999995) [look at the best practices for accessing and using classes.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m3&clip=7&mode=live&start=157.30945454545446)

[Accessing and Using Classes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live)

[Introduction](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live)

[Classes don't do anything until we access](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=0) [and use them. To access classes, we need](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=4.277777777777779) [to consider references and the using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=9.166666666666664) [directive. And to use classes, we need to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=12.333333333333334) [think about object initialization and null](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=15.888888888888891) [checking. Welcome back to C# Best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=18.55555555555555) [Practices: Improving on the Basics from](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=21.5) [Pluralsight. My name is Deborah Kurata,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=24.5) [and this module covers best practices for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=27.64705882352942) [accessing and using C# classes. Here again](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=31.35294117647061) [is a common architecture for a C#](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=34.8) [application. If we want one class in a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=37.59999999999999) [component to access another class within](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=40.799999999999976) [the same component, we can simply use the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=43.5) [class. For example, the Product class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=47.5) [could create an instance of the Vendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=49.84210526315791) [class to define the vendor that sells a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=52.42105263157899) [particular product. But if we want a class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=55.35) [in a component to access a class from a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=58.15000000000001) [different component, there's a little more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=61.300000000000026) [work to be done. For example, the Vendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=63.33333333333334) [class needs to use the Email class to send](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=65.99999999999999) [an email to the vendor. In this module,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=69) [we'll start with setting references and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=73.16666666666666) [the purpose of the using directive,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=75.49999999999997) [including a look at the new using static](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=77.83333333333329) [feature in C# 6. 0. Then we'll examine how](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=81.38095238095241) [to use both non-static and static classes.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=85.66666666666674) [Next, we'll compare three techniques for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=89) [object initialization. We'll also cover](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=91.80000000000001) [how to instantiate related objects,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=94.13333333333335) [including a technique called lazy loading.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=96.41176470588235) [And we'll look at null checking and why](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=98.88235294117644) [that is important, including the new](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=102.17647058823522) [null-conditional operator in C# 6. 0.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=105) [We'll conclude with a set of frequently](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=108) [asked questions. These are the types of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=110.57894736842103) [questions that you may see in a C# programming interview. Let's get started.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=0&mode=live&start=113.15789473684205)

[References and Using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live)

[If we want a class in one component, such](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=1.654) [as our Product class, to access a class in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=5.082571428571429) [the same component, such as our Vendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=8.511142857142861) [class, we simply create an instance of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=11.19246153846154) [class. But if we want a class in one](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=14.26938461538462) [component, such as our Product class in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=16.939714285714285) [the business logic component to access a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=18.939714285714278) [class from a different component, such as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=21.03495238095238) [our Email class in the common code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=23.701619047619037) [library, we first need to tell our current](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=26.368285714285694) [component how to find the other component.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=29.554) [We do this by defining a reference to that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=32.704) [other component. In our example, a class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=36.754000000000026) [in the Acme. Biz component wants to use a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=39.90400000000002) [class in the Acme. Common component. So](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=43.95400000000004) [the Acme. Biz component needs to set a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=47.12066666666667) [reference to the Acme. Common component.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=50.85400000000002) [Once the reference is in place, we can use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=53.654) [any accessible class within the component.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=57.25399999999999) [So our Product class can access the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=59.654) [Logging or Email classes. But to use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=62.7651111111111) [classes in another component, the Product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=65.87622222222221) [class must specify the fully qualified](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=68.529) [class name. That means the full component](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=71.154) [name, plus the class name. To simplify the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=74.2165) [code, we can optionally define a using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=77.92066666666668) [directive. By specifying a using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=81.18733333333336) [directive, we can use the class without](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=83.36828571428572) [having to fully qualify its name with a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=86.36828571428573) [namespace name. Let's see how to do these](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=89.79685714285718) [steps with a demo. We are back in Visual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=93.05400000000003) [Studio with both the Product and Vendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=96.79685714285715) [classes open. Since the last demo, I added](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=99.79685714285716) [a C# region directive around some of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=102.48008695652172) [code so we can focus only on the method.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=104.91486956521734) [I'll close the constructor region and I'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=107.654) [close the properties region. That's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=110.83581818181817) [better. Notice that both the Product class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=113.06576470588234) [and the Vendor class are in the same](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=115.94811764705878) [namespace. If we want to use our Vendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=119.24223529411756) [class from our Product class, we can do](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=121.48008695652173) [that without the need for a reference or a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=123.56704347826086) [using directive. We can simply create an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=126.12458823529411) [instance of the Vendor class and call its](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=129.41870588235292) [members. Let's try this out in our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=133.18341176470585) [SayHello method. So the first step is to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=135.65400000000005) [define an object variable, and we'll set](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=138.3206666666668) [that equal to a new instance of the Vendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=140.654) [class. Next, we can call its members.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=144.5915) [Notice again we have IntelliSense here](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=147.654) [listing all of the available properties](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=149.9873333333333) [and methods, and we can type in a message.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=152.32066666666663) [So that's all there is to it. Again, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=155.65400000000002) [can do this because the Product class and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=158.6540000000001) [Vendor class are within the same](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=161.32066666666685) [namespace. Let's say that the Product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=164.28557894736835) [class wants to also use the EmailService](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=167.44347368421037) [class. Notice that the Product class and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=171.12768421052607) [the EmailService class are in two](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=174.654) [different namespaces. Let's try to create](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=177.654) [an instance of the EmailService class in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=180.08257142857144) [the Product class. We start by declaring](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=182.58257142857147) [an object variable, and then we create a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=185.06576470588232) [new instance of the class. Notice that the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=187.88929411764695) [EmailService does not appear in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=190.79685714285714) [IntelliSense, and if we try to use it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=192.70161904761903) [anyway, we see an error. The type or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=195.74923809523807) [namespace name 'EmailService' could not be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=198.854) [found. Are you missing a using directive](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=201.25400000000005) [or an assembly reference? So the error](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=204.0540000000001) [here tells us what's wrong. To add a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=206.88127272727272) [reference, first open the node for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=210.15399999999997) [project in Solution Explorer. This is the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=213.0176363636363) [project that wants to use a class from the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=215.72542857142858) [other component. In this example, our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=218.93971428571433) [Product class wants to use another class,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=221.25400000000002) [and the Product class is in the Acme. Biz](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=224.05400000000006) [project, so the Acme. Biz project is the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=227.654) [node we need. We already have that node](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=231.41870588235292) [open. Under that node, right-click on](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=235.18341176470585) [References and select Add Reference.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=238.65399999999997) [Ensure the Projects node is selected on](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=241.654) [the left, then add a check next to every](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=243.86452631578953) [component that this component wants to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=246.7066315789475) [access. In this case, we want to check](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=249.03861538461535) [Acme. Common. That is the component that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=252.73092307692298) [contains the EmailService class that we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=255.4397142857143) [want to use. This component's actually](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=257.5825714285713) [already checked here, because we are using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=259.70400000000006) [it in the Vendor class to send the welcome](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=262.1540000000002) [email. So we'll close this dialog. If we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=265.3040000000004) [open the References node, we can see that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=268.98733333333337) [the Acme. Common reference is here. But](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=272.7968571428572) [why then do we have this error? That's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=276.004) [because Visual Studio does not know which](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=278.8040000000002) [component it should use to locate the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=281.25400000000036) [EmailService. We have 2 choices for fixing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=283.7592631578947) [this error, and both choices are listed if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=286.3382105263156) [we use the quick actions indicator shown](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=289.2855789473681) [in Visual Studio 2015 with the light bulb](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=292.05399999999986) [icon. We can either change this code line](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=295.2539999999997) [to use the fully qualified class name,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=298.7651111111112) [including the namespace name, or we can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=301.8762222222224) [add a using directive to the project.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=304.8539999999999) [Let's select add a using. The using then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=307.65399999999977) [appears at the top of the code file. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=310.98733333333337) [using directive specifies the namespace](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=314.9873333333335) [containing the classes we wish to access.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=317.20955555555577) [The using directive allows us to use any](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=319.86452631578936) [class from the namespace without having to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=322.81189473684185) [fully qualify its name with the namespace](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=325.4159047619048) [name. Notice now that our error is gone](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=328.08257142857167) [and we can use the EmailService. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=331.13019047619093) [call the SendMessage method. Notice we now](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=334.40399999999994) [get IntelliSense. The SendMessage method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=338.48733333333314) [wants a subject for the email, the message](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=341.24223529411756) [itself, we'll just send the ProductName,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=345.4775294117644) [and the recipient. We'll send it to Sales.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=348.654) [What about static classes? Let's look at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=351.9873333333335) [the LoggingServices class. As we saw in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=355.0750526315789) [the last module, the LoggingService is a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=358.390842105263) [static class. Static classes work the same](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=361.7066315789471) [way. We have to first set a reference to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=364.2329473684211) [the component containing the static class,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=367.07505263157907) [and then specify a using directive for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=369.19945454545456) [component namespace. Let's use this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=373.56309090909104) [LoggingService that is in the common code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=375.9665) [library component from the Product class.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=379.029) [We already have a reference to the common](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=381.654) [code library component, as we can see](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=383.835818181818) [here, so we don't need to do that step](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=385.7449090909088) [again. And because we already have the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=388.6013684210526) [using in place, we can just use the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=391.9171578947367) [LoggingService class. Since the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=395.7066315789471) [LoggingService is a static class, we don't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=397.404) [create an instance using the new keyword.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=400.029) [Rather, we access its members using the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=402.654) [class name. So that's all there is to it.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=406.154) [In C# 6. 0, there is a new feature of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=410.654) [using directive. We can add the static](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=414.4800869565215) [keyword to the using directive. Using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=416.91486956521703) [static allows us to access the static](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=419.004) [members of a type without having to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=421.4540000000002) [qualify the member with the namespace or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=423.90400000000034) [the class name. So let's add a second](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=426.7128235294117) [using and try out the using static. So the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=430.94811764705855) [syntax is using static, the namespace](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=435.8847692307693) [name, and the class name. This allows us](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=439.57707692307713) [to call the members of the LoggingService](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=443.8892941176471) [class without even specifying the class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=446.77164705882376) [name. So let's go down to where we're](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=449.242235294118) [using it and remove the class name. We can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=452.1539999999998) [see that Visual Studio understands this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=455.4232307692307) [method without the class name. So that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=457.73092307692286) [could be cool, or it could be confusing.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=460.3206666666666) [Just looking at this code, it is not clear](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=462.98733333333314) [where the LogAction is coming from. Is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=465.98733333333297) [using static a fun new feature in good](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=469.154) [practice? Or does it make the code harder](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=473.154) [to understand? What are your thoughts?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=476.3463076923075) [Okay, so we've covered a lot of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=478.654) [information in this demo. We saw that for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=480.9873333333332) [a class to access another class that is in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=483.6539999999997) [a different component, the original](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=486.9665) [component needs a reference to the other](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=489.154) [component. And we saw that the using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=492.2165) [directive prevents the need to fully](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=494.83581818181824) [qualify the name of the class with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=497.0176363636365) [namespace name. Lastly, we examined the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=499.9267272727275) [new using static feature that allows us to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=502.12768421052624) [call static methods of a class without](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=505.0750526315787) [specifying the namespace or class name.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=507.654) [Before moving on, let's look at some best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=510.83047058823513) [practices for references and the using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=515.065764705882) [directive. Do take care when defining](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=518.154) [references between the components of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=521.154) [application. All references must be only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=524.154) [one way. As we saw in the demo, we created](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=526.4721818181819) [a reference from the Acme. Biz project to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=530.1085454545456) [the Acme. Common project, so that our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=533.1834117647059) [Product class could use the EmailService](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=536.8892941176468) [and LoggingService classes. If we would](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=540.065764705882) [then try to set a reference back from the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=542.8539999999999) [Acme. Common project to the Acme. Biz](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=546.4539999999997) [project, we'd get a circular dependency](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=549.2539999999996) [error, and Visual Studio wouldn't let us](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=551.1539999999998) [do it, so we need to ensure we organize](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=553.2539999999995) [our components well, so that all needed](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=556.1924615384615) [references are one way only. When using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=559.9616923076924) [classes in other namespace, do take](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=563.529) [advantage of the using directive whenever](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=566.154) [possible to reference a class by its name](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=568.779) [without its fully qualified namespace](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=572.1539999999998) [name. This makes the code easier to read.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=574.2373333333329) [Avoid excessive use of the using static](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=577.9206666666669) [directive. Excessive use of the using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=581.1873333333338) [static can make the code harder to read](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=583.5984444444446) [and comprehend, because the associated](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=586.7095555555559) [class members aren't prefixed with a class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=588.654) [name. Now that we can access the class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=591.1817777777776) [from any component, let's dive deeper into using a class.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=1&mode=live&start=594.0706666666663)

[Using a Class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live)

[We have been using our classes starting](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=1.72) [with the very first demo in this course,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=4.17) [but let's do a quick overview of how to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=6.969999999999997) [access class members and cover some](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=10.90181818181818) [terminology. How we access class members](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=14.17454545454545) [depends on whether or not the class is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=16.505714285714287) [static. We access members of a non-static](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=19.36285714285715) [class by first creating an instance of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=22.51999999999999) [class. We create an instance of a class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=26.25333333333331) [using the new keyword. This code calls the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=29.442222222222224) [default class constructor, and returns a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=32.553333333333335) [created instance of the class. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=34.955294117647064) [resulting instance is normally assigned to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=37.425882352941194) [a variable, in this case, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=39.896470588235324) [currentProduct variable. This variable is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=42.47) [often called the instance or object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=44.6575) [variable. We can then use the resulting](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=47.2825) [object variable to access the members of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=50.11999999999999) [the class. In this case, we are calling](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=52.91999999999998) [the SayHello method. To clarify the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=55.93052631578949) [terminology here, the class is the code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=58.14105263157899) [that we wrote. We used the new keyword to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=60.72) [create an object, which is an instance of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=64.5094736842105) [the class. That object is stored in an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=67.87789473684207) [object variable. For a static class, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=70.71999999999997) [simply use the class name to call the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=73.05333333333327) [members of the class. We don't create an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=75.72) [instance of the class, so there is no](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=79.52952380952385) [object and no object variable. To ensure](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=83.3390476190477) [we are clear on the terminology,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=86.65333333333334) [conceptually an object represents one](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=89.45333333333335) [specific thing, such as a hammer or a saw.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=91.78666666666669) [A class represents things of the same](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=95.8311111111111) [type, such as Product. A class defines the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=98.9422222222222) [template specifying the data and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=102.36705882352939) [processing associated with all things of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=104.42588235294113) [that type, such as a product ID, product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=106.89647058823522) [name, and description properties, and a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=110.19058823529409) [calculate quantity on hand method. An](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=112.66117647058817) [object defines one thing created from that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=115.19058823529411) [template. Each object has specific values](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=118.48470588235293) [for the properties, such as a product name](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=121.30823529411762) [of hammer, and each object can invoke the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=124.72000000000003) [defined methods. A class is created at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=127.92000000000007) [development time by writing code. An](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=130.96999999999994) [object is created at runtime with the new](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=133.66999999999987) [keyword. Because a static class cannot be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=137.26999999999978) [instantiated, a static class does not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=141.1485714285715) [create objects. Now let's look at ways to initialize our objects.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=2&mode=live&start=144.577142857143)

[Object Initialization](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live)

[When we create an object from a class, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=2.128) [often want to initialize that object with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=5.128) [some data. There are several ways to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=7.461333333333331) [initialize an object. We can set each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=9.877999999999998) [property of the object, we can use a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=12.327999999999996) [parameterized constructor, or we can use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=15.128) [object initializers. Let's look at each of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=18.128) [these techniques in detail with a demo. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=21.628) [are back in Visual Studio. Let's use our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=27.478) [Product class unit tests that we created](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=30.278000000000013) [earlier in this course to try out the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=32.72800000000002) [different ways to initialize our objects.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=35.528000000000006) [In this first test, we used the setting](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=37.628000000000014) [properties technique. We created a new](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=40.428000000000026) [instance of the class using the default](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=42.528000000000006) [constructor, and set the value for each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=44.978000000000016) [property by calling the property setter.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=47.428000000000026) [Moving down to the second test, we used](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=50.245647058823536) [the parameterized constructor technique](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=54.48094117647061) [here. We created a new instance of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=56.598588235294145) [class and passed in values for each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=59.92799999999999) [property. The parameterized constructor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=62.72799999999998) [then initializes each of the properties](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=64.878) [with these values. Now let's add another](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=68.37799999999997) [test to demonstrate the object initializer](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=71.94618181818181) [syntax. I'll paste in the code and we can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=74.67345454545453) [talk through it. The syntax here for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=78.03709090909088) [object intitializer is a little different.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=80.94618181818176) [This code defines a new product instance](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=83.128) [and uses curly brace syntax to succinctly](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=86.628) [define property name and value pairs. At](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=90.128) [runtime, this code invokes the default](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=93.51688888888889) [constructor, then sets the values of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=95.8502222222222) [properties on the object as defined here.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=98.5724444444444) [It's basically a shortcut of the setting](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=101.4405) [properties technique we looked at first.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=104.503) [With object initializers, we can set the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=107.128) [values for any of the object properties](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=110.27800000000002) [without the need for parameterized](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=113.42800000000004) [constructors. This is especially useful if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=115.67800000000005) [we want to set different combinations of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=118.43569230769234) [properties. So these are the three ways to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=121.6664615384616) [initialize our objects. Setting](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=127.378) [properties, parameterized constructor, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=130.378) [ObjectInitializer. But which technique](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=133.378) [should we use when? Let's look at best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=135.84228571428574) [practices and compare the three object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=140.128) [initialization techniques. It's best to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=143.128) [set properties when populating an object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=145.37799999999996) [from database values. Using the properties](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=147.8779999999999) [makes it easier to perform any data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=150.41371428571424) [conversion from database types. And if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=153.41371428571415) [anything goes wrong, the debugger will](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=155.95152941176468) [point us to the exact property causing the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=158.42211764705877) [problem. Setting properties is also best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=161.71623529411755) [when modifying property values anytime](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=165.0446666666667) [after initialization. Parameterized](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=167.9613333333334) [constructors are great when setting the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=169.67345454545452) [basic set of properties. This can be used](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=172.9461818181817) [to initialize an object to a valid state.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=176.68355555555553) [Object initializers are best used when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=179.79466666666661) [readability is important, and when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=182.128) [initializing a subset or superset of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=185.0446666666667) [properties. Each of these techniques gets](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=188.54466666666676) [the job done, so use the one that works](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=190.94618181818186) [best for you based on this specific](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=194.21890909090922) [scenario. But what if our object depends](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=196.76436363636384) [on other objects? How and when do we initialize those?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=3&mode=live&start=203.128)

[Instantiating Related Objects](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live)

[Objects in our application frequently](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=2.25) [depend on other objects. For example, a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=5.583333333333334) [product object may depend upon a vendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=9.392857142857144) [object to provide information on the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=12.059523809523814) [vendor that sells that product. An order](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=14.345238095238102) [object may depend on both a vendor object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=16.977272727272727) [to define who the order is sent to, and a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=19.886363636363633) [product object to define which product to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=23.522727272727266) [order from that vendor. How these related](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=26.472222222222214) [are instantiated depends on how the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=29.583333333333314) [related objects are used. There are three](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=32.25) [common usage scenarios when working with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=37.61363636363636) [related objects. In some cases, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=40.34090909090908) [related object may only be needed in one](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=42.75) [method of the class. For example, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=45.75) [Product class may only need to use the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=48.35526315789475) [Vendor class when looking up the vendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=51.302631578947405) [name. In other cases, the related object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=53.88157894736848) [is always needed by the class. For](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=56.749999999999986) [example, the vendor associated with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=59.65) [product is always included with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=62.04999999999999) [product information, or the related object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=64.44999999999999) [is sometimes needed by the class. For](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=66.7236842105263) [example, the vendor associated with a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=69.30263157894733) [product is only needed if the inventory of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=71.51315789473678) [that product is low. Let's consider each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=75.09210526315789) [of these scenarios in a demo. Here we are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=78.4078947368421) [back in Visual Studio. For the first](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=82.29999999999998) [scenario, let's say that our product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=84.74999999999994) [object only needs a vendor object in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=86.84999999999991) [SayHello method, so here in that method we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=90.06818181818181) [create the instance of the vendor and use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=93.70454545454544) [its members. Easy enough. So when an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=97.34090909090907) [object is only needed in one method of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=99.99999999999997) [class, instantiate the object in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=103.14999999999992) [method that needs it. But if the Product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=105.25) [class exposes vendor data as part of its](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=107.91666666666663) [data, or if the vendor associated with a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=110.58333333333326) [product is needed in several methods, then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=113.45000000000002) [we need a different approach. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=116.25000000000006) [comment this out. To ensure all of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=118.63888888888889) [Product class can access the instance of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=121.74999999999997) [the vendor, let's create a field and a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=124.47222222222217) [property for the vendor. We'll open the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=127.77631578947367) [properties region and we'll use the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=130.7236842105264) [propfull snippet that we've used](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=133.25) [previously, propfull tab tab, the type of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=135.75) [the property is vendor. Recall from our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=139.25) [earlier discussion that a class defines a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=142.49999999999997) [data type. We'll name the field](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=145.41666666666657) [productVendor and name the property the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=147.75) [same name with a capital P. So now any](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=150) [code that creates a product object will](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=153.51315789473688) [have access to the vendor associated with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=156.4605263157896) [the product. Let's go to our unit tests](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=159.4078947368423) [and give this a try. In the SayHello test,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=162.53571428571428) [let's set the vendor's company name. We'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=165.9642857142857) [use the currentProduct object variable,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=168.82142857142858) [access the ProductVendor property, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=171.6785714285715) [access the vendor's CompanyName property.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=174.53571428571442) [Let's set it to some name. Now let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=177.5) [right-click and run the selected test. And](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=182.5) [we see that the test fails. Clicking on](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=186.625) [the test, we can see the error. Object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=189.625) [reference not set to an instance of an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=192.6) [object. This is a frequently seen error](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=195.39999999999995) [that means we have used the object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=197.8499999999999) [variable for an object before we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=200.65) [instantiated or newed up that object.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=203.45000000000002) [Clicking on the link here, we can go to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=206.25) [the line causing the error.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=209.46428571428575) [Unsurprisingly, it is the line that is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=211.25) [setting the vendor's name. The problem is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=213.79545454545462) [that we did not instantiate the vendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=216.41666666666666) [object in the Product class, so the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=219.13888888888886) [ProductVendor object variable is not set](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=221.86111111111106) [to an instance of an object. Let's go back](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=224.19444444444443) [to the Product class. Here's our object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=227.6944444444444) [variable, but where should we instantiate](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=230.75) [the vendor object? One common approach is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=233.75) [to instantiate related objects in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=237.7954545454545) [constructor. So when the product object is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=241.61363636363626) [constructed, its related vendor object is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=244.65000000000003) [constructed as well. Let's do that. We'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=247.05000000000007) [go up to the constructors, and let's be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=249.85000000000002) [sure to initialize the vendor object in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=253.05000000000007) [the default constructor, so it is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=255.8500000000001) [instantiated both when using the default](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=258.4375) [constructor and when using the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=261.0625) [parameterized constructor through](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=263.25) [constructor chaining. So here we're going](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=265.125) [to set this. ProductVendor = new Vendor.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=268.875) [So when the product is constructed, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=273.25) [vendor is also constructed. If we rerun](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=276.4318181818181) [our test, we'll see that it passes. So for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=279.6136363636363) [the scenario when the object is always or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=283.70454545454527) [very often needed by the class, define a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=287.3409090909088) [property for the object variable in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=290.72058823529426) [class that needs it. In this example, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=293.6029411764709) [created a ProductVendor property. Then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=297) [instantiate the related object by creating](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=299.1875) [the instance in the constructor. That way](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=301.8125) [the vendor instance is created when the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=305.42647058823513) [product instance is created. But what if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=309.1323529411761) [the product object only needs the vendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=312.5625) [object sometimes, our third usage](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=315.625) [scenario? It seems a waste to create a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=317.8125) [vendor instance every time that a product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=320.5833333333332) [instance is created in this third](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=322.9166666666664) [scenario. Why not wait to create the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=324.9166666666663) [vendor instance until we really need it?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=327.55769230769215) [We can use a technique called lazy](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=330.25) [loading. With lazy loading, we wait to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=332.8289473684209) [load or instantiate a related object until](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=335.40789473684185) [it is actually needed. To try out the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=338.04999999999995) [scenario, we can comment out the code in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=341.2499999999998) [the constructor. That way the related](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=344.4499999999996) [vendor object is not created immediately](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=347) [when the product object is created. And](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=349.625) [instead, we'll create the vendor instance](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=352.6136363636364) [when it is needed. But how do we know when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=354.7954545454546) [it is needed? If the ProductVendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=358.77631578947376) [property getter is called, then the vendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=361.3026315789475) [instance must be needed, so let's put the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=364.25) [object instantiation there. Let's start by](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=368.6136363636365) [reformatting this getter a bit so we can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=371.24999999999994) [add more code here. In the property](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=373.91666666666646) [getter, we first need to check whether the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=376.24999999999994) [productVendor backing field is not yet](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=378.91666666666646) [set, so we check for a null value. If the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=380.91666666666634) [productVendor object variable is null, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=385.75) [create the instance. So whenever any code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=388.75) [requests the productVendor, if the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=391.9642857142858) [productVendor has not been initialized, it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=394.107142857143) [is initialized and returned. Notice that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=396.67105263157896) [we are working with the backing field](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=399.1973684210527) [here, not the ProductVendor property. So](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=402.14473684210543) [when any code requests the ProductVendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=404.71153846153845) [property, the backing field is checked. If](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=407.48076923076917) [it is null, a new vendor instance is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=410.65) [created, the instance is then returned.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=413.8499999999998) [Let's run our unit test again, and we can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=416.25) [see that it still passes. So if an object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=419.4642857142855) [is sometimes needed by the class, define a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=422.58333333333326) [property for the object variable in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=425.2499999999998) [class that needs it, as we did here with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=427.583333333333) [the productVendor variable. Then use lazy](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=430.9722222222224) [loading to instantiate the related object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=433.3055555555559) [in the getter of that property. That way](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=435.7) [the related object instance is created](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=439.2999999999999) [only when it is requested. Now let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=441.99999999999983) [compare the three scenarios for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=445.45000000000005) [instantiating related objects. When an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=448.45000000000016) [object is only needed in one method of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=450.9868421052631) [class, instantiate the object by creating](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=454.30263157894717) [the instance in the method that needs it.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=456.51315789473654) [When the object is always needed by the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=459.2499999999999) [class, define a property for the object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=461.9166666666664) [variable in the class that needs it, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=464.25) [instantiate the object in the class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=467.4499999999998) [constructor. That way the related instance](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=469.8499999999997) [is created when the object instance is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=472.1730769230768) [created. When an object is sometimes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=474.8653846153843) [needed by the class, define a property for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=476.75000000000006) [the object variable in the class that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=479.15000000000015) [needs it, and instantiate the object in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=481.25) [the getter of that property. That way the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=484.75) [related object instance is created when it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=488.24999999999994) [is requested. This technique is called](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=490.58333333333314) [lazy loading. So how we instantiate](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=493.1323529411766) [related objects is entirely dependent upon](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=495.95588235294144) [how the code will use them. As we saw in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=498.7794117647063) [the demo, when working with related](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=502.625) [objects, we need to be watchful for null](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=504.875) [references. Let's look further at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=507.875) [techniques for null checking our object variables.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=4&mode=live&start=512.25)

