[Design Patterns Overview](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live)

[Course Overview](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live)

[We use design patterns in our software](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=0) [development, without even realizing it.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=3.2500000000000004) [Design patterns offer us proven solutions](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=5.571428571428572) [to common programming problems. Once we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=8.125) [start to learn about design patterns we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=10.5625) [can deliberately take advantage of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=13.352941176470589) [benefits that they offer. But, design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=15.470588235294121) [patterns can be difficult to approach for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=17.588235294117645) [the first time. Many of the resources](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=20.05882352941176) [available are for architects and software](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=22.52941176470587) [designers, not for every day developers.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=24.64705882352939) [Our goal here is to provide an onramp to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=26.750000000000007) [the design pattern super highway, by](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=29.90000000000002) [covering the basics of design patterns and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=32) [removing some of the mystery around them.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=34.7222222222222) [We'll be focusing on the gang of four](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=37.4444444444444) [design patterns. If you don't know who the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=39.95238095238096) [gang of four is, that's just fine, we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=41.85714285714289) [meet them along the way. After this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=43.761904761904816) [course, you'll be more comfortable with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=46.210526315789494) [design patterns and ready to move on to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=48.42105263157899) [more detailed exploration. On the road to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=51.75) [getting more comfortable with design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=55.111111111111114) [patterns, we'll need to learn a bit about](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=56.50000000000001) [them. We'll take a look at what patterns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=58.722222222222236) [are. We'll also find out who the gang of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=60.94444444444445) [four is, and why people keep talking about](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=63.44444444444446) [them, with regard to design patterns. And](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=65.99999999999997) [we'll explore why it's important for all](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=68.38461538461539) [developers to learn design patterns, not](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=71.0769230769231) [just architects and designers. We're going](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=73.6) [to spend the bulk of our time in code,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=76.47619047619048) [exploring the patterns that we use every](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=78.61904761904765) [day in our development, even if we don't](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=80.28571428571433) [realize it. We'll see that we already use](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=83.5) [the observer, proxy, iterator, chain of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=87.5) [responsibility and facade patterns. None](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=90.54545454545455) [of these are very complex, we just need to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=93.27272727272728) [learn how to recognize them. Next we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=97.77777777777777) [take a look at some other useful patterns.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=100.57142857142858) [These aren't necessarily patterns that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=102.85714285714292) [use all the time, but they've been useful](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=104.66666666666666) [in many of the applications that I've](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=107.33333333333329) [built over the years. Finally, we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=109.66666666666659) [figure out what to do next. Once we've](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=111.73684210526315) [learned the basics of design patterns,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=114.68421052631575) [we're ready to start exploring at a deeper](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=116.8947368421052) [level, including the design patterns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=120.33333333333334) [library course, offered by Pluralsight.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=122.66666666666669) [You don't need any previous experience](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=125) [with design patterns or the gang of four,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=127.14285714285717) [that's what we're here to learn. This](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=130) [course does assume that you have a basic](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=132.1875) [understanding of C# and. NET, including](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=134.6875) [things like events, exception handling and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=137.69230769230774) [data binding. If you've been working with.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=140.92307692307702) [NET for six months or so, you'll follow](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=143.5625) [along just fine. But even if your brand](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=146.0625) [new to. NET or coming from another curly](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=148.5625) [brace language, you should be able to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=151.0625) [follow along the concepts without much](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=156) [difficulty. So, let's get started on our journey.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=0&mode=live&start=162)

[What Are Design Patterns?](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live)