[Null Checking](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live)

[When working with objects, we often store](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=3.243) [the instance in an object variable.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=6.204538461538463) [Sometimes that object variable is a local](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=8.743) [variable, such as the vendor variable in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=11.8055) [this example. In this case, we may not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=14.868) [need to check that the vendor variable is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=17.742999999999995) [null, because we are creating the instance](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=20.409666666666652) [right here, and no external code can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=22.743) [modify or clear this instance. Sometimes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=26.243) [we define the object variable as a backing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=29.142999999999997) [field with a property, such as the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=32.34299999999999) [productVendor in this example. In this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=35.14299999999998) [case, the object variable is publicly](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=37.69036842105263) [accessible, so any outside code can create](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=40.53247368421052) [or clear this instance. We must be careful](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=43.84826315789473) [then to check the object variable for a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=47.17157142857142) [null value. Look at this line of code. How](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=50.02871428571425) [many places here can we get a null](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=53.21358823529411) [reference error? If we want to ensure that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=56.03711764705881) [we don't get a null reference error on](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=58.04734782608697) [this line of code, we need to ensure that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=59.78647826086959) [currentProduct is not null, and that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=61.743) [ProductVendor is not null. The classic way](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=64.743) [to prevent a null reference error is to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=67.80182352941178) [add an if statement, like this. If the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=70.62535294117653) [currentProduct object variable is not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=73.618) [null, and the ProductVendor property of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=75.8055) [the object variable is not null, then we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=78.4305) [can successfully return the company name.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=81.68744444444442) [But considering how often we use object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=84.02077777777774) [variables, this technique can get tedious,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=86.743) [and it makes the code harder to read. When](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=89.31442857142858) [using C# 6. 0, which comes with Visual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=93.193) [Studio 2015, there is a better way to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=96.79300000000002) [check for nulls. C# 6. 0 introduced the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=100.39300000000004) [null-conditional operator. The question](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=104.243) [mark followed by a dot is the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=106.243) [null-conditioner operator. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=109.743) [null-conditional operator removes the need](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=111.20966666666666) [for explicit null checks when working with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=113.543) [nullable variables, such as object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=116.80966666666669) [variables and strings. It can be used](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=118.79299999999998) [anytime we want to check for a null before](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=121.24299999999994) [performing a member access with the dot](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=124.39299999999989) [operator. The null-conditional operator is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=127.743) [sometimes called the Elvis operator. If](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=130.243) [you look at the null-conditional operator,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=133.0611818181818) [you may be able to see the two eyes and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=134.9702727272727) [swoop of the pompadour hairstyle. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=138.15209090909082) [null-conditional operator works as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=140.13188888888888) [follows. If the variable on the left side](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=141.68744444444442) [of the operator is null, the expression is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=144.7985555555555) [null, and the expression is not processed](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=148.1066363636364) [further. If the variable on the left side](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=151.28845454545467) [of the operator is not null, evaluation of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=154.40966666666665) [the expression continues with the dot. An](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=157.4572857142857) [easy way to remember this is if null then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=160.143) [null, if not, then dot. Looking at our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=163.74300000000005) [example, if the currentProduct object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=167.0555) [variable is null, then the expression is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=169.243) [null. If the currentProduct object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=172.3055) [variable is not null, it uses the dot and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=174.3900588235294) [performs the member access. If the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=178.09594117647052) [ProductVendor object variable is null,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=180.40966666666668) [then the expression is null. If the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=182.0763333333334) [ProductVendor object variable is not null,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=184.44299999999998) [then it uses the dot and performs the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=186.54299999999995) [member access to get the CompanyName](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=189.3429999999999) [property. By using the null-conditional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=191.618) [operator, we can write less code to handle](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=193.8055) [null checks, and that code doesn't get](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=197.3055) [lost among a slew of if statements. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=200.05069230769232) [try this out. Here we are back in Visual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=203.493) [Studio. Let's write another product unit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=208.5122307692307) [test. I'll paste in the code without the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=211.28146153846143) [null checks first. Here the code is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=213.6874444444444) [explicitly setting the currentProduct to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=215.6318888888888) [null, and then attempting to access the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=217.343) [CompanyName property. Let's run this test.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=221.54299999999995) [Right-click and select Run Tests. Without](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=224.743) [the null checks, it should generate an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=227.743) [error. We can see that error here. It's a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=231.243) [null reference exception, just as we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=235.47633333333334) [expected. Now we could use if statements](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=238.27633333333335) [around this line, but since we're using C#](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=241.3144285714285) [6. 0, let's insert the null-conditional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=244.74299999999982) [operators. We'll want one after](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=247.31442857142832) [currentProduct and after ProductVendor.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=249.89684615384618) [Now let's rerun the test. And it passes.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=252.05069230769237) [If you are using C# 6. 0, take advantage](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=255.943) [of the null-conditional operator to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=259.54299999999984) [perform null checking. This helps prevent](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=261.5429999999997) [null reference errors without a lot of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=263.99300000000005) [extra code. Now let's conclude this module with some frequently asked questions.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=5&mode=live&start=266.90966666666685)

[Frequently Asked Questions](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live)

[As a review, let's look at some frequently](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=2) [asked questions. These are the types of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=4.986666666666667) [questions often used in job interviews.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=7.599999999999999) [What is the difference between an object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=9.84) [and a class? This was one of the first](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=11.940000000000005) [questions my company would ask a potential](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=14.640000000000011) [candidate, because it would provide an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=17.251764705882348) [indication of the candidate's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=20.075294117647044) [understanding of object-oriented](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=21.957647058823508) [programming. A class is a template that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=23.369411764705855) [specifies the data and operations for an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=26.411428571428562) [entity. For example, a Product class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=29.41142857142855) [defines the properties and methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=31.98285714285715) [appropriate for managing products. An](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=34.1257142857143) [object is an instance of that class,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=36.17333333333334) [created at runtime using the new keyword.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=38.50666666666669) [For example, we could create an instance](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=40.84) [of the Product class and define a hammer](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=43.38545454545457) [with a specific product ID and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=46.294545454545506) [description. What is lazy loading and when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=48.47636363636371) [would you use it? Lazy loading involves](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=51.6635294117647) [instantiating related objects when they](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=54.95764705882351) [are needed, and not before. This often](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=57.290000000000006) [involves creating the instance in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=60.440000000000026) [property getter for the related object.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=63.14000000000004) [That way when any code requests the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=65.84) [instance, it is created as needed. In this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=69.60923076923073) [module, we saw how a class in one](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=73.50666666666666) [component can access a class in another](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=76.17333333333329) [component by setting a reference to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=78.50666666666659) [other component. And we saw how to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=80.78736842105262) [leverage the using directive, so we don't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=82.99789473684206) [need to include the namespace with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=85.2084210526315) [class name. We also looked at the new C#](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=87.7447619047619) [6. 0 using static feature that allows us](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=91.17333333333332) [to use static class members without the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=94.25666666666667) [namespace or class name. We then reviewed](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=97.17333333333337) [how to use a class and create an object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=99.98285714285714) [from both a normal class and a static](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=103.41142857142856) [class. Next we covered three techniques](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=106.4590476190476) [for initializing objects with data. We can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=109.34) [create an instance and set properties, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=112.84) [can invoke a parameterized constructor, or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=116.34) [we can use object initializers. Often an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=119.34) [object needs to instantiate related](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=122.6635294117647) [objects. Where we instantiate a related](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=124.72235294117644) [object depends on how the related object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=127.19294117647053) [is used. We saw how to instantiate a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=130.00666666666666) [related object local to a specific method.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=133.11777777777775) [We looked at how to define a property for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=135.84) [the related object and instantiate it in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=138.68210526315798) [the original object's constructor, so the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=140.89263157894752) [related object is always available. And we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=143.25176470588235) [used lazy loading to instantiate the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=146.54588235294116) [related object in its property getter, so](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=149.36941176470586) [that the related object is only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=152.3105882352941) [instantiated when it is needed. Lastly, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=154.78117647058818) [looked at null checking, including a look](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=157.7775) [at the new null-conditional operator in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=161.05875) [C#. Next up, we'll take a closer look at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=163.87125) [how to define appropriate fields in our classes.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m4&clip=6&mode=live&start=172.34)

[Defining Fields Appropriately](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live)

[Introduction](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live)

[Fields hold the data in our application,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=0) [so defining fields appropriately helps](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=4.529411764705882) [ensure that data is correctly identified](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=7.764705882352943) [and retained. Welcome back to C# Best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=11.6) [Practices: Improving on the Basics from](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=15.799999999999997) [Pluralsight. My name is Deborah Kurata,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=19.400000000000006) [and this module covers best practices for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=22.35294117647058) [defining fields in our classes. Fields can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=25.64705882352939) [be variables or constants, read-only or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=29.375) [read-write, public or private, built-in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=33.5) [types or types defined by the classes we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=36.9375) [write. In this module, we'll start with a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=41.5) [more detailed look at backing fields and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=44.882352941176485) [introduce nullable types. We'll cover](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=47.76470588235297) [constants and read-only fields. Then,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=50.14285714285714) [we'll compare and contrast constant and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=52.999999999999986) [read-only, and conclude with a set of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=56.4285714285714) [frequently asked questions. These are the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=58.79999999999998) [types of questions you may see in a C# programming interview. Let's get started.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=0&mode=live&start=60.599999999999966)

[Backing Fields](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live)

[Backing fields are the most common types](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=1.967) [of fields that we use in our classes. A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=4.3003333333333345) [backing field is simply a variable in a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=7.421545454545454) [class that holds the data for each object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=11.057909090909092) [we instantiate from that class. Because](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=14.694272727272732) [much of the data for our application,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=17.395571428571426) [including company proprietary and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=20.395571428571415) [operational data, is stored in backing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=22.109857142857123) [fields, one key best practice is to follow](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=24.849352941176463) [the principle of data encapsulation,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=28.61405882352939) [otherwise known as information hiding. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=30.967) [principle of data encapsulation specifies](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=33.967) [that an object's data should be accessible](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=36.467) [only to that object. So the backing fields](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=39.967) [that hold that data are private. The data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=43.967) [is accessible outside of the class only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=47.82414285714286) [through property getter and setters. We'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=50.824142857142874) [talk more about properties in the next](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=53.41144444444444) [module. Here are the backing fields for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=56.52255555555554) [the product description, ID, name, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=59.790529411764695) [vendor that supplies the product. Each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=62.61405882352939) [backing field has an optional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=65.43366666666667) [accessibility modifier. As per the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=67.76700000000001) [principle of data encapsulation, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=70.10033333333335) [accessibility modifier on backing fields](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=72.52255555555556) [is normally private. Next is the data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=75.30033333333334) [type. The data type can be a built-in. NET](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=78.35830434782606) [type, such as int or string, or it can be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=81.48873913043471) [a custom type defined by a class, such as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=84.967) [the vendor type used here. After the data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=88.18128571428575) [type is the field name. The field name is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=91.01699999999998) [normally in camelCase with the first](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=94.16699999999993) [letter of the name in lowercase, and each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=96.2669999999999) [appended word capitalized. Optionally we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=99.43758823529409) [can initialize the value of the field in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=101.49641176470583) [the declaration. For example, we could](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=105.16699999999999) [specify a default description of coming](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=108.76699999999995) [soon. We've seen demos of backing fields](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=112.36699999999992) [previously in this course, so let's move](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=114.86173684210523) [right on to some best practices when using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=117.07226315789467) [backing fields. Do use a meaningful field](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=120.967) [name. Do use camelCasing. Avoid single](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=125.63366666666666) [character or abbreviated names. Do use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=128.83366666666666) [private accessibility for backing fields](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=132.05790909090908) [to keep them private. Do use properties to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=134.78518181818174) [provide access to the fields as needed.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=138.86173684210533) [Avoid initializing the field to its](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=142.17752631578963) [default value. C# automatically sets each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=145.0196315789476) [field to a default value appropriate for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=147.967) [its data type. For example, integers are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=151.467) [initialized to 0, Booleans are initialized](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=154.717) [to false, and strings and object variables](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=157.342) [are initialized to null, so there is no](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=160.467) [need to explicitly initialize fields to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=164.467) [their default values. All of the data for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=167.467) [our objects are stored in backing fields,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=170.63366666666673) [so we will use them often. One thing we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=172.96700000000013) [have not yet discussed is nullable types. Let's look at what those are now.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=1&mode=live&start=177.967)

[Nullable Types](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live)

[A nullable type is a value type, such as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=3.067) [an integer, decimal or date, that allows](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=7.567) [definition of a value or null. A nullable](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=11.067) [type is specified by adding a question](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=14.817) [mark as the suffix on the type. A nullable](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=17.442) [type is useful if the code needs to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=20.909105263157898) [distinguish between not set and the type's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=24.277526315789487) [default value. For example, if we declared](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=27.224894736842128) [the cost as a decimal value and that value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=29.885181818181817) [was 0, does that mean that the cost was](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=33.1579090909091) [not yet set? Or that the cost was set and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=36.442) [the actual cost is 0? A nullable type](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=40.192) [helps us make that distinction. This may](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=43.467000000000006) [be clear in a demo. Here we are back in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=46.733666666666686) [Visual Studio once again with the Product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=50.85271428571427) [class open. Let's define a property for a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=53.35271428571425) [product availability date. This is the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=56.59331578947367) [date that the product is in stock, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=59.11963157894734) [available to be sold. We'll again use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=62.5045) [propfull tab tab to quickly create the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=65.567) [field. We'll define the field as a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=68.6295) [DateTime and call it availabilityDate. Now](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=72.33972727272727) [let's close this region and modify the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=75.49557142857142) [SayHello method to display the date. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=78.49557142857144) [want to format the date in a short date](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=81.59641176470588) [format, so we'll use the ToShortDateString](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=86.36111764705883) [method. Next we'll need to modify the unit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=89.53758823529414) [test accordingly. Here we need to modify](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=93.3611176470588) [the expected value. We have not set a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=96.65523529411762) [date, so no date should appear here. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=100.31700000000001) [can run the test, and it fails. Looking at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=103.91700000000003) [the test results, we can see that the date](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=108.35271428571427) [appears as 1/1/0001. When an instance of a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=114.13842857142852) [product is created, all of the fields,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=117.83170588235296) [including the availability date field, are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=120.30229411764712) [assigned a default value. As we can see,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=122.62255555555555) [for date data types the default value is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=127.06700000000001) [1/1/0001. We certainly don't want that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=131.51144444444438) [showing up in the UI or stored in our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=134.06700000000004) [database. That's where nullable types can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=137.6670000000001) [help. Let's go back and change the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=140.01144444444444) [availability date to a nullable type. To](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=142.73366666666664) [change the availability date to a nullable](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=145.38518181818182) [type, we just add a question mark to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=147.6124545454545) [end of the data type, and we have to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=150.47609090909083) [change the data type on the associated](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=153.78128571428567) [property as well. Now we see an error](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=156.7812857142856) [here. DateTime? does not have a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=161.5285384615384) [ToShortDateString method. How do we solve](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=165.68238461538448) [this? Well, if we're using C# 6. 0, we can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=168.40033333333338) [use the new null-conditional operator here](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=171.7336666666668) [to handle a null. Simply add a question](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=173.73366666666686) [mark here. Now let's try our unit test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=177.567) [again. And it passes. Now let's go back to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=181.567) [our tests. We'll need to modify all of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=184.976090909091) [other SayHello tests to also include the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=188.24881818181836) [availability on. I'll do that now. With](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=191.1781111111111) [all of our SayHello tests modified, let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=195.0669999999999) [try running all of our unit tests. And](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=198.9558888888887) [they all pass. By using a nullable type,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=202.76699999999994) [the code can now distinguish between not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=206.36699999999985) [set, which is a value of null, and set to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=209.41482608695654) [a default value. Before moving on, let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=212.89308695652184) [take a look at some best practices when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=215.32786956521755) [using nullable types. Do use nullable](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=219.56700000000004) [types with simple types, such as int or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=223.567) [DateTime to distinguish between not set](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=227.567) [and default value. When a nullable type is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=230.567) [not set, it is null. Otherwise, it has a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=234.1722631578948) [value appropriate for its type. Do use the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=237.96173684210544) [properties of the nullable type as needed.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=241.40033333333338) [Nullable types have a HasValue property](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=244.51144444444458) [that returns true if the nullable type has](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=247.17811111111132) [a value. The Value property of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=251.067) [nullable type returns the associated](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=254.567) [underlying value. Avoid nullable types if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=257.067) [they aren't necessary. For example, if the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=259.62255555555566) [code does not distinguish between a null](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=262.34477777777806) [cost and a cost of 0, there is no need to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=265.067) [define the cost as a nullable type.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=268.428111111111) [Nullable types are just another tool in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=270.567) [our toolbox. Use them as needed. So far](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=273.52853846153835) [all of our fields have been variables. What about constants?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=2&mode=live&start=278.067)

[Constants](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live)

[A constant represents information that is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=2.667) [hard-coded into the application. A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=6.266999999999999) [constant is defined in a class and holds a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=9.111444444444444) [hard-coded value that is expected to never](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=13.111444444444446) [change. For example, we can use constants](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=16.22255555555556) [for Pi, the RGB value of red, or the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=19.238428571428564) [number of inches in a meter. A C# constant](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=23.095571428571407) [has some very unique qualities. A constant](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=26.930157894736848) [must be assigned to an expression that can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=29.87752631578949) [be fully evaluated at compile time, so a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=33.24594736842107) [constant can't be assigned to a value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=36.61436842105262) [returned from a method or retrieved from a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=39.56173684210523) [file, nor can it be an object instance.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=43.167) [Think of a constant as a compile-time](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=47.167) [constant value. The compiler compiles the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=50.667) [constant value into every location that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=53.82084615384616) [references the constant. So if we later](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=57.0516153846154) [change the constant in our code, every](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=59.93972727272728) [piece of code that uses the constant would](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=62.16700000000002) [be need to be recompiled and redeployed.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=64.71245454545456) [Constants are by definition static. That](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=68.33366666666669) [means we don't have to create an instance](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=72.00033333333333) [of the class to access them. We instead](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=74.66699999999996) [access them using the class name.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=77.667) [Declaring a constant is a bit different](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=80.667) [from declaring a backing field. Like a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=83.5836666666667) [backing field, a constant often has an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=86.50910526315789) [accessibility modifier, but in many cases,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=89.45647368421051) [the constant is not marked as private. It](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=91.98278947368418) [is often publicly accessible to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=95.84881818181819) [application. Since the value of a constant](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=99.12154545454547) [cannot be changed, a constant needs no](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=101.78464705882357) [property to protect it. A constant must](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=104.25523529411772) [include the const keyword, which defines](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=107.0516153846154) [it as a constant. Then, the data type.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=109.8208461538462) [Because a constant must be assigned to an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=113.00033333333332) [expression that can be evaluated at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=115.66699999999994) [compile time, constants can only be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=117.667) [numbers, Boolean values, or strings. Next](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=121.48518181818184) [is the constant name. Some coding](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=125.05588888888889) [standards suggest that constant names be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=127.3892222222222) [in all uppercase so they stand out in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=129.72255555555552) [code. Current generally accepted coding](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=133.95271428571434) [standards recommend following PascalCasing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=136.80985714285725) [instead. Lastly, a constant must be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=139.0955714285716) [initialized to a value. Unlike other](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=141.8892222222223) [field, which can be declared and not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=144.55588888888903) [initialized, a constant must be declared](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=147.667) [and initialized on the declaration. And](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=150.9397272727272) [since constants are by definition static,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=154.1045) [we can't use the static keyword with a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=156.7295) [constant. Let's give this a try. Here we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=160.2295) [are back in Visual Studio with a Product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=164.50910526315792) [class open. Constants are traditionally](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=167.8775263157896) [inserted above the constructor. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=169.9827894736844) [declare a constant that defines the number](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=172.0516153846154) [of inches in a meter. We'll make the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=174.7439230769231) [constant public, we'll define it as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=178.167) [double, and the value is 39. 37. Now let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=181.167) [see how to use this constant by creating a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=185.28238461538464) [unit test. Let's add a new test to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=188.05161538461553) [product test's file. I'll set up the test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=191.24594736842113) [with a standard structure, Arrange, Act,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=194.19331578947384) [Assert. To arrange the test, we'll set the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=197.00033333333332) [expected result. Let's calculate the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=202.33366666666657) [number of inches in 2 m, so that's 78. 74.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=205.167) [Then we'll act. We'll use the constant to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=210.167) [calculate the number of inches in 2 m.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=213.59007692307694) [Just as with static members, we access](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=216.667) [constants using the class name. Notice](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=220.167) [that the constant appears in IntelliSense](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=223.167) [for the class. Lastly, we'll assert the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=226.167) [result. Now we are ready to run the test.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=229.5131538461538) [Right-click in the test and select Run](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=233.667) [Tests. And we see that it passes. This](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=237.6670000000001) [demo illustrated the mechanics of defining](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=242.12154545454547) [and using a constant. We define a constant](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=244.84881818181827) [in a class as we have done here using the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=248.1215454545455) [const keyword, and we reference it using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=251.75790909090924) [the class name as shown in the test here.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=254.30336363636385) [For this particular constant, we could](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=257.4670000000001) [instead define it in a class library with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=259.56700000000023) [other measurement conversion constants,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=262.667) [but it would look and work the same.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=264.667) [Before moving on, let's look at some best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=268.667) [practices when using constants. Do define](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=273.3336666666665) [a meaningful field name. Do use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=276.5091052631579) [PascalCasing, meaning that the first](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=279.03542105263165) [letter of every word in the name is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=281.14068421052644) [capitalized. Avoid single character or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=284.867) [abbreviated names, and avoid using upper](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=287.86700000000013) [case names. Do use constants for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=291.46700000000027) [compile-time constant values that will](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=295.2124545454545) [never change. Avoid using constants for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=298.3942727272726) [fields that could change over time, such](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=301.53366666666653) [as a version number. As an alternative, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=304.800333333333) [could use read-only fields. Let's look at what those are next.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=3&mode=live&start=310.667)

[Read-only Fields](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live)

[Read-only fields represent object data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=2.76) [that is set and never changed for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=5.1129411764705885) [lifetime of the object. A read-only field](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=8.87764705882353) [is a variable defined in a class that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=11.902857142857144) [holds a value that is initialized and then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=14.950476190476195) [not changed. Read-only fields must be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=17.998095238095235) [initialized, either in the declaration, as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=20.89333333333334) [shown in the DefaultMeasure example, or in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=24.09333333333335) [a constructor, as shown in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=27.6021052631579) [MinimumPrice example. No other code in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=30.12842105263159) [application can modify the value of a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=33.075789473684225) [read-only field. Think of a read-only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=36.160000000000004) [field as a runtime constant value. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=38.960000000000015) [break down the syntax. A read-only field](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=42.33142857142857) [optionally starts with an accessibility](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=46.33142857142855) [modifier. In many cases, read-only fields](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=49.1885714285714) [are publicly accessible to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=52.032727272727264) [application. Since the value of a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=54.30545454545453) [read-only field cannot be changed by other](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=56.510000000000005) [code, it needs no property to protect it.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=58.960000000000015) [Optionally use the static keyword. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=61.76) [static keyword defines the read-only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=64.385) [property as belonging to all instances of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=66.5725) [the class. For example, the minimum price](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=69.70736842105264) [may have only one value for all products](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=73.02315789473684) [and inventory. If so, then it should be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=76.81263157894736) [defined using the static keyword. A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=80.42666666666666) [read-only field must include the readonly](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=83.09333333333332) [keyword, then the data type. Because a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=85.76) [read-only field can be assigned to any](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=89.09333333333338) [expression, any data type can be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=92.42666666666675) [specified. Next is the field name.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=95.28380952380964) [Generally accepted coding standards](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=98.67666666666665) [recommend following PascalCasing. Lastly,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=101.00999999999996) [a read-only field must be initialized to a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=103.21454545454546) [value. It can be initialized on the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=106.85090909090908) [declaration as in the DefaultMeasure](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=110.03272727272726) [example. Alternatively, it can be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=112.30545454545452) [initialized in a constructor, as shown](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=114.76) [with the MinimumPrice example. Either way,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=117.76) [it cannot be changed anywhere else in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=120.66909090909091) [application. Take care, however, when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=124.30545454545454) [using read-only fields to store object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=126.94181818181819) [instances. The read-only applies to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=130.2145454545454) [instance itself, but not to properties of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=132.98222222222228) [that instance, so other code could change](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=136.09333333333348) [the instance properties of a read-only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=139.35999999999999) [object field. Now let's give this a try.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=142.95999999999995) [Here we are back in Visual Studio with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=147.76) [Product class open. As with constants,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=151.7600000000001) [read-only fields are normally defined](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=154.42666666666685) [above the constructors. Let's define a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=156.82666666666665) [read-only field to retain the minimum](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=160.02666666666664) [price. We'll use public accessibility, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=163.22666666666663) [readonly keyword, we'll make the data type](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=166.39157894736834) [a decimal, and we'll call it MinimumPrice.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=170.07578947368404) [Let's set the value of the MinimumPrice in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=173.76) [the constructor. In the default](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=177.12842105263167) [constructor, we'll set a default value. In](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=179.23368421052646) [the parameterized constructor, we'll set](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=182.3225) [an alternate value. So if the ProductName](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=185.135) [starts with Bulk, then it's a higher](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=189.0725) [MinimumPrice. What happens if we try to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=192.6547368421053) [reset this field, say, in the SayHello](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=195.9705263157896) [method? We see an error. A read-only field](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=199.28631578947392) [cannot be assigned to, except in a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=203.4442105263157) [constructor or a variable initializer.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=207.12842105263138) [Note that if we make this read-only field](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=209.76) [static, then it can't be initialized in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=213.52470588235292) [these constructors. It could only be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=216.81882352941173) [initialized in a static constructor or on](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=219.2145454545455) [the declaration, so let's not make it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=221.7600000000001) [static in our example. Now let's access](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=224.30545454545472) [this minimum price from a unit test. I'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=227.18105263157898) [again set it up with Arrange, Act, Assert.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=230.9705263157896) [Since by default a read-only field is not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=234.76) [static, in the arrange, we need to first](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=238.03272727272724) [create an instance of the class. Then we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=241.3054545454545) [can set the expected result. Then we'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=244.53777777777776) [act. We'll retrieve the value of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=247.25999999999996) [read-only field. Lastly, we'll assert the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=249.98222222222216) [result. Let's copy and paste that test to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=252.44421052631583) [try out the bulk value as well. We'll use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=255.8126315789475) [the parameterized constructor and provide](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=259.4658823529412) [a product name that starts with Bulk, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=261.23058823529425) [we'll change the expected value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=264.0541176470591) [appropriately. Now we are ready to run the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=266.01000000000005) [tests. Let's just rerun all of them. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=269.34333333333353) [can see that they all pass, including our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=273.26) [two new tests. This demo illustrated the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=277.26) [mechanics of defining and using a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=280.42666666666673) [read-only field. We can define a read-only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=282.92666666666685) [field in a class as we have done here and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=285.42666666666656) [set a default value for it, either on the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=288.7599999999997) [declaration or in the constructor, as we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=291.76) [did in this example. We actually set a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=295.26) [different value in each of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=299.26) [constructors. We can then access the value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=302.26) [using an object instance. Depending on the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=304.87764705882364) [constructor that is used, the MinimumPrice](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=307.3482352941179) [is set accordingly. Before moving on,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=309.98222222222216) [let's look at some best practices when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=313.6488888888887) [using read-only fields. Do use a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=317.9266666666663) [meaningful field name. Do use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=321.1236363636363) [PascalCasing, meaning that the first](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=323.3963636363635) [letter of every word in the name is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=325.6690909090907) [capitalized. Avoid single character or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=329.3054545454542) [abbreviated names. Do use read-only fields](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=331.51) [for runtime values that are initialized](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=334.135) [and won't change. Do use static if the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=336.76) [constant value is valid for all instances](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=340.76) [of the class. Now that we've seen how to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=344.26) [define both a constant and a read-only field, let's compare them.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=4&mode=live&start=351.76)

[Constant vs. Read-Only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live)

[Here are some of the key differences](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=2.25) [between a constant and a read-only field.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=5.151) [A constant is a compile-time constant,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=8.052) [meaning that it must be assigned to an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=10.262526315789472) [expression that can be fully evaluated at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=13.209894736842102) [compile-time. A read-only field is a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=16.451999999999998) [runtime constant. It can be assigned to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=20.651999999999994) [any valid expression at runtime. A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=24.274222222222214) [constant must be assigned on the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=26.94088888888887) [declaration. A read-only field can be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=29.60755555555553) [assigned on the declaration or in a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=32.3596923076923) [constructor. A constant can only be a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=35.59046153846152) [number, Boolean, or string. A read-only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=38.71866666666666) [field can be any data type. A constant is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=41.385333333333314) [always static, so it is accessed using the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=45.20584615384616) [class name. A read-only field can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=48.282769230769254) [optionally be static, so constants are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=50.73621052631578) [best used with simple data types when the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=53.26252631578945) [value will never change. Read-only fields](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=56.63094736842101) [are best for any values that are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=58.996444444444435) [initialized from a file, a table, or some](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=61.718666666666635) [code, but cannot then be changed anywhere](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=64.97507692307694) [else within the application. If the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=68.20584615384621) [read-only field value is shared by all](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=70.8755294117647) [instances, then make it a static read-only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=73.75788235294114) [field. If the field value could be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=76.64023529411757) [different for each instance, then it is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=79.24610526315787) [best to leave the field non-static. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=81.80589473684205) [conclude this module with some frequently asked questions.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=5&mode=live&start=85)

[Frequently Asked Questions](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live)

[As a review, let's look at some frequently](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=3.04) [asked questions. These are the types of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=6.08761904761905) [questions often used in job interviews.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=8.75428571428572) [Explain the data encapsulation, or data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=11.04) [hiding, principle. The principle of data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=14.56941176470588) [encapsulation is an important concept.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=18.098823529411767) [This principle states that data stored](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=21.04) [inside an object should be accessible only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=23.665) [to that object. A useful way to interpret](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=26.7275) [this principle is to say that all backing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=29.858181818181816) [fields in a class should be marked as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=32.76727272727273) [private. Well, what is a backing field? A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=35.67636363636367) [backing field is a variable in a class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=39.04000000000001) [used to retain each object's data. When](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=42.46857142857146) [should you use a backing field? For every](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=45.50666666666667) [data field retained for an object. So for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=49.240000000000016) [most properties of the object, there](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=52.75428571428571) [should be a private backing field. For](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=54.89714285714283) [example, product ID, product name,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=57.64) [description, and so on. When should you](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=60.64000000000001) [use a constant? When defining a field with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=64.30315789473684) [a simple data type that will never change.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=67.6715789473684) [For example, Pi, the RGB value of red, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=71.04) [the number of inches in a meter. When](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=74.415) [should you use a read-only field? When](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=77.42888888888889) [defining a field that is initialized from](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=80.15111111111109) [a file, table, or code, but should not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=82.87333333333329) [then be changed anywhere else in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=86.34769230769234) [application. For example, a minimum price](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=89.57846153846161) [and default unit of measure. What is the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=93.03999999999998) [difference between a constant and a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=97.13090909090909) [read-only field? A constant is static,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=99.31272727272724) [must be assigned on the declaration, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=101.72421052631579) [must be assigned to an expression that is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=104.6715789473684) [fully evaluated at compile time. A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=108.04) [read-only field can be static or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=111.2707692307692) [non-static. It can be assigned in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=114.5015384615384) [declaration or in a constructor, and it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=118.04) [can be assigned to any valid expression.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=121.54) [In this module, we looked at backing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=125.04) [fields, nullable types, constants, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=128.54) [read-only fields. We covered what they](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=131.04) [are, when to use them, and identified](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=133.90666666666667) [generally accepted best practices. We then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=137.17333333333335) [compared constants and read-only fields to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=139.9630769230769) [clarify when to use which. Of all of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=142.73230769230761) [these, we'll use backing fields most](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=148.04) [often. Next up, how to protect our backing fields with properties.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m5&clip=6&mode=live&start=154.04)

[Creating Good Properties](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live)

[Introduction](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live)

[Creating good properties is about more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=0) [than just encapsulating our fields. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=4.636363636363636) [want to write good code in our setters and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=9) [getters, define appropriate accessibility,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=13.5) [and use properties wisely. Welcome back to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=15.5) [C# Best Practices: Improving on the Basics](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=19) [from Pluralsight. My name is Deborah](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=22.5) [Kurata, and this module covers best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=25.5) [practices for creating good properties in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=28.5) [our classes. Properties are simply getter](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=31.5) [and setter functions that can be used to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=34.099999999999994) [guard access to the fields of a class.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=37.29999999999998) [They encapsulate the fields, providing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=40.5) [better control over the data contained in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=42.64285714285715) [the field. Okay, we've said that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=45.64285714285717) [properties guard fields several times so](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=48.02380952380952) [far in this course, but I'm just not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=50.309523809523796) [seeing that here. How is this property](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=53.35714285714283) [protecting this field? As it is written,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=56.21428571428572) [it really isn't. Any code can call the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=59.21428571428574) [getter to get this field or call the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=62.44444444444443) [setter to set this field. What are we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=65.55555555555551) [missing here? Well, one thing that we're](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=68.57142857142858) [missing is some code. We can put code in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=71.07142857142861) [the getter and setter to actually protect](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=74.6875) [and validate the field. In this module,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=77.75) [we'll start by adding code to our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=80.66666666666666) [properties. Then we'll see how to use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=83.38888888888886) [auto-implemented properties, which will](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=86.11111111111106) [save us time and effort. We'll cover](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=88) [property accessibility modifiers and look](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=91.5) [at additional uses of properties. Next](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=94) [we'll introduce expression-bodied](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=97.16666666666666) [properties, which are new in C# 6. Then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=98.76666666666665) [we'll identify the benefits of using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=102.94444444444444) [properties, and we'll conclude with a set](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=105.6111111111111) [of frequently asked questions. These are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=108.7222222222222) [the types of questions you may see in a C# programming interview. Let's get started.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=0&mode=live&start=111.35714285714286)

[Coding Properties](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live)

[The code we put into the getter depends on](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=2.394) [what the property is, how it will be used,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=5.72008695652174) [and the protection it requires. Some](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=9.046173913043482) [common types of code in a getter include](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=11.294) [code to check the user's credentials. This](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=14.494000000000003) [is useful if the property is only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=17.33844444444444) [accessible to some types of users, such as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=20.44955555555554) [admin-only features. We can check the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=24.005111111111084) [application state. This is helpful if the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=26.305764705882346) [property is only accessible under certain](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=28.776352941176455) [conditions, such as only when the object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=30.894) [is first created. We can add code to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=33.75763636363635) [format the value before it is returned. In](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=37.0303636363636) [this example, we're trimming any extra](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=40.32257142857143) [spaces from the productName before](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=42.89400000000001) [returning it. We can also add logging in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=45.036857142857166) [the getter to track when a field is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=47.49399999999999) [accessed. And, as we saw earlier in this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=49.62733333333332) [course, we can add code in the getter to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=52.69399999999999) [lazy load related data. Let's go back to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=56.293999999999976) [our demo and add some code to our getter.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=59.74015384615384) [Here we are back in Visual Studio with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=63.894) [Product class open. First let's look again](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=67.49400000000004) [at the productVendor property. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=70.29400000000008) [productVendor property provides access to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=72.30576470588235) [a vendor so the user can view the vendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=74.3645882352941) [information when viewing the associated](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=78.07047058823522) [product. Recall from earlier in this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=80.22733333333333) [course that we initialized the vendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=82.89399999999999) [using lazy loading. We create the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=85.56066666666665) [associated instance of the vendor for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=88.019) [product only when it is requested. So here](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=90.644) [in the getter, we check whether the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=93.50938461538462) [backing field is null. If it is, we create](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=95.66323076923076) [the instance first before returning it.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=99.11622222222222) [Now let's look at the productName](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=101.78288888888888) [property. Let's say we have a change](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=104.44955555555553) [request to remove access spaces from the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=107.10452631578946) [beginning and ending of the productName.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=109.68347368421048) [It seems that some of the productNames](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=111.894) [have been entered into the application](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=114.0815) [with extra spaces, and that does not look](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=115.9565) [very nice in the UI or on reports. So](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=118.19834782608696) [let's add some code to the getter for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=120.54617391304348) [ProductName property to reformat the value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=122.894) [before returning it. We'll use the Trim](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=126.89400000000003) [method to trim off any leading or trailing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=130.43246153846155) [spaces. But what if the ProductName is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=133.50938461538465) [null? Let's use the null-conditional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=136.29400000000004) [operator, which is a new C# 6. 0 feature.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=138.29400000000007) [If null, then null, if not, then dot. So](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=141.894) [if the productName is null, the formatted](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=145.32257142857142) [value is set to null. If the productName](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=147.98923809523808) [is not null, the formatted value is set to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=151.294) [the trimmed productName. The formatted](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=155.49400000000003) [value is then returned. We could add](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=157.594) [similar code to the setter, so any new](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=160.04399999999995) [values going into the system would be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=162.8439999999999) [stored without extra spaces as well. Now](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=165.41780952380952) [let's try out this code with a new unit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=168.08447619047618) [test. We'll open the product test's file,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=171.5130476190476) [I'll paste in the test to try out the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=174.24182608695656) [formatting, and then we can talk through](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=177.7635652173914) [it. We arrange the tests by creating an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=180.50269565217405) [instance of a product and setting the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=182.99400000000009) [ProductName to a value with extra leading](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=185.09400000000016) [and trailing spaces. We set the expected](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=187.4654285714286) [result to not have any spaces. We then act](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=191.46542857142867) [by returning the productName. Lastly, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=196.394) [assert that the expected matches the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=199.394) [actual. Right-click to run the test, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=202.394) [it passes. So we've just seen two examples](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=205.73610526315798) [of code in our getters. The productName](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=209.52557894736861) [formats the value before returning it, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=212.894) [productVendor uses the getter for lazy](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=216.394) [loading. Now what about the setters? The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=219.394) [code we put into the setter also depends](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=224.31066666666666) [on what the property is, how it will be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=227.64399999999992) [used, and the protection it requires. Some](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=231.39399999999983) [common types of code in a setter include](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=234.294) [code to check the user's credentials. This](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=237.49400000000006) [is useful if the property can only be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=240.22733333333335) [modified by some types of users. In the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=242.8940000000001) [Product class, for example, maybe only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=245.67177777777778) [users in a specific role can modify the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=248.0051111111111) [product price. We can check the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=251.11622222222218) [application state. This is helpful if the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=253.5410588235294) [property is only updatable under certain](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=256.42341176470586) [circumstances, such as only when the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=258.894) [product is first created. We can validate](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=261.519) [the incoming value. In this example, if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=264.5815) [the productName is less than three](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=267.2940000000001) [characters in length, it won't assign the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=269.39400000000023) [new value to the productName backing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=271.8440000000004) [field. Adding validation to the property](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=274.394) [setter helps keep the field value valid.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=277.394) [We can add logging or change tracking when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=280.894) [a field is modified, and we can add code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=283.6940000000002) [to format, convert, or clean up the value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=286.8440000000004) [before it is assigned to the backing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=289.8170769230768) [field. We can remove extra spaces, convert](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=292.5093846153843) [the casing, or remove symbols, such as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=295.2273333333335) [dashes, from a phone number. Let's try out](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=297.9495555555559) [some setter code. We are back in Visual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=301.89400000000006) [Studio with a Product class again open.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=305.8939999999999) [Let's add some code to the productName](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=308.69399999999973) [setter to validate the field. Let's say](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=311.4939999999996) [that the productName must be longer than 3](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=314.59399999999994) [characters and less than 20 characters.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=318.19399999999985) [I'll paste the code, and then we can walk](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=320.894) [through it. The pasted code has an error](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=324.39400000000023) [here. We don't currently have a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=327.50511111111155) [ValidationMessage property, so we can use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=330.1162222222223) [the quick action option to create it. This](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=332.78288888888903) [first if statement checks for a value that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=336.269) [is less than three characters in length.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=339.269) [Where did this value variable come from?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=341.894) [It is implicitly defined as the value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=344.6162222222224) [assigned to the property. If the field is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=347.3384444444448) [too short, it assigns a message to our new](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=350.4939999999999) [ValidationMessage property. The second if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=354.0939999999997) [statement checks for greater than 20](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=356.14400000000006) [characters in length. If the field is too](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=358.6440000000002) [long, it assigns a message to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=362.03685714285723) [ValidationMessage property. The value is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=365.03685714285734) [only assigned to the backing field if the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=367.2939999999999) [value is just right. Now let's try out](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=371.02733333333305) [this code with some unit tests. I'll paste](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=374.2940000000001) [in three tests, one for the validation too](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=377.0940000000003) [short, one for too long, and one for just](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=379.894) [right. The too short test sets the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=384.6308421052633) [ProductName to aw, and expects that the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=388.3150526315792) [ProductName will be null. It also checks](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=391.5410588235295) [that the appropriate ValidationMessage is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=394.42341176470615) [set. The too long test sets the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=396.482235294118) [ProductName to a long value, and expects](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=399.42031578947376) [that the ProductName will be null. It also](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=402.3676842105265) [checks the resulting ValidationMessage.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=405.71752941176476) [And the just right test sets a valid](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=407.36458823529426) [ProductName and expects that name will be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=410.6587058823533) [set. It also ensures there is no](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=414.22733333333326) [ValidationMessage. Let's just run all of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=418.31066666666646) [the product tests, and we can see that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=420.79876190476205) [they all pass, including our three new](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=423.8463809523813) [ones. So we've seen how to add code both](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=426.51304761904817) [to the getter and to the setter. Before](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=430.0939999999998) [moving on, let's look at some best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=433.43945454545457) [practices for properties. Do define a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=437.2576363636365) [meaningful property name. Do use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=440.89400000000006) [PascalCasing. Avoid single character or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=444.2273333333335) [abbreviated names. Do add code in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=447.5606666666669) [getter to protect, format, or initialize.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=451.394) [Do add code to the setter to protect,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=454.394) [format, or validate. Now that we've been](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=458.394) [creating properties for awhile, let's look at an easier way.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=1&mode=live&start=463.894)

[Auto-implemented Properties](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live)

[We've been creating fields and properties](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=2.849) [the hard way. We've been declaring the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=5.319588235294119) [field and creating the property with a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=8.20194117647059) [getter and setter. We have been saving](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=11.182333333333334) [some typing by using the Visual Studio](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=14.293444444444447) [propfull snippet that generates the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=17.404555555555554) [structure of this code for us. But there](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=19.599) [is an easier way. With C# auto-implemented](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=23.099) [properties, it is fast and easy to create](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=26.5365) [the properties for our application.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=31.0365) [Auto-implemented properties provide a more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=33.849) [concise property declaration. Notice that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=36.974) [there is no field declared when using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=39.93990909090909) [auto-implemented properties. A private](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=43.75809090909092) [backing field is declared implicitly](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=45.58584210526316) [behind the scenes, so instead of writing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=47.42794736842107) [six lines of code for each property, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=50.00689473684215) [can define each property in one line of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=53.260764705882345) [code. Auto-implemented properties don't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=57.02547058823527) [allow for any code in the getter or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=58.907823529411736) [setter. Because of this, they are best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=62.05952631578949) [used for simple properties that don't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=64.63847368421055) [require any additional logic or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=66.849) [processing. As of C# 6, we can also](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=71.849) [initialize an auto-implemented property.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=76.66718181818183) [As we would expect, initializing the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=78.849) [property sets the value of the implicit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=81.24900000000004) [backing field. In this first example, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=84.04900000000008) [set the default Category to Tools. In the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=86.95426315789473) [second example, we set the default](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=90.32268421052629) [SequenceNumber to 1. The third example](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=92.849) [demonstrates that the assigned value does](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=95.6725294117647) [not need to be hard-coded. Here we call a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=98.4960588235294) [method to set a default vendor. Note that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=102.40455555555555) [an auto-implemented property initializer](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=105.51566666666663) [can only call static methods. So in this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=107.07122222222218) [case, the GetDefaultVendor method must be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=111.54130769230768) [static. To initialize the property value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=115.23361538461536) [by calling a non-static method, perform](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=118.79017647058826) [the initialization in the constructor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=122.31958823529418) [instead. So the GetVendor method here can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=125.26076470588244) [be static or non-static. Also new in C# 6,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=129.44899999999998) [we can define read-only auto-implemented](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=135.03081818181812) [properties. Read-only properties have a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=138.21263636363625) [getter, but no setter. In this example,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=140.64899999999994) [the inventory count can be read, but not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=143.79899999999986) [set. If needed, the property value can be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=147.39899999999977) [initialized in the constructor. We could](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=151.03081818181826) [also initialize the read-only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=153.93990909090905) [auto-implemented property on the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=156.12172727272718) [declaration. Here the value is initialized](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=158.30354545454531) [by calling an InitializeCount method. As](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=161.349) [discussed on the prior slide, if the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=164.23788888888888) [property initializer calls a method, that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=166.96011111111108) [method must be static. So in this example,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=169.2934444444444) [InitializeCount is static. In either case,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=172.96664705882353) [once the value of InventoryCount is set,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=176.14311764705883) [it cannot be changed. Sometimes these](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=179.849) [read-only auto-implemented properties are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=183.2775714285715) [referred to as immutable properties,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=185.56328571428583) [because they cannot be changed. Let's try](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=188.599) [out some auto-implemented properties. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=193.849) [are back in Visual Studio with the Product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=197.22995238095237) [class open. Visual Studio has a snippet we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=200.2775714285714) [can use to quickly create auto-implemented](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=203.32519047619044) [properties. Let's create a product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=206.07976923076922) [category and a product sequence number.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=209.15669230769228) [Type prop Tab Tab and the structure is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=212.849) [created for us. Type the data type, a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=216.63847368421062) [string, Tab Tab, type the product name,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=220.42794736842126) [Category, Enter Enter, and repeat. Prop](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=223.7437368421053) [Tab Tab, type the data type, and int this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=226.58584210526328) [time, Tab, type the property name,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=230.849) [SequenceNumber, Enter Enter. We can crunch](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=234.84899999999993) [through our class properties very quickly](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=238.349) [with this technique. If we are using C# 6,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=241.349) [we also have the option to initialize the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=245.1823333333333) [property on the declaration. Let's set an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=248.2934444444444) [initial value for the SequenceNumber to 1.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=251.27005263157898) [Alternatively, we can initialize the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=254.58584210526328) [property in the constructor. Let's set the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=256.95426315789484) [default value for the Category to Tools.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=259.9918571428572) [Now we are ready to build some unit tests](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=262.65852380952407) [and try accessing these properties. We'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=266.08709523809574) [open the ProductTests file, I'll paste the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=268.849) [code, and we can talk through it. First](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=272.349) [are the Category tests. The default value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=276.3226842105263) [test expects a result of Tools, which was](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=279.6384736842104) [our initialized value. The new value test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=283.4279473684208) [sets the category to a new value, then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=286.40455555555565) [expects to get back that value. The next](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=289.51566666666696) [two are the SequenceNumber tests. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=292.74899999999997) [DefaultValue test expects a result of 1,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=295.4489999999999) [which was our initialized value. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=298.5989999999998) [NewValue test sets the SequenceNumber to a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=301.26076470588237) [new value, then expects to get back that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=304.143117647059) [value. Let's run all of the product tests,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=307.437235294118) [and they all pass, including our two new](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=311.8055217391306) [Category tests, and our two new](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=316.3272608695656) [SequenceNumber tests. Using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=319.7185652173918) [auto-implemented properties gives us a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=321.2019411764706) [much quicker and easier way to define the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=322.96664705882364) [properties in our classes, and they are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=325.7901764705885) [quicker and easier to read. Before moving](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=328.32268421052623) [on, let's look at some best practices when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=330.90163157894716) [using auto-implemented properties. Do use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=333.849) [a meaningful property name in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=339.849) [auto-implemented properties just as with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=342.349) [full properties. Do use PascalCasing.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=344.849) [Avoid single character or abbreviated](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=348.1823333333333) [names. Do initialize the value of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=352.07122222222216) [backing field on the property declaration](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=355.1823333333335) [if an initial value is needed. Avoid](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=357.51566666666696) [auto-implemented properties if the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=360.27757142857143) [property should have code in the getter or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=361.9918571428572) [setter, such as validation or formatting.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=365.4204285714288) [So far we've mostly looked at public](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=368.2019411764707) [properties, but there are more choices and combinations for property accessibility.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=2&mode=live&start=371.4960588235297)

[Property Accessibility](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live)

[C# provides a standard set of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=2.916) [accessibility modifiers for use on class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=5.916) [members. Let's look at each one, and when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=8.916) [it is appropriate on a property. Use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=11.839076923076927) [public to grant access to the property](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=14.30488888888889) [from any code. This is very common,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=17.027111111111115) [especially for properties that are defined](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=19.74933333333334) [in a business logic layer component, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=22.021263157894737) [are displayed and edited in a user](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=24.600210526315788) [interface component. Protected is used](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=27.17915789473684) [most often when working with inheritance](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=29.06984615384615) [and a base class. We aren't covering](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=31.37753846153845) [inheritance or base classes in this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=34.316) [course. Check out the Object-oriented](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=37.116000000000014) [Programming Fundamentals in C# course for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=39.44933333333336) [more information on inheritance and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=42.6083076923077) [building base classes. Internal limits](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=45.3006153846154) [access to only the component in which the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=47.68523076923077) [property is defined. For example, we could](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=50.762153846153865) [create a view model class and a user](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=53.51599999999999) [interface component as discussed earlier](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=56.71599999999998) [in this course. We could then define the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=58.71599999999997) [properties to be internal and only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=61.820761904761895) [accessible to the other parts of the user](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=64.10647619047617) [interface component. Protected internal](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=67.15409523809521) [limits access to the same component and to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=68.916) [inherited classes. And private limits](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=72.916) [access to only the class in which the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=75.20171428571429) [property is declared. These accessibility](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=78.63028571428573) [modifiers are available for all class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=80.666) [members, but with properties, things can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=82.916) [get a little more complicated. When using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=85.166) [properties, the getter or setter can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=90.166) [include accessibility modifiers, but there](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=93.916) [are some restrictions. The getter or the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=97.041) [setter can have an accessibility modifier,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=100.76215384615386) [but not both. This makes sense, because if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=103.53138461538467) [the getter was defined as internal, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=106.86044444444443) [the setter was defined as private, what](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=109.58266666666663) [would it mean for the property to be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=112.30488888888888) [public? Instead make the property the less](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=115.41599999999997) [restrictive modifier, internal in this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=118.13822222222217) [case, and use the more restrictive](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=120.15129411764704) [modifier on the getter or setter as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=122.62188235294113) [needed. Also, the accessibility modifiers](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=125.50423529411756) [on the getter or setter must be more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=127.79835294117646) [restrictive than the property modifier. So](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=131.5630588235294) [if the property is internal, the getter or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=134.5313846153846) [setter cannot be public. The general rule](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=139.45446153846152) [of thumb when defining the appropriate](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=142.91600000000003) [accessibility level for a property is to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=144.91600000000008) [select the most restrictive accessibility](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=147.24933333333348) [that still gets the job done. If the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=149.2285) [property can provide the functionality it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=152.7285) [needs and be marked as private, mark it as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=155.2844210526316) [private. If the property must be accessed](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=158.6002105263159) [throughout its component, mark it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=161.17915789473702) [internal. Only use public when a property](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=163.316) [must truly be publicly accessible, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=166.58266666666668) [even then, consider whether the getter or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=169.37753846153845) [setter can be more restrictive. Let's see](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=172.60830769230762) [the accessibility modifiers in action.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=176.34457142857144) [Once again, we are back in Visual Studio](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=179.916) [with a Product class open. Let's start by](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=182.9929230769231) [changing the Category property getter to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=186.15129411764704) [be internal and the setter to be private.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=188.62188235294113) [We then see an error, Cannot specify](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=191.916) [accessibility modifiers for both accessors](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=195.62188235294118) [of the property or indexer. So if we want](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=198.2689411764706) [the getter to be internal and the setter](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=201.95947826086962) [to be private, we can change the property](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=204.04643478260886) [itself to be internal and remove the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=206.1333913043481) [accessibility modifier from the getter.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=209.13822222222217) [Now this is syntactically correct. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=211.916) [see what happens if we try to make the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=214.38658823529408) [setter public. We see an error, The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=218.09247058823522) [accessibility modifier of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=221.416) ['ProductCategory. set' accessor must be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=223.416) [more restrictive than the property or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=225.916) [indexer. So let's change it back to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=228.58266666666663) [private. Now let's take a look at our unit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=231.49933333333323) [tests. We see several errors here.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=235.34457142857133) ['ProductCategory' is inaccessible due to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=237.916) [its protection level. So our unit tests](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=240.28442105263164) [can no longer access our Category](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=243.60021052631595) [property. It is often the case that we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=246.44231578947392) [have internal members that we want to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=249.2493333333334) [include in our tests. So we can use a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=251.5826666666668) [special attribute in our code file that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=255.16599999999994) [grants our tests access to our internal](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=258.31599999999986) [members. First, under the Acme. Biz](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=261.4659999999998) [project in Solution Explorer, open the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=264.60830769230773) [Properties node. Then open the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=267.839076923077) [AssemblyInfo. cs file. This file contains](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=270.6035) [all sorts of information about our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=273.9785) [component. We can simply add one more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=277.3535) [attribute to this file. This attribute](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=280.916) [grants the defined project, the Acme.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=283.916) [BizTests project, access to the Acme. Biz](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=287.18872727272725) [internal members. It does not provide](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=291.64327272727263) [access to any private members. Now let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=294.416) [look again at our tests. We can see that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=297.041) [our error here is gone. However, we still](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=300.666) [have an error here. That's because our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=304.166) [setter is marked as private. If we go back](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=306.96600000000007) [to the Product class and remove the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=310.11600000000027) [private from the setter, then when we look](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=312.56600000000043) [again at our test, our errors are gone.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=315.71599999999984) [Let's rerun all of our tests, and they all](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=318.916) [still pass. Setting the appropriate](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=323.6807058823527) [accessibility on our properties is an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=326.327764705882) [important factor when protecting our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=329.416) [fields, and even when defining internal](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=331.916) [accessibility, we saw that we can still](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=334.916) [access the property with our unit tests.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=337.72369230769215) [Now let's look at some additional ways to use a property.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=3&mode=live&start=340.416)

[Additional Uses of Properties](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live)

[There are many other uses of properties](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=2.544) [beyond encapsulating fields. We can define](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=6.0440000000000005) [concatenated values, express calculations,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=9.794) [or expose related object properties. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=12.794) [look at an example of each of these. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=16.988444444444443) [canonical example of defining a single](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=21.044) [property that concatenates multiple fields](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=24.044) [is a FullName property. Here we are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=26.544) [defining the FullName property with a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=29.69784615384615) [getter and no setter. And we don't need a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=32.00553846153845) [backing field here, because it is using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=35.54399999999999) [two properties that already have implicit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=38.34399999999998) [backing fields. So the FullName property](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=40.74399999999997) [simply returns the concatenation of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=43.69784615384616) [FirstName and LastName. The primary](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=46.9286153846154) [benefit of using a property to expose](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=49.305904761904756) [concatenated fields is that we only have](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=51.97257142857141) [to write this code once. Every time that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=54.63923809523807) [this code is used on the user interface,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=57.58747826086957) [in a report, in a log, this same FullName](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=60.37008695652175) [format is provided. And if the users ever](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=63.50052173913046) [decide that it should instead be LastName,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=66.29399999999997) [FirstName, we only need to change the code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=68.74399999999993) [in one place, and the change will be seen](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=71.544) [everywhere. Another advantage of this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=75.3334736842105) [approach is with data binding. If we want](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=77.43873684210523) [to display the FullName in one bound](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=80.64926315789472) [field, most binding technologies require](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=83.22821052631575) [that the field be bound to a single](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=85.07031578947363) [property. In addition to a full name, this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=87.94399999999997) [use of properties is great for defining a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=90.74399999999993) [mailing address as a single block, or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=93.544) [defining a product code from a category](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=96.83811764705881) [and sequence number. Another use of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=100.13223529411762) [properties is to express a calculation.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=102.894) [Again, we define the property with a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=105.59400000000002) [getter and no setter. And we don't need a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=108.74400000000004) [backing field, because it uses other](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=112.48844444444443) [properties that already have implicit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=114.82177777777774) [backing fields. Here the LineItemTotal](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=116.76622222222217) [property simply multiplies the quantity](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=119.45309090909092) [and the price. Exposing calculations with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=122.63490909090912) [a property has the same benefits as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=126.044) [concatenated fields. We define the logic](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=129.544) [in one place. If it needs to change, it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=131.87733333333338) [only needs to change in that one place,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=134.87733333333347) [and it can more readily be bound to a user](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=137.544) [interface element. This example is a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=140.87733333333344) [simple one, but you can imagine using this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=142.8773333333335) [technique for any basic calculation in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=146.4530909090909) [your application. Properties can also be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=150.27127272727265) [used to expose object properties from](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=153.544) [related objects. In this example, our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=156.544) [product object has a related vendor object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=159.22821052631585) [that represents the vendor that's applied](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=162.17557894736856) [the product. If we find that we often need](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=164.70189473684232) [to display the vendor's CompanyName when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=168.169) [displaying product information, we can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=170.419) [define a property in the Product class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=172.544) [that exposes the vendor's CompanyName.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=176.044) [Code that uses a product object can then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=178.544) [access the vendor's CompanyName directly](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=181.8381176470588) [without having to navigate through the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=183.89694117647053) [ProductVendor related object. This](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=186.7106666666667) [effectively flattens out the object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=189.04400000000007) [hierarchy, making it easier to use our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=191.96066666666678) [code and for binding. So as we can see,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=194.54400000000007) [there are many other uses for properties,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=197.54400000000015) [but notice that in all of these cases,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=199.9815) [there's quite a bit of syntax required.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=203.4815) [Wouldn't it be nice if there was a syntax shortcut?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=4&mode=live&start=206.544)

[Expression-bodied Properties](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live)

[What if we could change our concatenated](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=2.611) [property syntax from this to this? That's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=6.918692307692307) [the purpose of the expression-bodied](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=11.072538461538462) [properties that are new in C# 6. They](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=13.38023076923077) [provide a syntax shortcut for read-only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=17.14946153846154) [properties that immediately return a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=20.38023076923078) [value. Expression-bodied properties are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=23.072538461538482) [great for each of the scenarios we just](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=25.010999999999996) [discussed, defining a concatenated value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=28.744333333333316) [like the FullName property shown here,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=31.211000000000002) [expressing a calculation, or exposing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=34.81100000000001) [related object properties. Each of these](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=37.811000000000014) [cases are read-only properties that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=41.111) [immediately return a value. Let's look a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=43.611) [little closer at the syntax here. Notice](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=46.89671428571429) [that there are no curly braces and no get](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=49.8967142857143) [keyword and no return statement, just an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=53.75385714285718) [equal to and greater than sign. Some](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=56.83322222222221) [people call this fat arrow syntax, but](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=59.94433333333331) [technically it is called a lambda](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=63.236) [operator. Here are a few examples. Here is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=66.986) [the FullName property that is the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=70.41100000000004) [concatenation of the first and last names.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=72.81100000000008) [Here is the ItemTotal that calculates the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=75.611) [total from the Quantity and Price. And](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=78.84176923076927) [here is the VendorName, which exposes the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=82.111) [ProductVendor's CompanyName. Each of these](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=85.611) [take up one line of code instead of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=87.8967142857143) [original three. Now let's give this a try.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=91.75385714285717) [We are back in Visual Studio with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=96.611) [Product class open. Let's add a property](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=99.27766666666663) [that concatenates the Product Category and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=101.61099999999993) [the SequenceNumber to form the product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=104.41099999999999) [code. We'll use the C# 6 expression-bodied](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=108.01099999999995) [property syntax. So if you are using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=111.13731578947367) [Visual Studio 2013, you'll need to instead](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=114.08468421052629) [use the standard property syntax. We want](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=117.08158823529412) [to make the product code public, it's a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=120.37570588235293) [string, we'll call it ProductCode, here's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=124.14041176470586) [our lambda operator, and we want to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=126.96394117647058) [concatenate the category, a dash, and the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=130.2580588235294) [SequenceNumber. So that's all that's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=133.89671428571427) [required to use the expression-bodied](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=137.11099999999996) [property syntax. Let's add a unit test to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=140.32528571428566) [give it a try. I'll paste the code and we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=143.41100000000006) [can talk through it. We create an instance](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=146.41100000000017) [of the Product class, we then expect the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=148.87415789473687) [product code based on the initialized](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=151.40047368421062) [values of the category and SequenceNumber.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=153.29521052631594) [We then act by retrieving the product code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=155.55544444444442) [and assert that the expected is equal to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=158.6665555555555) [the actual value. We can run this one unit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=162.111) [test, and it passes. The expression-bodied](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=166.611) [property syntax provides a nice shortcut](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=169.37570588235292) [that helps keep the code focused on what](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=171.6698235294117) [it needs to do with a minimal amount of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=174.7286470588234) [ceremony. Now that we've looked at the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=177.77766666666673) [many ways to create and use properties, it's time to contemplate their benefits.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=5&mode=live&start=180.11100000000013)

[Benefits of Properties](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live)

[It is a generally accepted best practice](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=2.5) [to encapsulate our fields with properties.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=5.345230769230771) [Now that we've spent some more time with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=7.784) [properties, let's look at why that is.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=10.45066666666667) [With properties, we have a more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=12.784) [fine-grained access control. If a field is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=15.23854545454545) [public, any code can get or set the field.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=18.10218181818182) [With a property, we can define separate](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=21.784) [accessibility for the getter and setter as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=24.8465) [shown here. For example, the getter here](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=27.909) [is internal and the setter is private, so](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=30.626105263157893) [only the code within the same component](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=33.57347368421054) [can see the property and only code within](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=36.184) [the same class can set it. In the second](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=39.383999999999986) [example, the getter is public and the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=42.784000000000006) [setter is internal, so any code can get](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=45.117333333333356) [access to the property, but only code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=47.78400000000004) [within this same component can set it.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=50.56177777777777) [With properties, we can execute code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=53.67288888888887) [before returning the value or before](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=56.33955555555553) [setting the value. We can check user](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=58.9715) [credentials or application state, format](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=62.034) [or convert the value, or perform](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=64.534) [validation. When debugging, we can set a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=69.034) [breakpoint on the property to see when the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=72.23854545454545) [property is changing, or we can add](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=75.5112727272727) [logging. Many user interface technologies](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=78.37490909090904) [support data binding, and in most cases,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=80.534) [that binding only works with properties,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=83.5965) [so if the data in our class will be used](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=86.284) [for binding, the fields must be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=91.284) [encapsulated with properties. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=94.284) [conclude this module with some frequently asked questions.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=6&mode=live&start=96.784)

[Frequently Asked Questions](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live)

[As a review, let's look at some frequently](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=2.5) [asked questions. These are the types of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=5.627619047619049) [questions often used in job interviews.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=8.364285714285717) [What is the primary purpose of a property?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=10.71) [To guard access to fields of a class and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=13.910000000000004) [optionally provide a location for logic](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=17.51) [that is executed when getting or setting a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=20.09461538461538) [field value. What are auto-implemented](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=23.78692307692306) [properties? An auto-implemented property](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=26.42428571428572) [is a shortcut syntax for defining an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=28.71000000000001) [implicit backing field with its associated](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=32.71) [property getter and setter. When should](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=36.91000000000002) [you use an auto-implemented property? When](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=40.71) [creating simple properties for a class.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=43.71) [When shouldn't you use an auto-implemented](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=46.71) [property? If the property requires any](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=50.043333333333344) [code in the getter or setter. In this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=53.37666666666669) [module, we looked at the types of code we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=57.37666666666667) [might want to add to a property getter or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=60.376666666666694) [setter. We saw how to use auto-implemented](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=63.376666666666715) [properties to save on typing when defining](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=66.04333333333332) [simple properties in our class. We looked](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=68.76555555555552) [at the many different accessibility](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=71.41588235294118) [modifiers available for properties, and we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=73.18058823529415) [saw how can define them both on the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=75.29823529411772) [property itself and on the getter or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=78.48777777777777) [setter. We examined other uses of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=81.59888888888887) [properties, such as for concatenated](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=84.26555555555552) [fields, calculations, or to expose related](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=87.04333333333331) [object properties. And we saw how to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=90.54333333333328) [shortcut these properties using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=93.98272727272726) [expression-bodied properties. We then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=95.80090909090907) [identified the key benefits of using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=97.59235294117646) [properties to protect our fields over](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=100.23941176470585) [using fields alone. So now we know how to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=102.88647058823524) [create good properties in our classes. Next up, how to create good methods.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m6&clip=7&mode=live&start=110.21)

[Creating Good Methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live)

[Introduction](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live)

[Most of the code in our applications is in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=0) [methods, so creating good, clean, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=4.5) [clear methods can make it easier to debug,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=7.5) [test, extend, and maintain our code.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=11.333333333333334) [Welcome back to C# Best Practices:](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=14.000000000000002) [Improving on the Basics from Pluralsight.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=16.666666666666668) [My name is Deborah Kurata, and this module](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=19.5) [covers best practices for creating good](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=23.5) [methods in our classes. A method is a code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=26.6) [block that contains a set of programming](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=31.3076923076923) [statements. A method is sometimes called a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=34.53846153846152) [function. Method is the name often used in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=37.625) [object-oriented programming, while the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=41.125) [term function is used in procedural](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=42.93333333333334) [programming. Since C# is an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=45.73333333333335) [object-oriented programming language,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=48.06666666666669) [we'll primarily use the term method. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=49.44444444444444) [purpose of a method is to implement the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=52.55555555555554) [logic required for a specific behavior or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=56.111111111111086) [functionality in a class. Define a method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=59.777777777777786) [anytime there is an operation that the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=63.38461538461538) [application must perform. First, identify](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=66.61538461538464) [the problem that the method should solve.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=68.8235294117647) [Will this method calculate and return a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=71.70588235294113) [value? Process some data? Execute business](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=74.58823529411757) [logic? Identifying the problem or task](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=77.64705882352942) [helps to clarify the method's purpose.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=80.82352941176472) [Then, ensure that the method has a single](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=84) [purpose. Clarifying the purpose will help](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=86.82352941176475) [determine which class the method belongs](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=88.94117647058832) [in. And building single purpose methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=91.5) [makes those methods easier to write, read,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=94.5) [test, and modify and maintain over time.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=98) [If the problem or task is too large,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=101.33333333333337) [consider creating a set of methods. Next,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=105.14285714285722) [specify the inputs and outputs. What data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=108.41666666666667) [does the method need? What data should the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=111.33333333333337) [method return? State any assumptions. Does](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=114.68421052631578) [the incoming data need to be within a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=117.21052631578945) [range of values or a date after the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=120.57894736842101) [current date? Does the method assume that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=123.54545454545452) [a customer exists before the method is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=126.09090909090904) [called? Whatever the assumptions are,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=128.63636363636357) [state them. And consider the errors that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=130.53846153846155) [could occur. Will the routine open a file?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=133.23076923076925) [Will it work with objects that could be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=136.40000000000003) [null? By thinking through all of these](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=139.60000000000008) [things, we'll write clearer and more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=143) [purposeful methods. In this module, we'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=146) [start by building a method, examining the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=148.6470588235294) [signature, method body, and return value,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=151.52941176470583) [and considering best practices. We'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=154) [compare methods versus properties to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=156.66666666666666) [clarify when to use each. Then we'll cover](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=159.33333333333331) [several techniques for working with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=163.5) [methods, including method overloading,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=166) [method chaining, and method overriding.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=168) [Next we'll introduce expression-bodied](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=170.71428571428575) [methods, which are new in C# 6. We'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=173.00000000000009) [conclude with a set of frequently asked](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=177.325) [questions. These are the types of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=179.5999999999999) [questions you may see in a C# programming interview. Let's get started.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=0&mode=live&start=181.54999999999984)

[Building a Method: Signature](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live)

[The code we write for a method includes a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=2.562) [method signature defining the method name,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=5.936999999999999) [parameters, and return type, the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=8.187) [body implementing the code for the method,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=10.620823529411766) [and the method return statement, which](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=13.503176470588238) [provides a value out from the method.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=15.9995) [Let's look at each of these in detail.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=19.062) [Here is an example method signature. A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=22.562) [method signature optionally begins with an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=26.295333333333346) [accessibility modifier. The accessibility](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=29.495333333333356) [modifier restricts access to the method.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=31.362) [If a method signature has no accessibility](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=33.76199999999999) [modifier, the default is private, and the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=36.562) [method is only accessible within the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=39.82866666666668) [current class. We looked at accessibility](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=42.62866666666669) [modifiers in detail in the last module.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=45.743818181818185) [After the accessibility modifier is the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=49.562) [return type. This is the type of value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=51.89533333333331) [returned by the method. If the method does](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=55.0064444444444) [not have a return value, use void as the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=57.89533333333334) [return type. Next is the method name. By](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=60.89533333333336) [convention, method names are PascalCased,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=64.26200000000001) [meaning that each word of the name is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=66.51200000000003) [capitalized. Method names are often verbs](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=70.11200000000005) [or verbs with objects, since the purpose](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=72.56200000000003) [of a method is to perform an action. For](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=75.36200000000007) [example, Retrieve or PlaceOrder or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=79.09533333333333) [CalculateDiscount. If it becomes difficult](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=81.76199999999999) [to name a method, maybe the method is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=84.42866666666664) [trying to do too much, or maybe its](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=87.89533333333331) [purpose is unclear. Review its purpose and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=90.56199999999994) [break the method into multiple methods if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=93.22866666666668) [needed. Last is the parameter list,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=96.14533333333338) [defining the data that must be passed to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=98.56200000000003) [this method. This gives the method the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=101.76200000000007) [data that it needs to perform its](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=104.48507692307693) [operation. For each parameter, the data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=107.17738461538464) [type and a variable name are defined. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=109.64533333333335) [parameters are enclosed within parentheses](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=113.16199999999999) [and separated by commas. In this example,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=116.16199999999996) [the PlaceOrder method requires a product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=120.062) [instance identifying the product order,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=123.062) [and a quantity defining the amount to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=125.562) [order. If there are no parameters, define](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=128.6245) [empty parentheses. It is these parentheses](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=131.687) [that distinguish a method from other class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=134.562) [members. Though not technically a part of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=138.062) [the signature, it is always best practice](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=140.8477142857143) [to add XML document comments for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=143.51438095238095) [method. XML document comments are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=146.1810476190476) [identified with three slashes. For a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=148.2090588235294) [method, the comment includes a summary tag](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=150.6796470588235) [for the method's purpose, and it includes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=153.562) [param tags to describe each of the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=157.062) [parameters. Including an XML document](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=161.062) [comment makes our methods easier to use,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=163.062) [because Visual Studio displays this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=165.687) [information as part of IntelliSense. We'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=167.562) [see that in the upcoming demo. Before](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=170.562) [moving on, let's look at some best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=174.062) [practices when defining a method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=177.562) [signature. Do use a meaningful name that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=180.062) [indicates the purpose of the method. Do](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=182.56200000000007) [use a verb, such as PlaceOrder or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=185.10046153846156) [CalculatePrice, since methods perform](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=188.8696923076924) [actions. Do use PascalCasing. Avoid vague](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=191.02353846153858) [or abbreviated names. Avoid verbs, such as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=194.7972941176471) [process or handle or perform, as they](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=199.32670588235305) [don't provide a clear indication of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=203.2286666666667) [action that the method will perform. Avoid](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=205.5620000000001) [conjunctions in the name, such as and or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=207.912) [or. This often indicates that the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=210.71199999999996) [is trying to do too much, and should be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=213.16199999999992) [divided into multiple methods. Avoid](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=217.062) [inconsistent names. For example, if the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=219.562) [method to retrieve vendors is called](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=222.36199999999997) [Retrieve, use Retrieve also for the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=225.0619999999999) [to retrieve products. Don't call it get or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=228.21199999999982) [query. Do define the most restrictive](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=231.89533333333335) [accessibility modifier as possible.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=234.69533333333337) [Provide the minimum level of access](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=236.562) [required to get the job done and nothing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=238.96200000000005) [more. Do keep the number of parameters to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=242.1620000000001) [a minimum. We'll talk more about](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=245.2842222222222) [parameters in the next module. Do define](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=247.61755555555553) [an XML document comment for the method to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=250.49533333333335) [define its purpose and parameters. Now let's look at a method body.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=1&mode=live&start=254.2286666666667)

[Building a Method: Body and Return Value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live)

[The method body contains all of the code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=2.129) [for the method. The code is defined within](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=5.176619047619049) [a set of curly braces. The code should be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=8.2242380952381) [begin by validating incoming parameters.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=11.813210526315787) [You may have heard the saying garbage in,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=13.918473684210522) [garbage out. The idea with this code is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=17.286894736842104) [that even if we get garbage in, we should](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=20.339526315789474) [not return garbage out. Rather we should](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=23.655315789473683) [check each parameter to ensure it has a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=26.254) [value expected by the method. If not, one](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=29.254) [option is to throw an appropriate](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=32.329) [exception, as shown in this code. Or if it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=34.72899999999999) [makes sense, assume an appropriate value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=38.02899999999999) [and continue. Or if the code is processing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=39.82899999999997) [a large set of data, log any invalid part](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=42.22899999999995) [of the data and continue. The important](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=45.70042857142858) [point here is to do something and not just](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=48.700428571428596) [let the remainder of the code fail](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=52.513615384615385) [unexpectedly or return invalid results. In](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=55.20592307692309) [this example, an order cannot be processed](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=57.479) [unless the product to order is defined, so](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=59.92900000000001) [the first line here checks for a null](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=62.72900000000002) [product object. If the product object is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=66.02373684210527) [null, the method terminates and throws an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=69.33952631578947) [exception. In this example, an order](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=72.65531578947368) [cannot be processed unless there is some](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=74.79566666666665) [quantity of the product to order, so the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=77.12899999999995) [second line here checks for a quantity](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=79.79566666666666) [less than or equal to 0. If the quantity](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=82.12899999999996) [is not valid, the method terminates and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=85.28284615384617) [throws an exception. These code lines are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=87.97515384615387) [often called guard clauses, because they](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=91.129) [guard the method from invalid parameters.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=94.129) [Next the code initializes a variable that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=97.129) [will be used as the return value from the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=99.59958823529416) [method. The remainder of the code in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=102.77605882352951) [method body performs the operations](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=105.70794736842103) [appropriate for the purpose of the method.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=107.55005263157891) [In this example, the code prepares the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=110.129) [text for an order, and then sends that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=112.57899999999997) [order using an email service. If the code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=115.37899999999992) [in the method body could generate an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=118.29566666666666) [error, consider adding exception handling](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=121.01788888888886) [around this code. The return statement](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=122.96233333333329) [completes execution of the method and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=125.4147142857143) [returns to the calling code. In this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=127.98614285714288) [example, the code returns true if the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=131.06233333333333) [confirmation message starts with Message](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=134.329) [sent. Let's talk more about return values.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=136.66233333333335) [The method signature defines the type of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=141.129) [the return value. If a type is defined](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=143.70794736842112) [here, the method must return that type as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=146.65531578947383) [part of the return statement. Use a type](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=149.2718571428571) [of void in the signature if the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=151.55757142857132) [does not return a value. Then the return](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=153.84328571428554) [statement can be omitted. But keep in mind](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=157.31081818181826) [that methods without a return value are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=160.879) [much more difficult to test. If the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=163.9415) [performs an operation that does not return](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=167.18782352941173) [a value, consider returning a success](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=169.6584117647058) [flag. But what if we need to return](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=171.77605882352927) [multiple values from the method? For](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=174.79566666666665) [example, say we want it to return both a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=177.08138095238093) [success flag and the orderText. That way](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=180.50995238095237) [we could display a message to the user](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=183.17661904761903) [showing the text sent in the order, and we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=186.22423809523806) [could confirm the orderText as part of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=189.55757142857144) [unit testing. There are several ways to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=192.41471428571433) [return multiple values from a method, but](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=194.87899999999996) [in most cases, the best way to return](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=197.32899999999992) [multiple values is to return an object. A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=200.129) [method can return an instance of a class,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=205.504) [such as this, to return multiple values. I](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=208.504) [call this class OperationResult, but we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=211.58354545454546) [could call it anything. Here we have two](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=214.31081818181826) [properties, a Boolean value that defines a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=217.77605882352938) [success flag, and a string message. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=220.65841176470582) [could define any number of other](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=223.51788888888888) [properties here. We can then use this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=225.8512222222222) [OperationResult as the return type from](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=228.5734444444444) [our PlaceOrder method. In the body of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=230.90677777777776) [method, we create a new OperationResult](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=234.01788888888885) [with a success flag and the message text,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=236.35122222222216) [and then we return it from the method.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=239.7004285714285) [We'll look at this further in the upcoming](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=243.129) [demo. Before jumping to the demo, let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=245.2342631578948) [look at some best practices when creating](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=247.07636842105273) [the code for our method. Do keep methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=250.004) [short. Shorter methods are easier to read,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=254.74438461538463) [understand, and test. How short? In "Clean](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=258.51361538461543) [Code: A Handbook of Agile Software](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=261.6845555555557) [Craftsmanship, " Robert Martin says, "The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=264.01788888888916) [first rule of functions is that they](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=266.35122222222265) [should be small. The second rule of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=269.03376190476206) [functions is that they should be smaller](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=271.7004285714289) [than that. Functions should not be 100](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=274.36709523809577) [lines long. Functions should hardly ever](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=277.004) [be 20 lines long. " A common guideline is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=279.254) [to limit length to the number of lines](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=282.3921578947369) [visible at one time in the editor. Other](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=284.91847368421065) [guidelines suggest that methods should be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=287.46233333333333) [as long as they need to be and not any](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=289.4623333333332) [longer. The key is to keep functional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=292.79566666666636) [coherence, which means that the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=295.4623333333335) [should be long enough to constitute a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=297.795666666667) [single coherent unit of logic. Do use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=300.46233333333333) [white space. Just like white space in a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=302.79566666666653) [book or article can help us better](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=305.46233333333305) [understand the break in thoughts, so too](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=307.97110526315794) [can white space help us more quickly](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=310.91847368421065) [understand the code, and it makes much](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=313.86584210526337) [easier to read. Do use guard clauses.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=316.7760588235295) [Guard clauses ensure that incoming](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=319.65841176470616) [parameters are within the range of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=321.71723529411804) [expected values. This helps for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=324.7760588235293) [maintenance and for defining unit test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=327.4231176470586) [cases. Do return an expected result and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=330.5995882352937) [use an object when necessary to return](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=333.92899999999986) [multiple values. Avoid using void methods.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=337.19566666666634) [Without a return value, methods are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=340.2828461538462) [difficult to test. Do implement exception](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=343.5136153846155) [handling. If the code within the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=346.41471428571435) [could generate an exception, add exception](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=349.41471428571447) [handling around the method. For more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=352.0623333333333) [information on exception handling, see the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=354.86233333333314) [Pluralsight course entitled Defensive](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=357.662333333333) [Coding in C#. Now, let's build a method in our sample application.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=2&mode=live&start=361.129)

[Building a Method: Demo](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live)

[Here we are back in Visual Studio, this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=3.151) [time with the Vendor class open. We're](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=6.008142857142855) [going to build a method. We are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=8.484333333333334) [implementing a feature that will allow the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=10.817666666666671) [user to send an order to a vendor to order](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=13.151000000000009) [more of one specific product. One note](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=17.017666666666663) [here before we begin. It may be more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=20.28433333333332) [appropriate to add a PlaceOrder method to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=23.57957142857143) [an Order class. To keep our sample](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=26.079571428571434) [application straightforward and easy to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=28.48433333333333) [work with, I wanted to keep our business](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=30.15099999999999) [object layer limited to two entity](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=32.81766666666665) [classes. So we'll add our PlaceOrder](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=35.40100000000002) [method in the Vendor class to implement](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=38.101000000000035) [this feature. Methods are normally](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=41.251000000000055) [inserted below all of the properties, so](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=43.436714285714295) [we'll place it here. This method will be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=46.43671428571431) [public, so it can be called from a user](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=49.751) [interface component. The PlaceOrder method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=53.350999999999985) [will return a Boolean value notifying the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=55.41415789473684) [calling code of the sent status successful](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=58.361526315789455) [or not. The name of the method is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=61.30889473684207) [PlaceOrder, and the method requires](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=64.81766666666667) [parameters that define the product to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=67.03988888888888) [order and the desired quantity of that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=69.70655555555554) [product. Following generally accepted best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=72.95100000000001) [practices, we'll create the associated XML](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=75.28433333333335) [document comment. Place the cursor in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=78.20982352941176) [front of the signature, type in three back](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=81.38629411764707) [slashes, and press Enter. Visual Studio](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=85.62158823529414) [automatically creates the structure of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=88.9635) [XML document comment for us. We'll add a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=92.3385) [method description and a description of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=96.30484615384616) [each of the parameters. The body of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=98.61253846153848) [method begins with our guard clauses. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=101.55099999999997) [want to ensure that the product that is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=104.00099999999993) [passed into this method is not null, so](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=106.80099999999989) [we'll add an if statement that throws an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=109.60099999999996) [exception if the passed in product is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=112.40099999999991) [null. And we want to ensure that the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=114.91290476190476) [quantity is greater than 0, so we'll add](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=117.96052380952379) [an if statement that throws an exception](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=121.00814285714283) [if the quantity is less than or equal to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=123.57957142857144) [0. The nameof keyword we are using here is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=126.79385714285719) [a new C# 6 feature. If you are using an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=130.06009090909095) [older version of C#, just use the quoted](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=133.69645454545469) [string name of the parameter here instead.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=136.62468421052637) [The remainder of the code is very specific](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=139.2036315789475) [to the particular operation that the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=142.151) [method performs. I'll paste in the code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=144.36152631578955) [and we can talk through it. So here is our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=146.94047368421067) [completed method. This code initializes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=150.67480952380953) [the variable that is used as the return](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=152.57957142857143) [value from the method. Here we build up](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=155.62719047619046) [the string that is the text of the order.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=158.551) [We create an instance of our emailService.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=161.70099999999994) [We discussed this service earlier in this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=164.151) [course. We call the SendMessage method of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=166.8732222222222) [that service to send an email and place](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=169.5954444444444) [the order. And if the message is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=173.03335294117647) [successfully sent, we return a success.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=176.3274705882353) [Now let's build a unit test. Right-click](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=179.151) [in the method and select Create Unit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=182.88433333333333) [Tests. Note that if you are using Visual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=186.61766666666665) [Studio 2013, this option may not be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=189.95100000000005) [available. As we have previously, accept](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=192.7510000000001) [the defaults here, and the test method is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=195.2938571428571) [created. So let's start by arranging this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=198.72242857142842) [test. First we create an instance of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=201.36152631578955) [vendor, then we create can instance of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=204.30889473684226) [product. The product is required, because](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=207.20982352941175) [it must be passed to the PlaceOrder](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=209.32747058823523) [method. We also define the expected](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=211.7980588235293) [result. We're expecting the method to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=214.84330769230775) [return true. Next, we act. Here we'll call](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=218.07407692307703) [the PlaceOrder method. Here we can see](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=222.0081428571429) [that the PlaceOrder method shows up in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=225.34147619047627) [IntelliSense. When we type the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=228.67480952380964) [parentheses, we see some help for calling](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=230.99715384615382) [this method. Where did this helpful](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=234.227923076923) [information come from? If you said our XML](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=236.7980588235294) [document comments, you are correct. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=240.09217647058819) [pass in the product object variable, and a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=242.651) [quantity, we'll just say 12. When calling](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=246.651) [the PlaceOrder method, the values that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=250.00814285714284) [we're passing in are called Arguments.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=252.57957142857134) [Arguments provide a value for each method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=255.151) [parameter. Now we just need to assert that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=259.0010000000001) [the expected matches the actual. We are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=263.4010000000002) [ready to run our test. And we see that it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=267.0983684210526) [passes. But one test is not enough. We're](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=271.8352105263156) [only testing here with valid values. What](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=275.61253846153846) [other tests do we need? Minimally, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=278.84330769230763) [should also test the guard clauses. Hmm,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=281.97452941176476) [but how do we test the guard clauses,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=284.8568823529414) [since they don't return a value, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=288.151) [instead throw an exception? The testing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=291.3328181818181) [framework provides an attribute we can use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=294.0081428571429) [to check for expected exceptions. I'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=297.008142857143) [paste the code to test the first guard](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=299.4635) [clause, and we can talk through it. Above](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=301.9635) [the method is the attribute identifying](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=304.5676666666667) [the exception that we expect. For the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=307.0676666666668) [first guard clause, we expect an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=310.026) [ArgumentNullException. To arrange the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=312.651) [test, the code simply creates the vendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=314.401) [instance. To act, the test calls the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=317.651) [method, passing in a null product. We can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=321.151) [run this test and see that it passes. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=325.0081428571429) [could write similar code to test the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=328.8652857142859) [quantity guard clause. But what if we want](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=331.865285714286) [to return multiple values from the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=335.0740769230768) [PlaceOrder method? As we saw in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=337.38176923076895) [slides, we can define a class with a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=339.5795714285714) [property for each value we want to return.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=341.8652857142856) [I included the OperationResult class as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=344.151) [part of the starter files downloadable](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=346.62158823529427) [from GitHub, as detailed in the first](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=349.0921764705885) [module of this course. The OperationResult](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=352.32747058823526) [class has a default constructor and a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=355.856882352941) [parameterized constructor. It has a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=359.97452941176437) [property for a Boolean success flag, and a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=362.35099999999994) [property for a message. Using an object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=365.55099999999976) [from this class, we can return multiple](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=368.43671428571434) [results from any method. Going back to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=371.43671428571446) [Vendor class, let's replace the Boolean](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=375.43671428571423) [return value with OperationResult. So here](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=378.86528571428556) [we create an instance of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=382.151) [OperationResult, and return both the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=385.151) [success flag and the orderText. And then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=387.651) [that is what we return from the method. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=391.0398888888889) [must then change the unit tests](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=395.03988888888904) [accordingly. Expected is now an instance](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=397.7065555555558) [of OperationResult. We expect that the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=399.9931052631578) [success flag will be true, and that the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=402.2036315789472) [message will contain the orderText. Notice](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=405.151) [that we are using the \r\n to define a new](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=408.2938571428571) [line within the text string. We'll look](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=413.5319523809523) [more at string handling later in this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=417.151) [course. But we're currently getting an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=420.651) [error on OperationResult. Any guess as to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=423.651) [why? OperationResult is in the Acme.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=427.151) [Common component. We need to set a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=430.151) [reference to the Acme. Common component](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=433.026) [from our unit test component, and we need](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=435.276) [to set up the using. That looks better.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=438.276) [Now we want to modify our assertions. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=441.2010000000001) [need to assert the value of both of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=444.00100000000026) [OperationResult properties. Let's run the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=447.151) [test, and it passes. So to build a method,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=449.9287777777777) [we define the method signature with an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=454.9287777777776) [accessibility modifier, return value,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=458.90099999999995) [name, and list of parameters. The body of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=461.2343333333332) [the method often starts with guard clauses](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=465.501) [to ensure that passed in values are within](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=468.6509999999999) [expected constraints. Then, is the logic](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=472.2509999999998) [that performs the appropriate operations](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=474.56276470588244) [for the method, and a return statement](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=476.3274705882355) [that returns the appropriate type. Now](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=478.79805882352974) [that we know how to create methods, let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=480.8615263157896) [look at when we should create methods versus properties.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=3&mode=live&start=483.59836842105295)

[Property or Method?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live)

[As we have seen, properties are for data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=2.908) [and methods are for operations. So it may](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=6.600307692307693) [seem obvious to define a particular member](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=9.8455) [as a property or a method. Let's give it a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=12.033) [try. ProductName, property or method?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=16.308) [Property. It defines a data attribute.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=19.308000000000007) [ProductDescription, property or method?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=22.685777777777787) [That's also a property. PlaceOrder,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=24.908) [property or method? That's a method. It](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=28.089818181818185) [defines an operation that the application](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=32.44133333333333) [can perform. But what about something like](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=35.64133333333332) [InventoryCount? Is it a property,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=39.37466666666664) [InventoryCount? Or is it a method,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=42.453454545454534) [CalculateInventoryCount? What about](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=46.27163636363633) [SuggestedPrice? Is it a property,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=48.57466666666667) [SuggestedPrice? Or a method,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=52.74133333333335) [CalculateSuggestedPrice? Hmm. Here are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=56.074666666666694) [some guidelines to help with the decision](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=58.29261538461538) [property or method. Let's start with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=61.5233846153846) [obvious ones first. Does it describe a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=64.44646153846155) [data attribute? If so, then it is a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=67.13876923076926) [property. For example, product name and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=70.21569230769232) [description. Does it describe processing?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=72.52338461538464) [If so, then it is a method. For example,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=74.408) [place an order. But when it's not clear,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=77.783) [like InventoryCount and SuggestedPrice?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=81.68577777777779) [Properties are expected to execute](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=83.908) [quickly, so if the InventoryCount is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=85.96682352941174) [simply returning a value that is already](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=88.43741176470583) [calculated, then it may make sense as a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=91.37858823529412) [property. If the InventoryCount is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=95.14329411764705) [accessing the inventory control system and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=97.49623529411762) [calculating the amount in inventory and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=100.033) [then calculating the amount needed for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=102.283) [existing orders and so on and so on, then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=104.533) [it may be best as a method. It may just](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=107.14800000000001) [take too long to execute to return](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=109.94800000000002) [immediately as expected with a property.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=111.908) [Properties should not product side](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=115.40799999999997) [effects. That is to say properties should](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=118.32466666666662) [not change the state of an object, so if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=120.90799999999997) [the member produces a side effect, it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=123.90799999999993) [should be a method. For example, if the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=126.3455) [InventoryCount decrements the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=129.8455) [InventoryCount and returns the result,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=131.158) [then it should be a method. Does it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=133.36254545454545) [require parameters? If the member requires](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=136.9989090909092) [parameters, it must be a method. For](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=139.79035294117645) [example, if the SuggestedPrice is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=143.08447058823526) [calculated based on a passed in markup](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=145.43741176470584) [percentage, then it must be a method. Now](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=148.2156923076923) [that we have some guidance when a member](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=151.158) [should be a property and when it should be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=153.158) [a method, let's look at some additional techniques for working with methods.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=4&mode=live&start=155.408)

[Method Overloading](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live)

[There are a lot of different techniques](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=2.835) [for working with methods. One technique is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=5.380454545454545) [called method overloading. Method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=8.1475) [overloading allows us to define methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=9.8975) [with the same name and purpose, but](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=12.5225) [different signatures. The first PlaceOrder](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=15.988846153846154) [method defines two parameters, one for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=18.681153846153855) [product to order, and one for the quantity](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=22.120714285714282) [of that product. This overload adds a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=25.5492857142857) [delivery by date, and another overload](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=29.296538461538468) [adds delivery instructions. For method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=32.98884615384616) [overloading, the method name must be the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=35.635) [same, and the number and/or type of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=38.43499999999999) [parameters must be different. The return](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=41.23499999999998) [type is excluded when comparing signatures](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=43.65852941176471) [for overloading, so even though this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=46.12911764705884) [method has the same name, it is not a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=48.59970588235297) [valid overload, because the only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=52.46) [difference is the return type. Overloading](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=54.6475) [lets us provide a simple signature for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=57.235) [simple scenarios, and more full-featured](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=60.43499999999999) [signatures for more advanced scenarios,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=62.43499999999998) [making it easier for other code to use our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=64.835) [methods. Let's try this out. Here we are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=69.335) [back in Visual Studio with the Vendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=74.24676470588234) [class open. Let's copy the PlaceOrder](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=77.54088235294115) [method. Then, let's paste it, and we'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=80.36441176470585) [add another parameter for the deliver by](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=82.97785714285716) [date. We'll define it as DateTimeOffset,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=85.47785714285719) [so it has the date, time, and time zone](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=88.50166666666665) [offset. It is normally good practice to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=93.30166666666663) [use DateTimeOffset instead of DateTime](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=95.95264705882356) [when the users of the application could be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=97.71735294117653) [in different time zones and the exact time](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=100.53499999999998) [matters. Let's make the date nullable,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=103.33499999999994) [that way it can be optionally defined. Now](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=105.4349999999999) [we need to add the associated XML document](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=108.71735294117646) [comment for this new parameter. Notice how](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=112.48205882352939) [IntelliSense helped us there. Next, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=115.67710526315788) [need another guard clause for a date on or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=118.20342105263155) [before today, and if the deliverBy date](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=121.99289473684206) [has a value, we want to append that date](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=124.89382352941173) [to the orderText. Notice that we are using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=128.59970588235288) [the two properties of a nullable type](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=131.3734615384616) [here. The HasValue property returns true](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=133.52730769230786) [if the variable has a value, and false if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=135.77944444444444) [the variable is null. The Value property](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=139.2794444444444) [returns the value of the variable; in this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=142.435) [case, a DateTimeOffset value. Let's add](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=146.70166666666665) [one more overload to include the order](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=149.77617647058824) [instructions. We'll again copy the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=153.07029411764705) [PlaceOrder method and we'll paste it in.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=155.42323529411763) [Then, we add the instructions parameter,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=158.57413043478263) [and of course we need to add it to the XML](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=161.18282608695657) [document comment. We don't really need a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=165.96543478260878) [guard clause for the instructions, because](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=168.33500000000006) [it is valid for the instructions to be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=170.13500000000013) [null. But if the instructions are not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=172.53500000000022) [null, we want them appended to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=174.97785714285718) [orderText. Notice how much repeated code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=177.4778571428572) [that there is here. We'll deal with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=179.58499999999998) [repeated code issue in the next clip. For](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=182.38499999999993) [now, let's build some unit tests. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=185.335) [already have the test using two](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=188.835) [parameters; we created it in a prior demo.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=191.835) [I'll paste in the test for the three](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=195.835) [parameter overload, and then we can talk](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=198.65852941176465) [through it. As in the prior unit test, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=201.1291176470587) [Arrange in this test creates a Vendor and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=204.46) [Product. The only difference is in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=207.46) [expected result, which now includes the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=210.14269230769233) [date. Notice that the date includes the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=212.45038461538465) [time zone information. The Act step calls](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=215.46) [the PlaceOrder method, passing in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=218.5225) [three needed values, and then we Assert](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=221.08499999999998) [the results. Let's run this test. We get](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=224.00166666666658) [an error here. If we click on the test, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=227.23500000000004) [can see that the problem is with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=231.2350000000001) [dates. We're expecting just the date, but](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=234.43500000000014) [what we're getting is the date plus the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=236.83500000000006) [time and the offset. By using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=239.5016666666668) [OperationResult to return both the success](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=241.72388888888892) [flag and the orderText, we can confirm](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=244.39055555555566) [whether the text is created correctly.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=247.50166666666686) [Note that we could instead pull out the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=249.94026315789478) [creating of the orderText into its own](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=252.8876315789475) [method with its own return value. That](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=255.46657894736862) [method then could be tested separately.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=258.3350000000001) [For now, let's fix our date formatting](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=260.835) [issue. We'll go back to the Vendor class.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=263.6349999999998) [We only want the short date, not the time](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=266.835) [and time zone, so we'll call the ToString](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=269.8349999999998) [method, and we'll pass in a d, which](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=272.5016666666663) [formats the date to a short date string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=275.10772727272723) [that includes the month, day, and year,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=277.65318181818174) [with no time or time zone information.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=279.8804545454544) [We'll need to make this change to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=282.585) [instructions overload as well. Now we can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=286.085) [rerun our test, and it passes. Feel free](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=289.1207142857143) [to create a similar test for the four](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=292.5492857142859) [parameter overload. Before moving on,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=295.97785714285743) [let's look at some best practices when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=298.4503846153846) [using method overloading. Do keep the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=302.21961538461545) [number of parameters to a minimum. If](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=304.7173529411765) [there are a large number of parameters,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=306.7761764705884) [consider grouping them into an object. In](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=308.835) [our PlaceOrder example, instead of passing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=311.8975) [in multiple product properties, we passed](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=314.5225) [in the entire product object. This kept](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=317.1475) [our parameter list to a minimum. Do keep](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=320.21) [the order of the parameters consistent.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=323.5016666666666) [Notice that for each overload, we added](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=325.5016666666665) [the new parameter to the end. Providing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=327.8349999999997) [consisting overloads makes it easier to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=330.29653846153843) [use the methods and prevents errors. Do](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=333.06576923076915) [define an XML document comment for each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=336.3016666666666) [overload with a description of each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=339.5683333333331) [parameter. Consider using optional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=342.36833333333294) [parameters instead of method overloads](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=344.335) [when feasible. Optional parameters are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=346.835) [covered in detail in the next method.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=349.4503846153846) [Avoid confusing overloads. For example,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=353.21961538461545) [one overload that takes a Boolean and a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=355.5969047619048) [string and another overload that takes a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=358.64452380952406) [string and a Boolean. Methods with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=361.3111904761909) [confusing overloads can be difficult to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=363.5016666666666) [use and cause hard to find bugs. Avoid](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=365.5016666666665) [overloads that differ in purpose. For](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=368.2725) [example, an OrderItems method could have](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=370.8975) [one overload that gets the ordered items,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=373.5225) [and a second overload that orders a set of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=376.54928571428576) [items. These methods don't have the same](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=380.40642857142876) [purpose and should not be named the same.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=382.977857142857) [And avoid duplicating code. Recall from](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=385.835) [our demo that we currently have a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=388.09382352941174) [significant amount of repeated code in our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=390.7291176470588) [overloads. Let's look at one way to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=395.235) [minimize repeated code with method chaining.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=5&mode=live&start=402.235)

[Method Chaining](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live)

[Method chaining is a technique whereby one](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=2.828) [method overload calls another method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=6.597230769230769) [overload. This is similar to constructor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=9.289538461538461) [chaining that we saw earlier in this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=11.366461538461541) [course. The purpose of method chaining is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=13.5203076923077) [to reduce repeated code between the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=16.161333333333335) [overloads, so there is one primary](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=18.49466666666667) [overload with the majority of the code. In](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=20.828) [this example, it is the bottom overload.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=24.56133333333332) [Each additional overload then provides its](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=27.828) [unique functionality and calls one of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=30.62800000000001) [other overloads. In this example, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=33.89466666666669) [first overload calls the last overload,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=36.628000000000014) [and the second overload calls the last](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=39.32800000000003) [overload as well. Let's try this out. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=42.47800000000005) [are back in Visual Studio once again with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=47.13569230769231) [the Vendor class open. Let's delete all of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=49.59723076923076) [the code from the first overload. Our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=52.30168421052633) [return value will instead simply call the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=54.88063157894741) [last overload, and we'll pass in nulls for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=57.459578947368485) [the last two arguments. Then let's delete](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=60.69163636363635) [all of the code from the second overload.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=63.555272727272694) [We'll again return and call the last](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=66.828) [overload, passing in the product, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=70.12211764705881) [quantity, the deliverBy date, and null for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=72.94564705882351) [the last argument, so we no longer have](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=76.1405) [all of that repeated code. We have not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=79.6405) [changed the functionality of the method,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=82.61747368421051) [so we should not need to change our unit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=84.19642105263152) [tests. Let's run them. And all of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=86.56484210526304) [vendor tests pass. Before moving on, let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=89.62800000000004) [look at some best practices when using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=92.42800000000008) [method chaining. Do consider using method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=95.828) [chaining to minimize repeated code in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=99.828) [method overloads. Avoid method chaining if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=102.828) [the chaining would add complexity. For](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=105.4750588235294) [example, if the code within the overloaded](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=107.94564705882348) [methods was different enough, trying to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=110.828) [merge those differences into one method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=114.02799999999999) [may add complexity. Do consider using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=117.22799999999998) [optional parameters instead of overloads](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=120.328) [and chaining to minimize repeated code.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=122.828) [We'll cover optional parameters in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=125.828) [next module. So we've seen how to use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=128.32800000000003) [method overloading and method chaining](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=131.6613333333333) [together to minimize repeated code. What about method overriding?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=6&mode=live&start=134.328)

[Method Overriding](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live)

[Method overriding allows us to completely](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=3.07) [replace the operation of a method that is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=5.5963157894736835) [defined further up in the object hierarchy](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=8.964736842105259) [as indicated by inheritance relationships.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=12.57) [Hmm. To make sense of overriding, let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=16.32) [look at basic inheritance in the. NET](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=19.641428571428563) [Framework. Everything in. NET inherits](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=22.641428571428552) [from the. NET Framework system class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=25.07) [called Object. So int, the. NET integer,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=28.07) [inherits from Object, string inherits from](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=31.42294117647058) [Object, and the classes we create inherit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=34.246470588235276) [from Object. The base Object class has](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=37.599411764705884) [built-in properties and methods, such as a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=41.30529411764707) [ToString method. The base ToString method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=45.01117647058826) [returns the fully qualified string name of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=47.60846153846155) [the class. Any child class can use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=50.300769230769255) [properties and methods of any class above](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=52.945) [it in the hierarchy. Because Product and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=55.57) [Vendor inherit from Object, they both](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=58.45461538461538) [provide the ToString method. So calling](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=61.22384615384614) [ToString on a Product object display Acme.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=64.195) [Biz. Product, the fully qualified class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=68.1325) [name. What if we want the ToString method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=71.5075) [to do something else when it is called on](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=74.28052631578943) [a Product object? For example, say we want](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=77.12263157894728) [to display detailed information about that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=80.17526315789472) [product, such as the product name and ID.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=82.70157894736839) [Well, that's the purpose of overriding.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=86.07) [With overriding, we can completely replace](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=88.54058823529408) [the operation of a method that is defined](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=91.01117647058817) [further up in the object hierarchy. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=94.7842857142857) [give it a try. Here we are back in Visual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=98.78428571428569) [Studio. Before we do anything else, let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=102.96473684210522) [see where Visual Studio uses the built-in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=105.17526315789466) [ToString method. We are currently looking](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=107.64142857142856) [at the ProductTests file and the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=111.06999999999998) [SayHelloTest. Let's say we are having](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=114.4985714285714) [problems with the SayHello method and want](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=117.01444444444442) [to debug it using our test. We can put a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=119.73666666666662) [breakpoint on this line here. Then we can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=123.75421052631577) [right-click and select to debug our test.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=127.12263157894733) [When the breakpoint is hit, we can hover](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=130.07) [over the currentProduct variable. We can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=133.40333333333325) [see that it gives us the fully qualified](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=135.9588888888889) [name of the associated class, Acme. Biz.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=139.51444444444456) [Product. That's coming from a call to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=142.62555555555576) [ToString method for that class. Not very](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=145.87000000000003) [helpful. We could, of course, drill down](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=148.67000000000007) [to see all the properties, but it would be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=151.15695652173918) [nice if we could see something better](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=154.28739130434795) [here. Since this value is coming from the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=156.72217391304366) [ToString method, let's override ToString](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=159.4033333333334) [in the Product class to give us back](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=161.0700000000001) [better information about which product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=164.18111111111108) [this is. Let's stop the debugging and open](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=166.9588888888888) [the Product class. We'll scroll down to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=171.40333333333314) [the bottom of the class, and if we type](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=174.67000000000002) [public override space, IntelliSense will](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=178.27000000000007) [give us the list of properties and methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=180.2700000000001) [above this class in the hierarchy that are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=183.87) [overridable. For classes that inherit from](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=187.60333333333335) [System. object, this includes ToString, so](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=190.7170588235294) [we can select to override that. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=193.89352941176472) [generated override simply calls the base](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=197.57) [class ToString method. We want to change](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=200.57) [that to display more detailed information](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=203.49857142857144) [about each particular product. So let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=205.6414285714286) [delete that, and instead, return the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=208.23666666666668) [ProductName and the productId. We'll put](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=211.73666666666674) [the productId in parentheses. Let's go](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=215.07) [back to our test and debug the test once](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=218.07) [again. Now when we hover over](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=222.57) [currentProduct, we see detailed](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=225.57) [information about this particular product.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=227.57) [We can see that it is a saw with a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=230.07) [productId of 1. This could come in very](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=234.07000000000005) [handy for debugging any of our code. So to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=237.2700000000001) [override any method defined further up the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=240.84777777777776) [object hierarchy from our current class,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=243.56999999999996) [use the override keyword and re-implement](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=245.90333333333328) [the method as desired. Before moving on,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=248.945) [let's look at some best practices. Do](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=253.32) [override ToString for each entity class.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=257.59941176470585) [As we saw, Visual Studio uses ToString to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=260.775882352941) [provide information on object variables.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=265.0111764705878) [By overriding ToString, we can enhance the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=267.6700000000001) [information provided by Visual Studio.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=271.4033333333336) [This is especially helpful when debugging.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=274.07) [Next, let's look at expression-bodied methods that are new in C# 6.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=7&mode=live&start=280.07)

[Expression-bodied Methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live)

[Recall when we discussed expression-bodied](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=2) [properties earlier in this course? What if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=4.4990000000000006) [we could do the same thing with methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=7.931333333333334) [and turn this into this. That's the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=11.664666666666667) [purpose of the expression-bodied methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=14.921076923076923) [that are new in C# 6. They provide a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=17.22876923076923) [syntax shortcut for single statement](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=21.38261538461538) [methods that return a value.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=23.69030769230768) [Expression-bodied methods cut down the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=25.998) [code we need to write for simple methods.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=28.3056923076923) [Notice that there are no curly braces and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=31.998) [no return statement, just an equal to and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=34.945368421052606) [greater than sign. As mentioned before,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=37.89273684210521) [some people call this fat arrow, but](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=40.409764705882345) [technically it is called a lambda](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=43.70388235294116) [operator. Let's give this a try. Here we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=46.52741176470585) [are back in Visual Studio with the Product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=51.72527272727273) [class open. Let's start by creating a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=54.634363636363666) [property for the product cost. We'll use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=57.179818181818234) [our snippet prop Tab, the cost is a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=59.998) [decimal, and we'll call it Cost. Then we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=63.998) [can calculate the suggested retail price](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=67.88688888888889) [based on the cost and a passed in markup](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=70.55355555555555) [percentage. I'll paste it in and then we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=74.55355555555553) [can talk through it. So this method simply](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=77.3313333333333) [returns the cost, plus the cost times that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=79.99799999999993) [markup percentage. Now we are ready to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=82.92107692307694) [write a unit test. Right-click in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=86.15184615384621) [method and select Create Unit Tests. Once](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=89.19800000000002) [again, we'll use all of the defaults and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=91.99800000000006) [click OK. I'll paste the code, and then we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=95.1980000000001) [can talk through it. We'll arrange the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=98.3313333333333) [test by creating a new product and setting](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=100.6646666666666) [its cost. We'll use a 10% markup so the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=103.498) [expected value is 55. We'll then act by](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=107.998) [calling the CalculateSuggestedPrice](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=112.15184615384614) [method, passing in the 10% markup. And](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=113.76723076923074) [we'll assert the value is as expected. Run](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=117.56942857142857) [the test, and it passes. Going back to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=122.14085714285713) [Product class, now let's refactor or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=126.998) [reorganize our method using the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=129.998) [expression-bodied method syntax. We'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=132.498) [take off the curly braces, add a lambda](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=134.46466666666666) [operator, and remove the return keyword.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=138.198) [This makes for a smaller method. Now let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=140.998) [rerun our test. And it still passes. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=144.73133333333334) [can use expression-bodied method syntax to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=148.41905263157895) [cut down on the amount of code required](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=150.9453684210527) [for this simple method. We could use the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=154.31378947368438) [same technique to refactor the ToString](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=157.33133333333336) [method. Feel free to give that a try.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=159.33133333333342) [Before moving on, let's look at some best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=161.998) [practices when using the expression-bodied](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=166.56942857142866) [syntax. Do use expression-bodied methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=169.42657142857158) [for very simple one line methods. Avoid](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=171.998) [using expression-bodied methods for simple](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=175.4355) [one line methods if those one line methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=177.623) [really should have guard clauses for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=181.123) [passed in parameters, or they should have](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=184.498) [exception handling. Now let's conclude](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=187.998) [this module with some frequently asked questions.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=8&mode=live&start=191.998)

[Frequently Asked Questions](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live)

[As a review, let's look at some frequently](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=2.5) [asked questions. These are the types of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=5.724761904761905) [questions often used in job interviews.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=8.546428571428573) [What is the primary purpose of a method?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=10.965) [To implement the logic required for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=14.259117647058826) [specific behavior or functionality in a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=16.729705882352942) [class. What is the difference between a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=19.465) [parameter and an argument? A parameter is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=22.965) [part of the method signature. An argument](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=26.2775) [is part of the method call. What is method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=29.34) [overloading? Methods with the same name](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=33.465) [and purpose, but different signatures,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=36.465) [basically defining multiple signatures for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=38.965) [the same method. The signatures may differ](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=40.84) [by the number or types of parameters, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=43.465) [not just the method return type. What is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=47.25071428571428) [method chaining? Method chaining is when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=51.822142857142836) [one method overload calls another overload](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=55.25071428571428) [to prevent repeated code. When is it best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=58.6792857142857) [to use method overloading versus](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=63.215) [overriding? Use overloading when one](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=66.0275) [method requires multiple signatures, such](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=68.84) [as a GetCustomer with an ID to get a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=71.01499999999999) [customer by ID and GetCustomer with a name](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=74.16499999999994) [to get the customer by name. Use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=76.965) [overriding when replacing a method defined](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=80.0761111111111) [higher up in the object hierarchy, such as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=82.74277777777776) [the ToString method. What is an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=86.60136363636364) [expression-bodied method? An](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=89.87409090909092) [expression-bodied method is a syntax](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=91.49833333333333) [shortcut for single statement methods that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=94.16499999999999) [return a value. In this module, we started](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=97.36499999999998) [by building a method, examining the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=100.72970588235297) [signature, method body, and return type,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=102.84735294117654) [and considering best practices. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=104.965) [compared methods and properties and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=107.465) [provided some guidance on when to use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=109.965) [each. We covered several techniques for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=113.465) [working with methods, including method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=115.88807692307694) [overloading, method chaining, and method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=117.81115384615387) [overriding. And we saw how to shortcut](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=120.09) [single statement methods using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=124.0275) [expression-bodied method syntax. As you](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=126.2775) [build your methods, always consider how](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=128.90617647058824) [other developers, or your future self,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=131.72970588235293) [might misuse the method and improve it as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=134.55323529411763) [needed. It is not enough for our methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=137.48673913043484) [to be bug free, they must also be easy and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=139.92152173913058) [safe to use. So now we know how to create](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=142.965) [good methods in our classes. Next up,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=147.29833333333337) [let's see how to specify appropriate parameters for those methods.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m7&clip=9&mode=live&start=151.465)

[Specifying Clear Method Parameters](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live)

[Introduction](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live)

[Methods are the workhorses of our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=0) [application. But without clear parameters,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=3.666666666666667) [it is easy to get off track. Parameters](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=6.722222222222221) [that are unclear cause confusion and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=11.466666666666667) [misuse, making development more difficult](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=14.266666666666667) [and causing hard to find bugs. Welcome](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=16.599999999999998) [back to C# Best Practices: Improving on](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=20.13333333333334) [the Basics from Pluralsight. My name is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=23.866666666666685) [Deborah Kurata and this module covers best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=27.800000000000004) [practices for specifying method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=32.000000000000014) [parameters. What does this line of code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=34.40000000000002) [do? Can we read this line of code and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=36.894736842105274) [glean its exact meaning? Well, it's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=39.736842105263186) [calling the PlaceOrder method from the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=41.66666666666667) [Vendor class, so it looks like it's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=43.666666666666686) [placing an order with a vendor. It is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=46.000000000000036) [passing in a product; that makes sense. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=48.47619047619048) [could assume that it is the product we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=50.38095238095241) [want to order. It would seem logical that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=52.285714285714334) [the second parameter might be the quantity](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=54.57894736842106) [of that product we want to order, but how](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=56.78947368421055) [would we guess what these Boolean flags](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=59.95238095238095) [are for? So how could we make these method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=63.28571428571427) [parameters more clear? Before we get too](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=67.5714285714286) [far, let's briefly review our terms. Here](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=70.68421052631578) [is the method signature that defines our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=73.6315789473684) [method. This is the accessibility modifier](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=76.57894736842101) [and the return type. We are returning an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=79.1875) [OperationResult object as discussed in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=82.6875) [prior module. This allows us to return](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=84.94736842105262) [multiple values from the method, such as a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=87.15789473684205) [success flag and the text of the order.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=89.6842105263157) [Next is the method name, and here are the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=93.29411764705881) [parameters. This is the code that calls](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=97.52941176470586) [our method. These are the arguments. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=100.50000000000003) [arguments provide the values for each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=103.58823529411765) [parameter. Now we are ready to dive into](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=107.11764705882356) [this module. In this module, we'll look at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=111.82352941176478) [how to improve the parameters in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=114.99999999999997) [method signature. We'll cover named](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=117.33333333333327) [arguments, using enumerations as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=119.90909090909092) [parameters, and optional parameters. We'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=122.45454545454548) [examine the difference between ref and out](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=125.42105263157895) [parameters, and we'll conclude with a set](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=128.36842105263156) [of frequently asked questions. These are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=131.31578947368428) [the types of questions you may see in a C# programming interview. Let's get started.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=0&mode=live&start=133.64285714285717)

[Improving Parameters in the Method Signature](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live)

[When working to improve method parameters,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=2.462) [our goal is to define the parameters in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=4.756117647058824) [our method signature, such that the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=7.814941176470592) [resulting method call arguments are clear,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=10.373764705882353) [easy to understand, and less prone to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=13.19729411764706) [error. The first step toward that goal is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=16.49141176470588) [to define coherent parameter names that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=20.111999999999995) [clearly describe the purpose of each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=22.81199999999999) [parameter. We did that in this example. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=25.511999999999986) [could even make these names longer so they](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=28.17252631578946) [are even more specific, such as include](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=30.698842105263132) [shipping address and send copy to user.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=33.29533333333333) [When reading the method signature, we can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=36.40644444444443) [quickly glean the purpose of each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=39.51755555555553) [parameter. Another way we can indicate the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=44.12866666666668) [intent of each parameter is to add an XML](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=46.96200000000002) [document comment, as we saw in the last](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=49.96200000000004) [module. In addition to specifying the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=52.628666666666724) [method summary, we can add a param tag for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=54.540947368421065) [each parameter and provide a detailed](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=57.38305263157898) [parameter description. This information](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=59.54533333333334) [appears in IntelliSense, helping any](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=61.87866666666668) [developer using our method to pass in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=64.79533333333335) [appropriate arguments. Limiting the number](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=69.712) [of parameters can also make our method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=72.11584615384616) [easier to use. How many parameters is too](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=74.80815384615387) [many? Studies of basic comprehension have](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=78.18422222222222) [shown that we as humans can remember only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=80.85088888888887) [about seven things, so some developers](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=84.412) [have suggested a maximum of seven](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=87.11200000000002) [parameters as a good rule of thumb. Other](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=89.81200000000004) [developers suggest using no more than](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=93.35088888888889) [four. The important thing is that a method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=95.6842222222222) [should have the minimum possible](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=98.79533333333329) [parameters and no more. Another technique](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=100.837) [for minimizing the number of parameters is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=103.462) [to use object types. In our example,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=106.5245) [instead of passing in the product name and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=109.29533333333332) [product ID and product description and so](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=112.4064444444444) [on, we are just passing in the product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=115.21200000000002) [object. This makes the method easier to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=118.54533333333339) [call and makes it possible to use other](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=120.85673684210524) [properties of the product object without](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=123.38305263157888) [requiring a change to the parameter list.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=125.587) [Defining a logical and consistent](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=129.962) [parameter order can also make our method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=132.1495) [signature easier to use. One recommended](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=135.212) [technique is as follows. Start with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=137.86199999999997) [parameters that are acted upon or are key](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=141.0119999999999) [to the operation. In our PlaceOrder](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=144.6119999999998) [method, we are placing the order for a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=147.31199999999995) [particular product, so that product is the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=150.91199999999986) [first parameter. Next, define the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=154.06199999999978) [parameters required for the operation in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=156.462) [order of importance. In our PlaceOrder](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=159.462) [method, the quantity is required for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=162.3256363636364) [operation. Then add any flags in order of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=165.50745454545466) [their importance. In our PlaceOrder](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=169.2561176470588) [method, these are the includeAddress and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=171.60905882352938) [sendCopy parameters. Lastly, add any](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=174.587) [optional parameters. We'll cover optional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=177.712) [parameters later in this module. If there](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=180.837) [are methods with similar signatures, be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=184.89533333333333) [sure to use a consistent parameter order.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=187.69533333333334) [Now let's build this example method and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=190.962) [improve it as we work through this module.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=194.6953333333333) [We are back in Visual Studio once again](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=198.962) [with a Vendor class open. Let's add](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=201.9093684210527) [another overload of the placeOrder method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=204.48831578947383) [that we worked with in the last module](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=206.962) [with two Boolean parameters. I'll paste](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=210.962) [the code and we can talk through it. So](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=213.66199999999998) [here's our method signature with a product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=216.81199999999993) [and quantity, but now we're passing two](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=219.2619999999999) [Boolean parameters, includeAddress and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=222.96199999999996) [sendCopy. Since our focus in this module](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=225.36199999999994) [is on the parameter list, we'll just have](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=228.04895652173917) [some test code in here to try this out. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=230.83156521739141) [start with a Test string. We add with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=234.30982608695652) [Address if the first flag is true, and add](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=237.09243478260876) [with Copy if the second flag is true. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=240.22286956521754) [create an instance of the operationResult](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=244.09533333333331) [and we return that result. Now let's go](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=247.2953333333333) [through our list of techniques for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=251.06726315789476) [improving our parameters that we went](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=253.2777894736843) [through in the slides. First, define](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=255.48831578947383) [coherent parameter names. We already have](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=257.8850769230769) [pretty good parameter names here. The next](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=260.6543076923076) [improvement to add clarity to our method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=263.78552941176474) [parameters is to add an XML document](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=266.6678823529414) [comment. We'll type three backslashes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=269.550235294118) [above the method signature, and Visual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=271.3737647058824) [Studio helps us by creating the skeleton](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=273.4914117647061) [of the XML document comment. Here we can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=275.962) [clearly state the purpose of the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=279.39057142857155) [and the purpose of each parameter. Next on](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=282.39057142857166) [the list of suggested improvements was](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=285.8850769230769) [limiting the number of parameters. We only](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=288.6543076923076) [have four parameters, so we look okay.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=291.8041052631579) [Lastly, we want a clear, logical, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=294.7514736842106) [consistent parameter order. We have the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=297.69884210526334) [product and quantity first, just like our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=300.5409473684211) [other PlaceOrder overloads, so our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=304.225157894737) [parameter order looks good. Now let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=306.8567368421055) [build a unit test. Right-click and select](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=309.962) [Create Unit Tests. We'll again accept the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=313.462) [defaults here and click OK. Let's update](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=316.82866666666655) [the test method name. I'll paste in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=320.09533333333303) [Arrange and Assert, similar to the unit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=323.22515789473687) [testing code we used in the last module.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=325.4356842105264) [Here we create an instance of the Vendor](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=327.962) [class. Here we create an instance of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=330.2477142857142) [Product class so we can pass it into the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=332.53342857142843) [method. And we expect that the result will](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=335.712) [be Test With Address. Now let's add the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=339.212) [code for the Act. Notice that as we type](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=342.3620000000001) [each argument, IntelliSense is showing us](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=345.5120000000003) [the associated parameter name, and telling](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=347.6120000000004) [us what the parameter is. Where is this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=350.462) [information coming from? If you said the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=354.462) [XML document comment, you are correct.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=357.3620000000001) [This is really helpful, especially as we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=359.4620000000002) [get to the Boolean arguments at the end.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=361.9120000000004) [Because we specify true for the first](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=364.90644444444456) [Boolean parameter, we should see With](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=367.62866666666696) [Address appended to our result. And since](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=369.962) [we set the second Boolean parameter to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=372.9620000000001) [false, we should not see With Copy. That](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=375.9620000000002) [matches with how we defined our expected](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=379.5731111111111) [value here. Let's run this new test, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=383.8508888888887) [it passes. But now going back and reading](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=388.73977777777736) [this method call, do you remember what the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=392.2953333333335) [true and false meant? How about tomorrow?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=395.4064444444448) [Or next week? There have to be additional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=398.12866666666673) [ways we can improve our method parameters,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=401.23977777777804) [so we could better read this method call.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=403.962) [Before moving on, however, let's look at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=406.9093684210525) [some best practices for improving the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=409.4883157894734) [parameters in a method signature. Do](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=412.1048571428571) [define coherent parameter names that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=415.462) [clearly indicate their purpose. Use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=417.962) [camelCase whereby the first letter of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=420.40644444444445) [name is in lowercase and each appended](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=423.51755555555565) [word is capitalized. Do define an XML](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=426.62866666666685) [document comment for each parameter. Do](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=429.7397777777778) [keep the number of parameters to a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=432.40644444444456) [minimum. Do order the parameters in a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=435.51755555555576) [logical sequence. We suggested a logical](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=438.587) [sequence that basically defines the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=441.212) [parameters in order of importance. Do use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=443.3786666666667) [a consistent parameter order. If there are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=446.2953333333335) [similar methods, the parameter order](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=449.22515789473687) [should be similar as well, to prevent](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=451.33042105263166) [confusion or incorrect usage. Avoid unused](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=454.2777894736844) [parameters. If a parameter is not used,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=456.89533333333327) [remove it from the method signature.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=460.16199999999975) [Recall, however, that we still have a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=462.962) [problem with the readability of our method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=465.76199999999983) [call. Next up, let's look at how we can improve that.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=1&mode=live&start=468.56199999999967)

[Named Arguments](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live)

[We just saw several ways to make](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=2.65) [improvements to the method signature, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=4.925000000000001) [in the last demo, we saw how IntelliSense](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=6.875000000000002) [displays the XML document comment as we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=9.608333333333334) [write the method call. But that doesn't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=12.816666666666672) [help much when reading the code after](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=15.899999999999999) [initial development. And in general, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=18.816666666666674) [read code much more often than we modify](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=20.880769230769225) [it. So what else can be done? Wouldn't it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=23.342307692307678) [be nice if we could include those clear](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=26.45000000000001) [parameter names right here in the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=29.25000000000002) [call? Well, we can. We can use the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=31.999999999999996) [parameter names from the method signature](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=35.600000000000016) [in the method call as named arguments.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=38.30000000000003) [Look at how much easier this is to read.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=41.80384615384616) [Place an order for a product, order 12 of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=46.65) [them, include the address in the order,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=50.507142857142874) [but don't send a copy. To take advantage](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=53.50714285714289) [of named arguments, simply add the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=56.98333333333333) [parameter name and a colon before the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=59.649999999999984) [argument value. But there are some](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=62.761111111111084) [eccentricities we need to keep in mind.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=65.45) [When using named arguments, parameter](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=68.60000000000002) [order no longer matters. C# matches the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=70.85000000000004) [arguments to their parameters by name, not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=74.2653846153846) [by positional order. So if we listed these](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=78.03461538461534) [two arguments in reverse order, this code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=81.41470588235298) [would still work as expected. As we can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=83.88529411764713) [see in this example, not all arguments](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=86.72142857142859) [need to be named. We can use named](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=89.22142857142862) [arguments for only those arguments that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=92.18846153846155) [are less clear. All named arguments must](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=94.49615384615387) [be listed after non-named or positional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=97.83181818181819) [arguments. This makes sense, because the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=101.10454545454547) [non-named arguments must be matched to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=103.98333333333335) [parameters by their position. Now let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=106.78333333333336) [try this out. Here we are back in Visual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=109.85) [Studio with a vendor test open. Let's add](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=114.17631578947368) [argument names here for clarity. We can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=117.54473684210524) [use names for any of these arguments. For](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=120.31666666666666) [the purposes of this demo, we'll only use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=122.98333333333329) [them for the two Boolean arguments. So](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=125.64999999999992) [let's add the parameter name in front of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=128.4) [the first Boolean argument. Notice that we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=131.9) [immediately see an error here. Named](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=135.15) [argument specifications must appear after](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=138.15) [all fixed arguments have been specified.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=140.65) [This is because we now have a positional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=143.42777777777783) [based argument after the named argument.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=146.9833333333335) [We can fix this easily by simply adding](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=149.65) [the name for this argument as well. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=152.85000000000005) [rerun our test, and it still passes. Now](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=156.1) [when we read this result, today, tomorrow,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=159.6999999999999) [or any time in the future, it is very easy](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=162.84999999999982) [to see what this is doing. There is one](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=166.74999999999997) [problem, however, with using named](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=169.89999999999992) [arguments to solve the method call clarity](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=171.65) [issue. This technique relies on the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=174.7125) [developer coding the method call to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=177.3375) [actually use the named arguments. Is there](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=179.91315789473688) [more we can do to improve clarity when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=182.8605263157896) [defining the method parameters instead?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=186.22894736842127) [Why yes, there is. Before moving on, let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=188.53235294117647) [look at some best practices when using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=192.2970588235294) [named arguments. Do use named arguments as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=196.65) [needed for clarity. In our examples, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=201.01842105263165) [primarily use named arguments for Boolean](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=204.33421052631596) [parameters. That allowed us to provide](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=207.17631578947393) [context when passing true or false into a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=209.7928571428571) [method. But named arguments can also](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=213.22142857142842) [clarify the purpose of passed in literal](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=215.65000000000003) [strings and numbers. Avoid unnecessary](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=218.45000000000007) [named arguments, as they can affect](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=220.7611111111111) [readability. This is especially true when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=224.09444444444435) [the name of the parameter and the name of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=226.59444444444443) [the argument variable match. For example,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=230.0944444444444) [the first parameter of our PlaceOrder](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=232.42777777777778) [method is named product, and the name of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=234.7611111111111) [the variable passed in as the argument is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=237.87222222222218) [also named product, so we end up with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=241.17631578947376) [something that looks like this. In this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=244.54473684210544) [case, adding the named argument makes it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=247.48333333333332) [more difficult to read instead of making](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=250.39999999999992) [it easier. Now let's look at how](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=253.31666666666652) [enumerations can further help us improve our method signature.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=2&mode=live&start=259.15)

[Defining Enumerated Parameters](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live)

[The issue with using named arguments to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=3.016) [solve the method call clarity issue is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=5.226526315789474) [that it relies on the developer coding the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=7.437052631578949) [method call to actually use the named](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=10.379636363636365) [arguments. What if we, as the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=13.56145454545455) [creator, want to provide additional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=16.516) [clarity? Looking again at our example, it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=18.599333333333337) [is primarily the Boolean parameters that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=21.54231578947369) [make this method call difficult to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=24.068631578947382) [understand. If the developer coding the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=26.594947368421074) [method call does not use named arguments,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=28.516000000000002) [one could only guess what the true and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=30.616000000000007) [false mean in this context, and it would](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=33.016) [be easy to put them in the wrong order.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=35.839529411764694) [Avoiding Boolean parameters in our method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=39.016) [signature could prevent this problem, so](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=41.266) [what are the alternatives to using Boolean](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=43.516) [parameters? That depends on what those](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=47.266) [Boolean parameters do and how they affect](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=50.07482352941177) [the operation of the code. One option is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=52.95717647058826) [to define separate method names. For](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=56.63138461538462) [example, PlaceOrder and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=59.86215384615386) [PlaceOrderWithCopy. This technique may not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=61.47753846153848) [work well in this case, because we have](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=63.61599999999999) [two Boolean values. But using differing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=66.81600000000003) [method names could work in other](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=69.516) [situations. Another option is to use an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=72.516) [enumeration defined with the enum keyword.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=76.016) [An enumeration is a set of named](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=79.016) [constants. And because each enumerated](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=82.33178947368421) [constant is named, its value is clear.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=84.70021052631579) [This first enum defines whether to include](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=88.016) [the address in the order. The named](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=90.9326666666667) [constants are simply yes or no. The second](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=93.87314285714287) [enum is similar, defining whether or not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=97.30171428571431) [to send a copy. Our original method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=100.30171428571433) [signature then changes from this to this.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=103.516) [We define an enum for each Boolean](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=107.016) [parameter. We then use that enum as the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=110.516) [type for those parameters. The method call](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=114.16600000000003) [then changes from this to this. We are now](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=117.31600000000005) [passing the fully qualified name of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=121.34933333333333) [constant defined in the enumeration, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=124.46044444444443) [IntelliSense will help us out here as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=127.12711111111109) [well. So now reading this method call, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=130.1212631578948) [can readily understand its full meaning.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=133.48968421052646) [Let's jump to a demo. We are once again in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=136.016) [Visual Studio with a Vendor class open.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=140.76599999999996) [We'll define the enumeration here at the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=143.21599999999992) [top of the class. The first enumeration is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=145.66599999999988) [for IncludeAddress. The second one is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=150.51599999999996) [SendCopy. In both cases, we have only two](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=154.3731428571428) [named constants for the enumeration, yes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=157.81600000000003) [or no. The other benefit of using an enum](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=160.21600000000007) [instead of a Boolean value is that we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=163.59494736842112) [could define more options. For example,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=166.54231578947383) [for IncludeAddress we could instead](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=169.07482352941176) [provide options, such as office address,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=171.72188235294118) [warehouse address, or none. But let's just](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=174.89835294117648) [stick to yes or no for our example.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=178.18266666666665) [Scrolling back down to the PlaceOrder](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=181.29377777777773) [method, we can then change the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=183.62711111111105) [signature to use these new enum types](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=186.13364705882347) [instead of the Boolean. We immediately see](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=188.60423529411753) [an error here in the code, because our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=191.3285) [parameters are no longer Booleans. We need](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=194.8285) [to change our two if statements to check](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=197.87314285714282) [against the enumerated values. Looking at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=201.30171428571416) [our unit tests, we also have an error](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=203.56145454545455) [here. We need to change the unit test to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=205.7432727272728) [pass in the correct enumerated value. For](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=208.19781818181832) [the first parameter, we specify Vendor.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=212.34933333333336) [IncludeAddress. Yes. Notice how](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=217.34933333333342) [IntelliSense helps us here. For the second](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=220.24676923076922) [parameter, Vendor. SendCopy. No. We can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=224.5544615384615) [rerun the test, and it passes. Notice how](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=227.91599999999997) [easy our method call is now to read and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=231.51599999999988) [understand. Even coming back weeks later,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=235.56599999999978) [the purpose of this call is clear. Before](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=238.09933333333328) [moving on, let's look at some best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=241.6313846153846) [practices when using enum parameters. Do](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=245.9390769230769) [define a clear name for both the enum](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=249.48968421052632) [itself and each named constant, and use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=253.27915789473695) [PascalCasing for both. Do use an enum to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=256.59494736842123) [represent a set of related values. Do](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=260.15885714285724) [favor an enum over a set of related](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=263.15885714285736) [constants. Avoid Boolean parameters where](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=266.5874285714289) [possible. Consider using enum types](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=269.816) [instead. Avoid using enums for lists that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=273.3159999999999) [change regularly, such as product types,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=277.016) [which may change often and should be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=280.016) [instead loaded from a database. Next,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=283.3844210526316) [let's look at how we can use optional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=285.59494736842095) [parameters to minimize the number of overloads we have.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=3&mode=live&start=288.54231578947343)

[Optional Parameters](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live)

[So far, our method signatures defined](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=3.112) [required parameters. When the method is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=5.935529411764707) [called, an argument must be provided for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=8.759058823529413) [each defined parameter. To provide](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=12.237) [flexibility in calling the method, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=15.0495) [define several overloads. So if we don't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=18.4245) [want to specify a delivery date or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=21.612) [instructions, we call this method. If we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=24.237) [want a delivery date, but no instructions,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=26.881230769230765) [we call this method. And if we want to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=29.573538461538448) [specify the instructions without the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=32.778666666666666) [delivery date, we would need yet another](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=34.445333333333345) [overload. That leads to lots of method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=36.778666666666695) [overloads. We can minimize this overload](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=40.64141176470587) [bloat by defining optional parameters.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=44.17082352941174) [Here is an example method signature that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=47.112) [demonstrates optional parameters. To mark](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=51.31200000000001) [a parameter as optional, simply specify a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=54.04533333333334) [default value in the method signature. Any](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=57.31200000000002) [parameter with a default value is an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=60.5495) [optional parameter. In this example, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=63.612) [deliverBy and instructions are optional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=66.237) [parameters, because they both have default](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=68.91199999999998) [values. Optional parameters don't have to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=72.51199999999994) [be passed in when the method is called. If](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=75.03507692307693) [an argument is not provided for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=78.49295238095237) [parameter when the method is called, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=81.15961904761903) [parameter is assigned the default value.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=83.82628571428569) [In this example, if no instructions](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=86.112) [argument is provided, the instructions](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=89.2884705882353) [parameter is set to standard delivery.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=91.93552941176472) [Using optional parameters can dramatically](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=95.112) [reduce the number of overloads we need.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=97.612) [Our three original method overloads then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=101.112) [become one method with two optional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=104.34276923076919) [parameters. Less code means less code to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=107.57353846153839) [understand and less code to maintain. But](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=111.112) [optional parameters have some](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=114.52866666666667) [eccentricities we need to keep in mind.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=116.19533333333335) [Optional parameters must be defined at the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=119.112) [end of the parameter list, after any](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=122.612) [required parameters. In this example, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=126.112) [deliverBy and instructions optional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=129.3342222222222) [parameters must be after the required](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=131.55644444444437) [product and quantity parameters. When](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=134.88977777777762) [calling the method, if an argument is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=137.46494117647057) [provided for any optional parameter,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=139.93552941176463) [arguments must also be provided for all](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=141.70023529411753) [preceding parameters, or we can use named](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=145.0405714285714) [arguments, which aren't positional. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=149.54057142857138) [give this a try. Here we are back in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=152.912) [Visual Studio with the Vendor class open.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=157.61200000000005) [We are looking at one of the original](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=159.71200000000013) [PlaceOrder methods, the one that has four](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=162.112) [parameters. Let's change our method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=165.1745) [signature to make the deliverBy and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=167.362) [instructions optional. Recall how to make](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=170.38472727272725) [a parameter optional? All we need to do is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=174.202909090909) [provide a default value. Let's define a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=178.51200000000003) [default deliveryBy date of null and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=181.31200000000007) [specify some standard text as the default](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=183.7120000000001) [for the instructions. Now that these last](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=186.58258823529408) [two parameters are optional, we no longer](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=189.46494117647052) [need the prior two overloads, so let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=192.36199999999997) [delete them. Now let's update our unit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=195.27866666666657) [tests. We haven't changed the logic, but](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=197.61200000000005) [now that we have default values for our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=199.71200000000013) [parameters, the expected value will](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=202.112) [change. The PlaceOrderTest is our test](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=204.9691428571429) [with two parameters. Here we aren't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=208.39771428571441) [providing an argument for the deliverBy or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=211.7483636363636) [instructions. The default for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=215.56654545454532) [deliverBy date is null, so it won't affect](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=217.79621052631583) [our expected results, but the instructions](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=221.1646315789475) [do have a default value, and that string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=223.69094736842126) [will be used, so we need to change our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=226.69094736842112) [expected value here. Our three parameter](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=230.00673684210543) [test also needs to be changed to include](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=232.39771428571424) [the standard instructions. Now let's run](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=235.82628571428558) [all of our vendor tests. And they all](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=238.54057142857144) [pass. But what if we wanted to call the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=242.3500952380953) [PlaceOrder method and provide the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=246.63580952380963) [instructions, but not the delivery date?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=249.112) [Let's add another test. I'll paste in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=252.112) [Arrange and Assert, and we can work on the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=255.22311111111108) [Act. We'll call the PlaceOrder method,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=258.7231111111113) [passing in the product, order quantity,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=261.80430769230776) [and instructions. However, since we are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=265.03507692307704) [trying to pass the instructions without](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=267.6675555555557) [the delivery date, we see an error here.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=270.00088888888916) [It is trying to treat the passed in text](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=273.112) [as the delivery date. That's because it's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=276.90147368421066) [matching these arguments with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=279.8488421052634) [parameters in their positional order.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=282.00088888888894) [Let's try just adding a comma to identify](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=284.2231111111112) [the missing argument. Nope, that doesn't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=287.7786666666669) [work either. We have two options for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=290.3620000000001) [resolving this. We can either pass in a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=293.2786666666669) [null for the delivery date, yep, that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=296.81199999999995) [works, or we can use named arguments. C#](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=299.9619999999999) [then no longer tries to match up the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=303.487) [position and we are good to go. Let's run](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=306.487) [all of our vendor unit tests, and they all](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=309.95410526315794) [pass. By changing our method to use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=313.7435789473686) [optional parameters, we significantly](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=316.6909473684213) [reduce the number of overloads we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=318.612) [required. Yet we still provided](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=321.612) [flexibility when calling the method. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=323.75905882352953) [calling code can use the required two](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=326.2296470588238) [parameters, three parameters, or all four.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=329.112) [And by combining optional parameters and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=332.54057142857135) [named arguments, the calling code can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=335.9691428571427) [define just the arguments it needs. Before](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=339.2172631578948) [moving on, let's look at some best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=342.9014736842107) [practices. Do use optional parameters for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=346.5856842105266) [parameters that are truly optional. This](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=350.11200000000014) [is a good way to minimize overload bloat.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=353.5564444444445) [Avoid optional parameters when the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=357.11200000000014) [parameters are really one or the other.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=359.3342222222224) [For example, here are two overloads for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=362.2658461538461) [finding a product. The first overload](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=364.9581538461536) [finds a product by its ID. The second](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=367.4453333333334) [overload finds a product by its name.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=371.00088888888905) [Using optional parameters to reduce the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=374.112) [overloads in this case does not make](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=376.254857142857) [sense. The calling code will always](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=378.75485714285685) [provide one argument or the other, never](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=381.4196923076923) [both. Avoid optional parameters if the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=384.65046153846146) [defined default value could change and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=387.7786666666668) [component versioning is important. At](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=390.978666666667) [compilation time, the optional parameter's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=393.612) [default value is compiled into the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=396.112) [call, not the method signature. So if the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=399.612) [default value is changed on the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=403.01200000000006) [signature, code that calls the method will](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=405.11200000000014) [have to be recompiled and redeployed.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=407.2120000000002) [Optional parameters are a great tool when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=409.86199999999997) [used wisely. Now let's look at two](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=413.94533333333317) [additional types of parameters, ref and out.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=4&mode=live&start=420.112)

[ref and out Parameters](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live)

[In the last module, we discussed one](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=2.179) [technique for returning multiple values](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=4.979) [from a method. In our examples, we've been](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=6.979000000000002) [using a class OperationResult. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=10.845666666666666) [OperationResult class defines properties](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=13.512333333333332) [for a flag and a string, which we can set](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=15.645666666666665) [here when calling the constructor. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=20.036142857142842) [return statement returns an operation](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=22.607571428571426) [result, thereby effectively returning](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=24.75042857142856) [multiple values from the method, both the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=26.46471428571427) [flag and string. But there are other ways](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=29.442157894736845) [to pass additional information back from a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=32.81057894736843) [method besides using the return statement.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=35.75794736842104) [Instead of returning values from a method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=40.179) [using the return statement, we can instead](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=43.06135294117649) [pass additional values back as part of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=45.94370588235297) [method parameters. This example returns a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=49.81057894736843) [simple Boolean flag and uses the ref](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=52.96847368421054) [keyword to pass a string back in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=56.65268421052633) [orderText parameter. The second example is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=59.97899999999999) [similar, but uses the out keyword to pass](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=62.378999999999984) [a string in the orderText parameter. Both](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=65.62344444444444) [ref and out parameters allow us to return](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=68.73455555555554) [multiple values from a method. We can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=72.29011111111109) [optionally return a value as specified in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=75.51233333333334) [the return statement. In both of these](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=78.77900000000002) [examples, a Boolean value is returned. And](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=81.57899999999998) [we can return one or more parameter values](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=84.02899999999994) [by prefixing those parameters with the ref](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=86.8289999999999) [or out keyword. What's the difference](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=90.554) [between ref and out? Before answering that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=93.929) [question, let's take a moment to look at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=97.22899999999998) [what it means to pass an argument by value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=100.02899999999994) [versus by reference. Here is the by value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=103.179) [example. We define an orderText variable,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=107.36947619047615) [we pass it to the PlaceOrder method.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=110.51233333333326) [Notice that in this case, there is no ref](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=114.179) [or out prefix here, so by default, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=117.45172727272724) [argument is passed by value. By value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=120.36081818181812) [means that the value of the orderText](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=123.03614285714286) [argument is determined, and that value is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=126.03614285714288) [passed to the PlaceOrder method. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=129.03614285714286) [PlaceOrder method then changes the value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=131.81536363636363) [of its orderText parameter. Any changes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=135.63354545454538) [made to arguments passed to a method by](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=138.9616086956522) [value are local to that method and not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=142.09204347826093) [recognized by the calling code. So if we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=145.22247826086968) [display the value of orderText here, what](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=148.42899999999997) [should display? It will display Standard](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=151.34566666666657) [Order. Let's compare this to a by](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=154.3328461538462) [reference example. Here is the by](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=158.10207692307702) [reference example. Again, we define an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=161.07373684210532) [orderText variable and pass it into the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=163.9158421052633) [PlaceOrder method. Notice that in this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=167.2316315789476) [case, there is a ref prefix on the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=169.86321052631584) [argument and on the associated method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=173.2316315789475) [parameter. By reference means that the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=175.75794736842127) [orderText variable is passed into the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=178.679) [PlaceOrder method as a reference. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=181.679) [PlaceOrder method then changes the value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=184.63354545454547) [of the orderText parameter. Any changes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=187.36081818181827) [made to arguments passed to a method by](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=190.12017647058823) [reference are reflected in the calling](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=193.88488235294116) [code. If we display the value of orderText](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=196.70841176470586) [here, what should display? It will display](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=200.36081818181827) [Order from Acme. Both the ref and out](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=203.51233333333337) [parameter modifiers cause the associated](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=207.06788888888903) [arguments to be passed by reference. Now](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=209.29011111111132) [that we understand what by value and by](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=212.2842631578948) [reference means, let's look at the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=215.65268421052647) [difference between ref and out. The ref](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=218.179) [parameter modifier causes an argument to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=222.91584210526318) [be passed by reference, as we saw in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=225.12636842105272) [prior slide. When calling the method, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=228.44215789473702) [argument variable must be initialized](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=231.51233333333334) [before it is passed in. The method can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=233.8456666666667) [then optionally modify the value. Changes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=237.51233333333337) [to the parameter are reflected in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=240.17900000000012) [calling code. The out parameter modifier](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=243.29011111111132) [also causes an argument to be passed by](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=246.0251538461538) [reference. When calling the method, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=249.71746153846144) [argument variable must be declared, but it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=252.12344444444443) [does not have to be initialized. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=254.84566666666663) [method must then set the value of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=257.54742105263153) [parameter. Changes to the parameter are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=260.494789473684) [reflected in the calling code, so the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=262.7053157894734) [difference is slight. When using ref, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=265.44215789473685) [passed in argument must be a variable that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=268.38952631578957) [is initialized to a value. When using out,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=271.75794736842124) [the passed in argument must be a variable,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=275.1263684210527) [but that variable does not need to be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=278.49478947368436) [initialized. However, the method must set](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=282.04566666666653) [the value of that variable. For our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=284.8456666666664) [PlaceOrder method to return both a Boolean](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=288.1263684210526) [value and the orderText, we could use ref](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=291.4421578947367) [or out. But just glancing at these](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=295.2316315789471) [methods, it is not immediately obvious](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=298.23782352941186) [that the method returns multiple values.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=300.7084117647061) [It is much more clear to return an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=303.179) [OperationResult than to have return values](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=306.54742105263165) [hidden among the method parameters. In](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=309.0737368421054) [most cases, it is a better practice to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=311.5678888888889) [return an object than to use ref or out.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=314.6790000000002) [Before moving on, let's look at some best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=318.179) [practices when using ref and out](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=321.3789999999998) [parameters. Do use ref when the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=323.77899999999966) [expects an incoming value. Think of a ref](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=326.75042857142864) [parameter as an input and output](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=330.1790000000002) [parameter. Do use out when the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=332.75042857142887) [expects no incoming value. Think of an out](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=336.179) [parameter as an output only parameter.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=340.179) [Avoid ref and out where feasible. Instead,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=343.179) [return an object similar to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=346.679) [OperationResult we've been using.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=349.679) [Returning an object makes the returned](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=351.679) [values explicit and clearly defined. So](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=354.679) [now you know what ref and out parameters](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=357.4947894736842) [are and why you may not want to use them.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=360.02110526315795) [Let's conclude this module with some frequently asked questions.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=5&mode=live&start=363.179)

[Frequently Asked Questions](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live)

[As a review, let's look at some frequently](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=2.308) [asked questions. These are the types of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=5.546095238095239) [questions often used in job interviews.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=8.379428571428575) [What is the difference between a parameter](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=10.808) [and an argument? A parameter is part of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=13.530222222222225) [the method signature, an argument is part](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=16.64133333333334) [of the method call. What is a named](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=19.281684210526315) [argument and when should it be used? A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=22.229052631578945) [named argument uses the parameter name](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=25.262545454545453) [when calling the method. Named arguments](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=27.989818181818173) [are used to clarify the purpose of an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=30.631529411764703) [argument, making the code easier to read.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=33.92564705882353) [And named arguments allow us to define](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=36.808) [arguments without concern for their](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=39.690352941176485) [position in the parameter list. How is an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=41.74917647058826) [optional parameter defined? In the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=45.043294117647065) [signature, we define a parameter as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=47.513882352941195) [optional by specifying a default value.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=49.984470588235325) [What is the difference between passing an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=54.808) [argument by value versus by reference?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=58.03876923076922) [This was a common question my company](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=60.808) [asked of interviewees. The answer](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=63.60799999999999) [demonstrated the developer's understanding](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=65.60800000000002) [of how methods work. When passed by value,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=67.17642105263158) [which is the default, the value of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=70.12378947368418) [argument is passed to the method. When](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=73.07115789473679) [passed by reference using ref or out, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=76.05800000000002) [variable is effectively passed to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=79.65800000000004) [method. Because of this, passing by](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=82.35800000000006) [reference enables the method to change the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=84.65010526315788) [value of the parameter and have that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=87.22905263157891) [change reflected in the calling code. What](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=89.808) [is the difference between ref and out? A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=94.19688888888889) [ref parameter requires that the argument](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=97.30799999999998) [be initialized before it is passed. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=99.6413333333333) [method can modify the value for the ref](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=102.34646153846155) [parameter. An out parameter must be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=105.42338461538465) [declared, but does not need to be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=107.86682352941175) [initialized before it is passed. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=110.74917647058818) [method must provide a value for the out](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=113.308) [parameter. The goal of this module was to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=117.308) [discover techniques and best practices for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=121.12378947368421) [improving parameters in the method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=123.9658947368421) [signature. We saw how we could improve the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=126.33431578947368) [readability of a method call by using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=129.433) [parameter names. Parameter names can be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=132.058) [used to name the arguments passed to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=134.03876923076928) [method. This makes the method call much](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=136.50030769230784) [easier to read, especially when passing in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=139.058) [string literals, numbers, or Boolean](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=141.683) [values, helping prevent hard to find](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=143.6501052631579) [errors. And we saw how we could use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=146.17642105263167) [enumerations and the enum keyword to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=149.54484210526334) [define a set of valid values that can be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=152.1205) [passed into a method. We then looked at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=156.058) [optional parameters and how we can use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=159.2197647058823) [them to minimize method overload bloat.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=161.69035294117637) [Lastly, we looked at the difference](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=163.808) [between ref and out parameters, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=166.01852631578953) [concluded that in most cases we don't want](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=168.22905263157907) [to use either. So now we know how to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=171.37942857142858) [specify clear method parameters. Most of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=176.52228571428583) [the data we work with is stored in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=180.808) [strings. Next up, let's see how best to handle those strings.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m8&clip=6&mode=live&start=188.808)

[Handling Strings](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live)

[Introduction](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live)

[Most applications work with strings,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=0) [names, addresses, email, instructions, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=3.4375) [messages, just to name a few. Knowing how](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=6.875) [best to manipulate, format, interpolate,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=11.933333333333334) [and build strings minimizes errors and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=14.266666666666667) [makes the resulting code easier to read.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=17.066666666666663) [Welcome back to C# Best Practices:](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=20.64705882352942) [Improving on the Basics from Pluralsight.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=23.823529411764724) [My name is Deborah Kurata and this module](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=27) [covers best practices for handling](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=31) [strings. In C#, variables of type string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=33.5) [are used to hold textual values in our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=36.80000000000001) [application. We can declare simple](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=40.53333333333336) [strings, such a name. Quoted text, such as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=42.89473684210526) [Frodo in this example, are string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=46.68421052631578) [literals. We can define string properties](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=49.52631578947367) [on our objects, such as a vendor's company](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=52.14285714285715) [name. Here we are setting the company name](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=55.5714285714286) [to a string literal. And we can build more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=58.33333333333335) [complex strings, such as the text for an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=61.33333333333337) [order. In this example, we are combining](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=64.8) [string literals and string variables.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=68.99999999999996) [Strings in C# are immutable. That means](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=72) [that the contents of a string cannot be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=75.00000000000001) [changed after the string is created. Wait,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=78.42857142857146) [what? We already have code in our sample](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=81.44444444444444) [application that changes a string after it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=84.99999999999999) [is created. Well, it certainly looks like](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=88.11111111111109) [that is what's happening here, but in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=90.84210526315788) [reality, C# is creating a new string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=93.4210526315789) [object here to hold the new value. So this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=96) [code creates an orderText string, and this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=100.05000000000003) [code creates a new orderText string,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=103.20000000000005) [setting it equal to the contents of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=105.8235294117647) [original orderText string, plus this new](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=109.11764705882348) [text. Even though we work with strings as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=111.58823529411757) [if they are changeable, strings are, in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=115.5) [fact, immutable. It is also important to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=119) [note that a string is a reference type.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=121.92307692307693) [Every type in. NET is a value type or a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=125) [reference type. Value types store their](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=130) [data directly. Most of the built-in data](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=133) [types, such as int, decimal, Boolean, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=136.1875) [enumerations, are value types. Reference](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=139.25) [types store references to their data.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=141.6) [Strings and objects are examples of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=145.19999999999996) [reference types. Borrowing Jon Skeet's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=148.79999999999993) [house analogy, think of a type as a piece](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=151.5) [of paper. A value type could be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=156) [represented by a drawing of an orange](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=158.92307692307693) [house. I could make a copy of that drawing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=161.61538461538464) [for you. If you then colored your copy of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=164.66666666666674) [the house blue, mine is still orange.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=167.66666666666683) [Likewise, if we make a copy of a value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=170) [type, we get a copy of its data. If that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=172.6470588235293) [copy is later changed, the original is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=176.2) [unaffected. That's how value types work. A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=180.39999999999995) [reference type would be represented as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=184.5) [instructions that refer to my orange](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=187.5) [house. I could make a copy of those](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=190.5) [instructions for you so you, too, would](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=193.47058823529406) [have that reference. If you then use that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=195.94117647058812) [reference and change my house to blue, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=198.84210526315795) [would both see my blue house. Likewise, if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=201.78947368421066) [we make a copy of a reference type, we get](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=204.8235294117647) [a copy of its reference. If we then change](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=208.94117647058818) [the referenced object, the original also](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=212.8461538461538) [sees the change. So that's how reference](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=215.61538461538453) [types work. As we just stated, a string is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=219.66666666666663) [a reference type. However, to keep the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=223.94736842105272) [semantics of working with strings easy in.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=226.89473684210543) [NET, we work with strings as if they were](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=229.9230769230769) [value types. That means that we can copy a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=234.07692307692298) [string and we get a copy of the value, not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=237.54545454545462) [a reference to that value. In this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=241.18181818181836) [example, we have a string set to Frodo. If](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=243.72727272727275) [we copy that string to the variable](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=247.0000000000001) [hobbit, both the name variable and the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=249.54545454545473) [hobbit variable are both Frodo. If we then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=252.41176470588235) [change the hobbit variable to Bilbo, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=256.1764705882353) [name variable does not change. So a string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=259.4736842105263) [is a reference type that acts like a value](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=263.2631578947367) [type. With that knowledge, we are ready to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=267.5263157894734) [tackle this module. The goal of this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=271.5) [module is to identify best practices for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=274.7142857142858) [working with strings. We'll start with a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=277.7142857142859) [look at the built-in string methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=280.53846153846143) [available in. NET. Then we'll see how to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=282.8461538461536) [handle null and empty strings. We'll look](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=285.8421052631578) [at how to define verbatim string literals,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=288.42105263157873) [how to format strings, and how to use the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=291) [new C# 6 string interpolation to simplify](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=295.9999999999999) [string formatting. Then we'll look at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=299.8888888888887) [techniques for building long strings, such](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=302.25) [as the text for an order. We'll conclude](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=304.125) [with a set of frequently asked questions.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=306.70000000000005) [These are the types of questions you may](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=309.1500000000002) [see in a C# programming interview. Let's get started.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=0&mode=live&start=311.9500000000004)

[Working with .NET String Methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live)

[Since strings are so commonly used in our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=2.865) [applications,. NET provides an extensive](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=7.100294117647058) [library of string methods. We won't, of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=9.74735294117647) [course, cover all of them here. There are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=12.970263157894736) [methods to manipulate strings, such as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=15.917631578947367) [changing the case to lowercase or to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=18.12815789473684) [uppercase, or replacing text within a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=21.365) [string. This replaces any occurrence of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=24.365) [the string Vendor with Supplier. There are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=27.365) [methods to obtain information about a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=30.570882352941172) [string, such as calculating the length of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=32.6885294117647) [a string, finding a specific location in a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=35.15911764705881) [string, in this case, the location of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=37.96500000000001) [colon, or determining if a string starts](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=40.76500000000002) [with or ends with specific text, plus much](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=43.465) [more. Let's do a quick demo. Here we are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=48.265000000000015) [in Visual Studio with the Vendor class](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=52.9559090909091) [open. Let's define a method we can use to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=55.50136363636367) [test out some. NET string methods. How](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=58.77409090909097) [about overriding the ToString method?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=62.21794117647058) [Recall from earlier in this course that we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=64.57088235294117) [simply type public override and get the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=67.865) [list of overridable methods. We want to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=71.04681818181817) [override the ToString method. Let's define](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=73.97026315789472) [a string with the literal text vendor and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=76.18078947368417) [the vendor's CompanyName, and return that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=79.12815789473677) [as the result of the ToString method. Now](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=82.04681818181818) [let's create a unit test. Right-click](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=86.39833333333333) [within the method and select Create Unit](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=89.59833333333331) [Tests. The defaults are fine, so we can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=93.33166666666664) [click OK. I'll paste in the code for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=96.29978260869561) [test, and we can talk through it. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=99.43021739130425) [arrange the test by creating an instance](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=102.27676470588234) [of the vendor and assigning the VendorId](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=105.15911764705878) [and CompanyName. We expect that the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=108.04147058823521) [resulting string will include the text](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=110.73166666666667) [Vendor, plus the company name. We then act](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=113.53166666666668) [by calling ToString, and assert that the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=117.365) [expected result matches the value returned](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=120.865) [from ToString. Let's run the test, and the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=123.865) [test passes. Now let's go back to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=127.49) [Vendor class. We're going to use our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=130.99) [ToString method to try out some of the.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=133.74) [NET string methods. First, a tip for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=136.74) [finding out about the string methods](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=139.40346153846156) [available in. NET. Type in a string. We'll](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=141.71115384615388) [use the vendorInfo string defined here,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=145.0525) [and then type a dot. IntelliSense will](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=147.6775) [provide us with a list of all available](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=150.865) [string methods. Let's define a string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=154.865) [result variable. Then, let's try out some](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=157.73166666666668) [of the string methods. How about ToLower?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=160.99833333333336) [Notice that we need to set the result of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=164.27676470588236) [this method to another variable. Calling](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=168.5120588235294) [ToLower on the vendorInfo variable does](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=171.33166666666668) [not change the value of the vendorInfo](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=174.1316666666667) [variable; rather, it creates a new string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=177.39833333333337) [and assigns it to the lowercase value of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=181.0414705882353) [the vendorInfo variable. Let's try ToUpper](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=185.27676470588239) [and Replace. Let's replace the vendor text](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=188.665) [in our string with Supplier. Let's get the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=192.86499999999995) [string length, which is a property, not a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=196.81236842105267) [method. Let's locate the position of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=199.33868421052642) [colon within the string using IndexOf.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=201.54921052631596) [Lastly, we'll see if the string starts](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=204.92055555555558) [with the text Vendor, using StartsWith.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=209.19833333333338) [Now let's set a breakpoint here on our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=212.865) [first line, and debug the unit test. At](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=216.06500000000005) [the breakpoint, we can see the result of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=219.2496153846154) [each of these methods. We'll press F10 to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=222.3265384615385) [execute each line. When we hover over](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=225.68318181818188) [result, we can see that it converted the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=228.86500000000015) [text to lowercase. F10 again, and we can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=232.5013636363639) [see that it converted the result to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=235.78807692307694) [uppercase. It didn't modify the original](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=238.48038461538465) [VendorInfo string. F10 again, we can see](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=241.64277777777772) [that it replaced Vendor with Supplier.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=245.53166666666652) [F10, we can see the length is 16. F10, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=248.865) [can see that the colon is at position 6,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=254.31954545454533) [it's 0 based. F10, and we can see that the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=259.22863636363627) [string does indeed begin with the word](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=263.66499999999985) [vendor. So there's lots of available](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=266.4649999999997) [functionality here. Take advantage of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=269.365) [string methods provided in. NET as needed.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=272.365) [Before moving on, let's look at some best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=275.865) [practices when using the. NET string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=280.6650000000002) [methods. Do look at the set of string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=284.2650000000003) [methods that. NET provides before writing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=287.66499999999985) [your own. It is always better to use the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=290.0649999999997) [tried and tested. NET string methods if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=293.66499999999985) [possible, rather than build one ourselves.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=296.4649999999997) [Do use IntelliSense to view the list of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=298.865) [available methods. Avoid calling string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=303.570882352941) [methods on null strings. Let's talk more about null strings next.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=1&mode=live&start=306.5120588235291)

[Handling Nulls](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live)

[Earlier in this course, we covered how to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=2.629) [handle nullable types and null object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=5.8290000000000015) [variables. Here we'll focus on null string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=8.229000000000003) [variables. What do you think this code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=11.429) [will do? If you said throw an exception,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=14.695666666666668) [you are correct. We set the VendorInfo](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=17.746647058823523) [variable here to null, meaning that it has](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=20.217235294117632) [no value. Then we try to call the ToLower](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=23.18455555555556) [method on that null value. The result is a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=26.684555555555562) [null reference exception error. There are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=30.379) [several ways to handle null strings. One](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=33.004) [option is to use the string method called](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=36.229) [IsNullOrWhiteSpace. This method returns](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=41.02900000000001) [true if the string is null or contains](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=43.129) [only white space characters, such as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=47.129) [spaces or tabs. Unlike the methods we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=50.129) [worked with in the last demo, this method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=53.083545454545465) [is static and is called using the String](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=55.9926363636364) [class name. We then pass the string that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=58.901727272727335) [could be null to this method. Another](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=62.02899999999999) [option is to use the new null-conditional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=64.829) [operator provided in C# 6. As we saw](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=67.629) [earlier in this course, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=71.629) [null-conditional operator handles the null](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=74.129) [values for us. If null, then null, if not,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=76.629) [then dot. So if vendorInfo is null, result](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=80.71990909090908) [is set to null and the ToLower method is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=84.35627272727271) [not called. If vendorInfo is not null, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=88.31321052631579) [dot is processed, the ToLower method is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=91.68163157894735) [called, and the result is set. Let's try](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=94.629) [this out. Here we are in Visual Studio](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=98.629) [with the Vendor class open to the ToString](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=102.02900000000004) [method we were working with previously.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=105.22900000000008) [Let's change the vendorInfo variable and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=107.629) [set it to null. Now let's rerun the test,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=110.629) [and we can see that it fails. As expected,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=115.129) [we have a NullReference exception. Object](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=119.57017647058824) [reference not set to an instance of an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=122.39370588235293) [object. To prevent this error, let's use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=126.15841176470586) [the IsNullOrWhiteSpace method and put a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=128.96233333333333) [check around all of our code. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=131.29566666666665) [exclamation point or bang operator is a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=134.21723529411764) [not operator. So this says if not String.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=138.3348823529412) [IsNullOrWhiteSpace, vendorInfo, then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=143.04076470588242) [execute this block of code. By putting](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=144.629) [this method around all of these](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=148.129) [operations, we only have to do the null](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=151.129) [check once. If we rerun our unit test, it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=154.67247826086958) [will still fail, but now it fails because](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=158.58552173913048) [we're not returning the expected value. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=162.0575714285714) [no longer get a NullReference exception.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=165.05757142857132) [Now let's remove the IsNullOrWhiteSpace](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=167.629) [and try using the null-conditional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=170.57017647058825) [operator, which is new in C# 6. To use the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=173.5113529411765) [null-conditional operator, we simply add a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=178.70042857142857) [question mark before the dot. We can rerun](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=180.84328571428574) [our test, and it doesn't generate a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=184.129) [NullReference exception. Again, it fails](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=187.629) [because we are not returning the expected](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=189.89215789473687) [value. We can fix that by changing the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=192.83952631578958) [vendorInfo back to its original string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=196.20794736842126) [value. Now rerun our test, and it passes.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=199.70592307692306) [So which null checking technique is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=204.629) [better? In this particular case, using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=207.254) [IsNullOrWhiteSpace may be better, because](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=209.879) [we are performing multiple operations. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=212.07344444444445) [then only need to check the variable for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=214.7401111111112) [null one time, but in other cases, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=218.29566666666685) [null-conditional operator may be better,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=221.99742105263164) [especially if there were only one or two](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=224.36584210526328) [references. Before moving on, let's look](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=228.15531578947392) [at some best practices when handling null](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=231.32130769230773) [strings. Do handle null strings. It is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=235.09053846153856) [often easy to forget about checking for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=238.32899999999992) [null values, especially when working with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=241.47899999999984) [strings. Do write unit tests that cover](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=244.17899999999977) [null conditions. This will help check that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=246.9623333333333) [the code correctly handles null strings](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=249.6845555555555) [and ensures future changes to the code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=252.0665) [don't adversely affect how null strings](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=255.129) [are handled. Do use IsNullOrWhiteSpace](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=257.754) [when testing for null in a block of code.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=259.8790000000001) [Do use the new C# 6 null-conditional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=263.629) [operator when checking for null in single](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=267.36233333333354) [statement. Avoid is difficult here. How](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=271.09566666666706) [about avoid code that does not check for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=273.77185714285724) [nulls? If you can think of things to avoid](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=277.2004285714288) [when handling nulls, please post your](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=280.36584210526337) [thoughts to the discussion section](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=282.4184736842109) [associated with this course as described](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=284.129) [in the first module. Now let's shift gears and look at verbatim string literals.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=2&mode=live&start=290.129)

[Defining Verbatim String Literals](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live)

[A quoted string, as shown here, is called](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=2.888) [a string literal. In C#, we can insert a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=6.12609523809524) [carriage return and line feed, basically a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=9.768952380952385) [new line, into a string literal using the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=13.464923076923075) [\r\n notation. This formats the text into](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=19.003384615384615) [a nice paragraph. But what if we want the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=22.344521739130432) [\ characters to actually appear in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=25.866260869565206) [text string? As written, this text will](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=28.60539130434781) [also appear as a paragraph. That's not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=31.387999999999995) [what we want. What we need is a verbatim](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=34.18799999999999) [string literal. A verbatim string literal](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=38.23010526315789) [tells C# not to process any characters in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=41.07221052631578) [the string and just leave them verbatim,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=44.81657142857143) [basically leave them as they are. A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=47.81657142857144) [verbatim string literal is denoted by](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=50.83244444444444) [placing an @ sign in front of the string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=53.4991111111111) [quotation mark. Let's try this out. Here](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=57.499111111111084) [we are back in Visual Studio once again](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=61.74514285714285) [with a Vendor class open. Let's define a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=64.60228571428574) [new method that will return a string. Here](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=67.55466666666666) [we declare a string that contains several](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=70.66577777777775) [backslashes that we want displayed as is.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=73.388) [Now let's create a unit test. Right-click](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=77.15723076923074) [and select Create Unit Tests. Again, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=80.888) [defaults are fine, so we'll just click OK.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=84.388) [I'll paste in the code for the test, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=88.388) [we can walk through it. We arrange the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=90.31657142857138) [test by creating a new vendor and setting](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=92.6737142857143) [the expected string. We act by calling the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=96.10228571428574) [method and we display the results so we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=99.15270588235298) [can visually check it. Lastly, we assert](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=101.97623529411773) [that the expected and actual are equal.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=104.888) [Run the test, and we can see that it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=108.388) [passes. Does that mean that it worked?](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=112.888) [Let's look at the output. We did not get](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=115.91431578947368) [the results we expected. Let's go back and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=119.70378947368418) [add an @ character to define this as a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=122.84254545454544) [verbatim string literal, and we'll need to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=126.11527272727268) [do the same thing in the test. Now let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=128.66072727272723) [run the test, it again passes. Looking at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=133.15723076923084) [the output, we can see that we now get](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=137.24514285714284) [what we wanted. Let's look at one more use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=141.10228571428559) [of verbatim strings. Let's go back to the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=145.388) [Vendor class. What if we do want to format](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=149.388) [our directions into a paragraph? There are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=153.18800000000005) [several ways we can accomplish this. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=155.98800000000008) [create a new method and see how to format](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=158.788) [the instructions onto two lines. We can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=162.38800000000006) [use the Environment. NewLine. NET system](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=165.24514285714284) [property to add a carriage return and line](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=167.81657142857134) [feed between the two strings. Or we can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=171.24514285714267) [use the backslash syntax, \r\n. That also](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=175.10228571428576) [adds a carriage return and line feed](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=179.10228571428584) [between the two strings. A third way is to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=183.10228571428593) [use a verbatim string literal. In this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=187.2927619047619) [case, the new line is entered directly](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=189.95942857142856) [into the editor and retained as is. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=192.62609523809522) [downside of the verbatim string approach](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=195.91431578947376) [is that it does not align very nicely in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=198.44063157894752) [the editor. And if you put tabs in front](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=202.20618181818182) [of this text, it won't align in a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=205.88799999999998) [paragraph as expected. Each of these](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=209.16072727272723) [techniques are functionally equivalent.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=211.788) [Use whichever technique that is clearer](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=213.65466666666669) [for you. Before moving on, let's look at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=216.4546666666667) [some best practices when using verbatim](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=220.8165714285715) [string literals. Do use verbatim string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=224.245142857143) [literals when a string contains special](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=227.388) [characters, such as backslashes. Do use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=230.388) [verbatim string literals to hold folder or](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=233.32917647058824) [file names or to hold connection string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=236.62329411764705) [names. Do use two quotes to include quotes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=239.91741176470586) [in a verbatim string literal. In this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=243.3046666666666) [example, "a" should appear in the result](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=246.29709090909094) [within quotes. Avoid using verbatim](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=249.4789090909092) [strings when there is no reason for it,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=251.513) [such as for simple strings. This is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=254.513) [unnecessary and could be confusing. Let's move on now to formatting strings.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=3&mode=live&start=258.388)

[Formatting Strings](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live)

[. NET provides a built-in method for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=0) [formatting strings. Instead of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=6.449666666666667) [concatenating parts of a string, like](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=8.316333333333334) [this, we can use the built-in String.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=10.712411764705882) [Format method to format the string using a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=14.418294117647058) [template. The first parameter of the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=18.653588235294126) [Format method is the template itself. Here](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=21.001181818181816) [we want something, a dash, and something](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=23.627444444444443) [else. We define placeholders in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=26.738555555555543) [template using a number within curly](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=29.4052222222222) [braces. The number represents the 0 based](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=32.12417647058823) [order of the arguments that follow the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=35.418294117647044) [template. So the first argument after the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=38.712411764705855) [template is placed into the placeholder](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=41.58299999999999) [marked with 0. The second argument after](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=43.98299999999998) [the template is placed into the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=46.65668421052633) [placeholder marked with 1, and so on if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=48.86721052631582) [additional placeholders are defined. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=51.81457894736848) [try this out. Once again, we are back in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=55.611571428571416) [Visual Studio, this time with a Product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=60.58299999999999) [class open. We are looking at the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=63.38299999999998) [ProductCode property we defined earlier in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=66.10607692307694) [this course. The ProductCode is defined as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=68.41376923076926) [the concatenation of the Category, a dash,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=71.84966666666666) [and a SequenceNumber. Let's change the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=75.58299999999998) [ProductCode to instead use String. Format.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=78.683) [First, we define the template. We want a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=81.683) [placeholder for the product Category, then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=85.683) [a dash, then a placeholder for the product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=88.683) [SequenceNumber. Next, we define the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=92.683) [variable containing the value to put into](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=95.02915384615387) [each placeholder. We want the Category](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=98.25992307692314) [first, and then the SequenceNumber. We can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=101.30064705882354) [locate the ProductCode test, run it, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=105.00652941176473) [we can see that it still passes. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=108.72146153846154) [open that unit test. Notice how our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=113.0291538461538) [SequenceNumber is formatted here, Tools-1.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=116.77123529411766) [What if we wanted it formatted with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=119.41829411764708) [preceding 0s? Let's go back to the Product](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=123.12417647058827) [class. We can use the placeholder to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=126.808) [provide some formatting. For example, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=129.8705) [could add preceding 0s. Just add a colon](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=132.51633333333336) [after the placeholder number and define](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=136.07188888888902) [whatever formatting string that you need.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=138.73855555555576) [In our case, we want four 0s. That will](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=141.93300000000005) [format the number to four places. Going](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=146.88300000000015) [back to the test, we'll have to change the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=150.6115714285714) [formatting here as well. We run the test,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=154.46871428571416) [and it passes. Note that many of our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=158.49878947368416) [vendor tests also use the ProductCode](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=163.13036842105248) [property. So before we can run all of our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=166.60405263157872) [vendor tests, we'll need to change those](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=170.1303684210527) [expected results as well. I'll do that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=172.70931578947383) [before our next demo. There are many](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=175.383) [different built-in formatting codes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=178.18300000000005) [available, including codes to format](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=179.78300000000007) [strings, numbers, and dates. So String.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=182.84966666666662) [Format provides some flexibility and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=186.84966666666656) [advanced formatting features. But using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=190.183) [String. Format is bulky. Its placeholders](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=193.51633333333328) [are error prone, and it can muddle our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=196.91027272727274) [intent. There is a better way. Before](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=199.81936363636373) [moving on, however, let's look at some](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=203.65668421052624) [best practices when using String. Format.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=207.70931578947352) [Do use String. Format if you need to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=211.183) [insert the value of an expression into a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=214.47711764705878) [string. But if you are using C# 6, there](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=217.77123529411756) [is a better way. Do include a formatting](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=221.1303684210527) [string as needed. For example, specifying](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=224.07773684210542) [:d as part of the placeholder will format](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=226.60405263157898) [the contents of that placeholder as a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=230.39352631578961) [date. Avoid using String. Format when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=233.70931578947392) [concatenating simple string literals. In](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=237.51633333333328) [this example, the code is simply](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=240.63754545454546) [concatenating Hello and World. It would be](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=243.36481818181826) [clearer just to define "Hello World" as a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=246.57585714285716) [simple string literal. Now let's look at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=250.29014285714294) [how we can improve upon the String. Format functionality using interpolated strings.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=4&mode=live&start=255.433)

[Using String Interpolation](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live)

[String interpolation lets us format our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=2.855) [strings easily. As we saw in the last](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=5.6883333333333335) [demo, String. Format is versatile, but](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=9.46611111111111) [somewhat clunky, and is easy to use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=12.455000000000002) [incorrectly. A common mistake is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=16.305000000000007) [mismatching the numeric placeholders with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=18.855) [the method arguments. String](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=21.355) [interpolation, as shown here, lets us put](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=23.426428571428573) [the expressions directly in their place.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=27.426428571428584) [Insert a $ in front of the quote to define](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=30.855) [it as an interpolated string. Then, define](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=34.85499999999999) [the template just as we did before, but](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=37.52166666666667) [instead of numbering the placeholders, add](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=40.188333333333354) [the expression directly within the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=42.355) [placeholders. These two are functionally](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=44.855) [equivalent, but which one is easier to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=47.355) [read? One important thing to note, string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=50.71214285714286) [interpolation is new in C# 6, so you won't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=53.71214285714287) [be able to use it if you are using Visual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=57.56928571428575) [Studio 2013 or older. Let's try this out.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=63.05500000000001) [We are back in Visual Studio with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=67.855) [Product class open, again looking at the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=71.14911764705879) [ProductCode property. Let's change the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=74.03147058823522) [String. Format we created here to use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=76.2396153846154) [string interpolation instead. We'll start](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=79.47038461538467) [by deleting String. Format. Then we insert](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=81.74388888888889) [a $ in front of the first quotation mark.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=84.85499999999999) [Within the quotation marks, we already](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=88.855) [have our template defined. However,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=91.855) [directly within the placeholders, we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=94.455) [insert the appropriate expression. And we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=97.45499999999997) [can still specify a format string for the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=100.6971052631579) [SequenceNumber, just as we did with the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=104.06552631578946) [String. Format. Let's rerun our unit test,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=107.01289473684207) [and it passes. I'm going to paste back the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=110.355) [older syntax for comparison. Notice that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=114.855) [the string interpolation syntax is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=117.855) [shorter, easier to read, and has no chance](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=120.355) [of placeholder mismatches. Before moving](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=124.355) [on, let's look at some best practices when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=127.08576923076923) [using string interpolation. Do use string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=132.00884615384615) [interpolation instead of String. Format](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=135.355) [where possible. Do include a formatting](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=137.855) [string as needed. For example, specifying](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=141.07722222222216) [:d as part of the placeholder will format](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=144.41055555555542) [the contents of that placeholder as a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=148.855) [date. Avoid using string interpolation if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=151.5772222222222) [you are using Visual Studio 2013 or older,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=153.9105555555555) [because it is a C# 6 feature. Next up,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=158.855) [we'll tackle techniques for building long strings.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=5&mode=live&start=167.855)

[Building Long Strings](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live)

[In this code example, we are building a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=2.616) [string that is a bit longer, though not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=5.674823529411766) [huge. As we discussed at the beginning of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=8.733647058823534) [this module, strings in. NET are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=11.741) [immutable, so once a string is created, it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=13.991) [cannot be changed. If the string is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=16.979636363636363) [assigned a new value in the code,. NET](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=19.525090909090906) [creates a new string for us based on the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=22.434181818181813) [value of the original string, and then](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=25.90171428571428) [destroys the original string. So looking](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=28.90171428571427) [at this code, how many strings will. NET](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=31.39377777777778) [create? If you said one, you are correct.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=34.50488888888887) [Since we are concatenating these here as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=37.616) [part of the string variable](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=41.116) [initialization,. NET only creates one](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=43.616) [string. So we don't have to worry about.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=46.116) [NET creating multiple strings and the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=49.498352941176485) [associated performance impact when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=51.968941176470615) [building a string with simple](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=53.616) [concatenation, such as this. What about](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=56.393777777777785) [this example? How many strings will. NET](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=59.525090909090906) [create here? In this case,. NET could](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=62.70690909090908) [create as many as three strings. There is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=65.45810526315789) [one created here when we first initialized](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=68.40547368421049) [the orderText variable. Then, one created](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=71.15446153846153) [here when we add more text.. NET creates a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=74.38523076923073) [new string and assigns it to the value of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=79.0896842105263) [the original string, plus this additional](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=82.40547368421048) [text. Another string is created here when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=84.61599999999993) [we added more text. Every time we change a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=86.71599999999997) [string variable,. NET has to create more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=89.86599999999991) [strings, which involves more processing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=92.81599999999999) [and more memory. From this example, we can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=95.81599999999996) [get a sense for the performance and memory](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=99.19494736842103) [management issues that could be involved](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=101.72126315789467) [when building long strings. Imagine if](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=103.616) [this code continued with several more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=106.4395294117647) [changes to the orderText string. Imagine](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=109.26305882352939) [if we were building an entire page of HTML](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=112.06044444444444) [using this technique, or building a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=116.06044444444443) [complex report. To better handle building](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=118.72711111111109) [large strings,. NET provides a special](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=121.76984615384613) [class called StringBuilder. StringBuilder](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=125.00061538461533) [is conceptually a mutable string. It](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=127.116) [allows string operations, such as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=130.116) [concatenations and replacements without](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=132.616) [creating a new string. StringBuilder](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=134.84676923076924) [provides methods for manipulating its](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=137.9236923076923) [mutable string, such as Append, Insert,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=141.00061538461537) [and Replace. When we are finished building](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=143.67482352941175) [up or modifying the StringBuilder](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=146.5571764705882) [instance, we use ToString to convert the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=148.616) [value of the StringBuilder to a normal](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=151.8826666666667) [string. StringBuilder is more efficient](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=155.14933333333337) [when working with strings that are built](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=157.116) [up using many separate concatenation](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=159.741) [operations, or strings that are changed a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=161.616) [large number of times, such as within a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=164.6785) [loop. Let's see how to use the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=168.1785) [StringBuilder. Here we are back in Visual](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=172.04457142857152) [Studio with the Vendor class open. We want](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=175.01600000000005) [to change the PlaceOrder method to instead](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=178.2160000000001) [use StringBuilder. First step is to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=181.19933333333336) [initialize an instance of StringBuilder.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=184.6993333333334) [Let's change our orderText variable to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=187.616) [orderTextBuilder and create a new instance](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=191.04457142857152) [of StringBuilder, passing in our initial](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=194.47314285714302) [text. Then each time we want to append](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=197.016) [more text to the StringBuilder, we need to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=199.81599999999995) [use the Append method. We'll change it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=202.616) [here and here. We could continue this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=206.116) [technique for any other changes we need](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=209.616) [for this string, such as replacing part of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=212.78266666666667) [the string, inserting text within the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=215.89377777777776) [string, or removing part of the string.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=218.22711111111107) [When we are finished, we need to convert](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=220.82652631578955) [the StringBuilder result back in to an](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=223.77389473684227) [actual string. We do that by calling the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=226.316) [ToString method, so when we are finished](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=229.11599999999996) [with building this string, we can define](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=231.56599999999992) [an orderText variable that holds the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=234.616) [completed string. The changes we have made](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=237.616) [should not have changed how this method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=240.15446153846162) [works. Let's recheck that by running all](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=242.30830769230786) [of the unit tests. And they all pass.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=245.616) [Notice that our code is now a little more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=249.616) [difficult to read. Instead of a simple](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=253.32188235294115) [concatenation, our orderText is now](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=256.2042352941176) [defined as parameters to a set of methods,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=258.2159999999999) [making it a little harder to visually](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=261.4159999999997) [locate. Before moving on, let's look at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=264.21599999999955) [some best practices when using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=268.1159999999999) [StringBuilder. Do use StringBuilder when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=271.03266666666644) [building up a string with numerous](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=273.94933333333324) [concatenation operations. Do use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=277.44933333333313) [StringBuilder when modifying a string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=279.4731428571429) [numerous times, such as in a loop. Do](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=281.6160000000001) [consider the change in readability when](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=285.04457142857143) [determining whether or not to use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=287.6160000000001) [StringBuilder. As we saw in the demo, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=290.18742857142877) [code using string concatenation was easier](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=293.47963636363653) [to read and understand than the code using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=295.93418181818214) [StringBuilder. Avoid using StringBuilder](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=299.2069090909096) [when only modifying a string a few times.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=300.9796363636363) [There is processing and memory overhead](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=304.616) [when setting up a StringBuilder, so if we](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=306.5107368421053) [only need to append or modify a string a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=309.03705263157906) [few times, using a StringBuilder is not](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=312.616) [worth the overhead and decrease in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=316.116) [readability. The bottom line with](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=319.116) [StringBuilder is that it is a powerful](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=321.116) [tool in our tool belt. Use it wisely.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=323.741) [Let's conclude this module with some frequently asked questions.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=6&mode=live&start=328.616)

[Frequently Asked Questions](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live)

[As a review, let's look at some frequently](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=2.75) [asked questions. These are the types of](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=6.186190476190475) [questions often used in job interviews.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=9.192857142857141) [What does it mean to say that C# strings](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=11.77) [are immutable? Immutable means unable to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=15.475882352941179) [be changed. So this means that C# strings](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=17.94647058823529) [cannot be modified once they've been](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=22.00076923076924) [created. Any modification to a string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=25.23153846153848) [results in a new string being created.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=28.27) [This can affect performance and memory](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=31.77) [management. Is a string a value type or a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=34.240588235294126) [reference type? A string is a reference](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=37.94647058823532) [type that acts like a value type. What is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=40.853333333333325) [the best way to determine if a string is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=44.6033333333333) [null? It depends. Using String.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=48.35333333333328) [IsNullOrWhiteSpace is great when checking](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=50.77) [nulls for a code block. Using the new C# 6](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=53.27) [null-conditional operator is great for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=58.84692307692307) [individual code statements. What are the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=61.923846153846135) [benefits to using StringBuilder? The. NET](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=65.18176470588236) [StringBuilder class is mutable, meaning](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=68.00529411764705) [that it can be readily changed. Using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=70.35823529411763) [StringBuilder is therefore more efficient](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=74.05571428571427) [when appending lots of strings. The goal](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=76.91285714285712) [of this module was to discover techniques](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=80.70333333333333) [and best practices for handling strings.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=83.97000000000001) [We started with a look at some of the many](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=86.77) [built-in. NET string methods. We then took](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=90.34142857142861) [a look at handling null strings. We tried](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=93.03315789473683) [out String. IsNullOrWhiteSpace, and the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=96.40157894736839) [new C# 6 null-conditional operator. We saw](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=98.50684210526312) [how to define verbatim string literals](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=101.77) [using an @ sign. With verbatim string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=104.77) [literals, we could define a string that C#](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=108.17) [will leave as is. We then looked at how to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=111.90333333333335) [format strings, first by using String.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=116.49727272727272) [Format, then using the new C# 6 string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=119.22454545454544) [interpolation feature. With string](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=122.86090909090906) [interpolation, we can place the variables](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=124.70333333333333) [for our placeholders directly into those](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=127.50333333333334) [placeholders. And we saw how to use](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=130.30333333333334) [StringBuilder to build up long strings. So](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=133.36090909090913) [now we know how to better handle our strings. Only one more module left.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m9&clip=7&mode=live&start=136.38363636363644)

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[Clean Code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live)

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" This quote is from](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=13.075857142857144) [Robert Martin in his book "Clean Code: A](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=16.123476190476193) [Handbook of Agile Software Craftsmanship.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=19.17109523809523) [" This practice of writing code in a way](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=21.344764705882348) [that is readable and understandable is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=25.58005882352939) [often referred to as clean coding. The](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=28.383) [primary premise of clean coding is to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=31.532999999999994) [focus on writing code that humans can](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=34.68300000000001) [understand. If another developer doesn't](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=37.808) [understand the intent of your code, they](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=39.9955) [may make incorrect assumptions about that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=43.058) [code and make inappropriate code changes,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=46.066333333333326) [causing your code to fail. Plus, if the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=49.266333333333314) [code is easy to read and understand, it](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=52.88754545454546) [will be easier and less time consuming to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=55.43300000000002) [modify as the application is enhanced and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=57.97845454545458) [maintained over time. Let's look at one](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=60.933) [more quote from this book. "Clean code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=64.433) [always looks like it was written by](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=67.70223076923078) [someone who cares. " As an apprentice, the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=70.39453846153849) [goal is to become a skilled craftsperson.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=73.61721052631579) [Just as a craftsperson takes pride in the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=76.5645789473684) [craft they product, so should we. We](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=79.933) [should write code that we can proudly](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=82.88036842105262) [commit and confidently pass along. Let's](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=85.82773684210524) [look a little more at what it means to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=88.3176153846154) [write clean code. Clean code has the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=91.77915384615387) [following characteristics. Clean code is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=94.933) [easy to read. If the code is easy to read,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=97.433) [we can more readily see potential coding](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=101.40358823529417) [errors or bugs. If the code is easy to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=103.87417647058832) [read, we can more easily see patterns in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=106.93299999999998) [the code, which can lead to building more](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=109.59966666666661) [reusable code. Code that is easy to read](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=112.26633333333324) [is more tolerant to quick changes made](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=115.14352631578946) [under pressure, and incremental changes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=117.72247368421048) [made over time by people other than you,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=119.56457894736836) [including the future version of yourself](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=123.24878947368421) [who no longer remembers the code. Clean](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=126.0908947368421) [code has a clear intent. Its purpose is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=129.40668421052632) [clear. Its structure and naming](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=133.19615789473696) [conventions add to that understanding. If](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=135.5645789473686) [other developers understand our original](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=138.3705) [intent, they are less likely to introduce](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=140.558) [bugs over time. Clean code is simple. If](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=143.6205) [the code is too complex or too elegant to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=147.10691304347827) [be understood, it will be too difficult to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=151.01995652173918) [maintain. This can also lead to more bugs](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=154.49821739130442) [over time. Clean code is minimal. Each](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=157.6253076923077) [part of the code does one thing and does](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=160.29014285714285) [that one thing well. Most importantly,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=163.5044285714286) [clean code is thoughtful. Thought is given](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=165.71077777777776) [to each line of code as it is written.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=168.43299999999996) [Method signatures are carefully considered](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=171.933) [and method parameters are thoughtfully](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=175.11481818181812) [defined. Potential errors and exceptions](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=178.29663636363625) [are anticipated and handled. Code location](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=180.79966666666667) [is carefully considered as well. Code is](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=183.59966666666668) [organized into clean methods, methods are](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=186.808) [organized into logical classes, and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=189.433) [classes are logically organized into](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=191.6205) [layers. By building clean code and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=193.87417647058822) [refactoring smelly code where feasible,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=196.69770588235292) [you are on your way to protecting your](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=199.0506470588235) [code from bugs now and during future](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=203.39453846153845) [maintenance activities. How do the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=207.70223076923074) [techniques and best practices we've](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=210.133) [covered in this course match up with these](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=212.13300000000004) [characteristics of clean code? Throughout](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=215.33300000000008) [the course, we looked at ways to make our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=217.21871428571427) [code easier to read. We looked at how to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=219.79014285714277) [organize code within our classes to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=222.77510526315794) [improve readability, and we detailed ways](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=224.98563157894748) [to make our method calls easier to read](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=227.196157894737) [using named arguments and enum parameters.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=230.933) [We covered several ways to clarify the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=233.933) [intent of our code. We looked at naming](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=236.6552222222222) [conventions for classes, fields,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=239.76633333333328) [properties, and methods, and we saw how to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=241.32188888888888) [add XML document comments to explicitly](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=244.43299999999996) [state the purpose of our code. We saw](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=246.76633333333328) [several techniques for simplifying our](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=250.66027272727266) [code. The new null-conditional operator](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=253.38754545454532) [can perform a null check in line, removing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=255.3447647058823) [the need for excess if statements that](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=258.1682941176471) [make our code more complex. And the new](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=260.9918235294117) [string interpolation feature can simplify](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=265.22711764705855) [string formatting. We identified ways to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=267.8741764705878) [keep our code to a minimum, such as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=270.5800588235295) [auto-implemented properties, using method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=273.8741764705885) [chaining to reduce repeated code, or using](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=275.521235294118) [optional parameters to minimize method](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=279.1637692307693) [overload bloat. We also looked at the new](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=281.856076923077) [expression-bodied properties and methods,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=285.183) [though the reduction in code for this](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=286.683) [feature may not offset its impact on](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=289.433) [readability. Thoughtful coding includes](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=292.933) [carefully considering where the code](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=294.933) [resides and how it is written. At the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=297.28299999999996) [beginning of this course, we examined](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=300.88299999999987) [common application layering. We discussed](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=303.5829999999998) [the different types of classes we may want](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=305.73299999999995) [to create in each layer. We examined the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=308.93299999999977) [code that belongs in a class, and how to](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=312.2455) [separate logic into methods. Throughout,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=316.183) [this course provided many tips and](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=318.933) [techniques you'll need as you thoughtfully craft your code.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=1&mode=live&start=324.933)

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[This course covered tips and best](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=2.975) [practices for the basic features of C#,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=5.074999999999999) [but there is much more to using C# in](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=7.524999999999997) [Visual Studio than what I could show you](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=10.60657894736842) [here. Check out these other great courses](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=13.132894736842106) [from the Pluralsight library to expand](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=15.34342105263158) [your skills. Feel free to pause if you](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=17.975) [want to add any of these to your](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=21.975) [Pluralsight playlist. As I mentioned at](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=25.975) [the beginning of this course, I have a](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=28.375000000000007) [GitHub repository specifically set up for](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=31.17500000000002) [this course. It is called CSharpBP-Basics,](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=33.27500000000003) [short for C# Best Practices-Basics. It](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=37.530555555555544) [contains the starter files for this course](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=42.325) [if you're interested in going through the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=44.77500000000001) [course again and coding along. I'll also](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=47.22500000000002) [add notes and reference materials there as](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=49.606578947368426) [needed. Note that these are only the](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=51.81710526315791) [starter files for the course, and not the completed source code.](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=2&mode=live&start=54.0276315789474)

[Closing](https://app.pluralsight.com/player?course=csharp-best-practices-improving-basics&author=deborah-kurata&name=csharp-best-practices-improving-basics-m10&clip=3&mode=live)

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