[Here's the most commonly used definition](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=1) [of design patterns. Each pattern describes](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=3.625) [a problem that occurs over and over again](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=6.25) [in our environment, and then describes the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=9.200000000000003) [core of the solution to that problem, in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=11.300000000000008) [such a way that you can use the solution a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=13.700000000000014) [million times over, without ever doing it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=17.150000000000002) [the same way twice. This definition comes](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=19.600000000000012) [from Christopher Alexander, and it's used](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=22.250000000000004) [in pretty much every book on design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=24.75000000000001) [patterns. The interesting thing about this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=27.42857142857143) [though is that Alexander is not talking](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=29.571428571428577) [about software development. He's talking](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=32.5) [about architecture, you know, buildings](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=35) [and bridges and things like that. Let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=37.42857142857143) [take a closer look at this definition to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=40.357142857142854) [see what it really means. First, each](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=43.21428571428569) [pattern describes a problem that occurs](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=45.93333333333334) [over and over again in our environment.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=48.73333333333335) [What types of problems do we run into over](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=52) [and over again? We may need to receive a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=56.5) [notification when a process completes,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=59.875) [such as when an asynchronous call is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=61.4375) [finished, or we may need to be notified](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=63.77777777777777) [when the state of a particular property](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=66.88888888888886) [changes. We may have a complex API that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=69.61111111111106) [want to share with other developers, but](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=72.43478260869563) [we want to make it easier to work with, so](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=74.5652173913043) [they don't need to understand the ugly](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=77.76923076923077) [details of that API. We may want to add](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=80.46153846153848) [functionality to an existing object, even](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=83.38888888888886) [if we don't have the source code for that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=85.05555555555549) [object or we're unable to subclass it,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=87.94117647058823) [such as with a sealed class in C#. We may](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=91.23529411764704) [want to have a state machine that behaves](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=95.66666666666666) [in different ways, based on the current](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=98.33333333333329) [mode. We may want to loop through the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=100.66666666666659) [elements of a collection or sequence, so](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=102.23529411764703) [that we can display them or perform some](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=103.47058823529406) [other action on them. These are just a few](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=106.00000000000003) [common problems that we run into, there's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=109.60000000000008) [many, many more. How do design patterns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=112.46153846153847) [help us with these problems? Well, let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=115.69230769230774) [go back to our definition. Each pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=118.85714285714286) [describes a problem that occurs over and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=121.85714285714286) [over again in our environment. And then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=124.85714285714288) [the pattern describes the core of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=127.76923076923077) [solution to that problem. This is one of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=130.46153846153848) [the important parts about design patterns.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=133.41176470588232) [Design patterns don't give us a specific](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=135.5294117647058) [implementation; instead they describe the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=138) [major parts and how they interact with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=140.5) [each other. Because of this, each pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=144) [describes the solution, in such a way that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=146.6666666666667) [you can use the solution a million times](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=149.33333333333346) [over, without ever doing it the same way](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=152.24999999999997) [twice. This is an important aspect of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=155.58333333333323) [design patterns. We choose how we actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=158.8) [implement them. And we'll see when we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=162.0666666666667) [start looking at code the. NET framework](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=164.7857142857143) [provides implementations for many](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=167.28571428571433) [different design patterns. But if a built](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=168.75) [in implementation does not fit our needs,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=171.375) [we're free to create our own](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=174) [implementation for the pattern. In the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=177) [world of architecture, we can think about](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=179.66666666666669) [the need to cover a space. There are quite](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=182.00000000000009) [a few different roof patterns, whether](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=185.5) [arched, domed, pitched, or flat. And when](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=188.5) [we look at a general style such as the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=191.60000000000002) [pitched roof, we end up with more specific](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=194.30000000000013) [patterns, such as the triangle roof, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=196.70000000000022) [bonnet roof, cross gabled roof, pyramid](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=200.75) [roof, and hip roof. And even though we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=204.5) [have these patterns, they still haven't](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=208.33333333333337) [given us a particular implementation, such](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=210.33333333333343) [as what materials to use, what distances](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=212.47058823529412) [to span, what angles to use, and so forth.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=215.76470588235293) [We have the design patterns that give us](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=220) [the core of the solution to the problem,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=222) [but we're free to implement it however we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=224) [like. In this case, we can see a combined](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=227) [pyramid and gabled roof using slate](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=231.5) [shingles. The patterns give us a general](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=234.5) [solution, but it doesn't hinder our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=237.00000000000006) [ability to provide a unique implementation](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=239.0000000000001) [that meets the needs of our clients. And](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=241) [because design patterns do not specify a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=244.29411764705878) [particular implementation, there's often](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=247.17647058823522) [some confusion. I've been presenting on](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=250) [design patterns, for several years, and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=253.0526315789474) [there is a very common question that comes](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=254.6315789473685) [up. Someone will ask, is For example,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=256.73684210526324) [someone might ask, is event bubbling in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=266.7777777777778) [WPF an example of the Chain of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=269.5000000000002) [Responsibility pattern? Or, is it an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=272.2222222222226) [example of the Observer Pattern? The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=274.5999999999999) [answer is usually, maybe it is. Since](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=276.9999999999998) [design patterns are conceptual in nature,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=279.7999999999996) [they're often interpreted differently, by](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=282.61538461538464) [different people. And that's ok. We're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=285.3076923076924) [dealing with the core of the solution](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=288.3333333333333) [here. We're more concerned about whether](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=290.6666666666665) [our code is following the spirit and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=292.6666666666664) [intent of the pattern, rather than a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=295.3125) [particular implementation. This is an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=298.375) [interesting question, and we'll come back](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=300.5625) [to it once we've had some more experience](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=302.875) [with design patterns. So we've seen the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=305.875) [general definition of design patterns, now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=308.1428571428571) [we should look at how the patterns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=309.8571428571428) [themselves are described. Design patterns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=313.00000000000006) [generally exist in catalogs, books, or](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=316.0769230769231) [articles that describe multiple patterns.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=319.3076923076924) [When looking in the catalogs we find the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=322) [same parts in common. First is the pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=324.6666666666665) [name. This describes the pattern in a very](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=327.75) [concise way, and ideally, this should use](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=331.25) [a description that is not already in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=334.125) [common use in the development community.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=336.75) [This is how we will refer to the pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=339) [in conversation, so we don't want there to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=341.25) [be any confusion about what we're talking](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=343.25) [about. Some examples include observer,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=345.5999999999999) [decorator, repository, and model-view](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=349.55555555555566) [controller. Next, we have the problem that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=353.1111111111113) [the pattern is trying to address. As noted](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=355.9999999999999) [in Alexander's definition of design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=358.6666666666664) [patterns, this is a common problem that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=360.4375) [occurs over and over again in our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=363.5) [environment. It could be, how to make a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=366.5625) [complex API easier to use, or, how to get](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=369.7222222222224) [notification when something has changed in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=373.2222222222226) [the environment. Next, we have the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=376.66666666666674) [solution. This is the description of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=379.2631578947369) [elements or actors that make up the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=381.4736842105264) [design, including relationships,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=383.68421052631595) [responsibilities, and collaborations](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=385.75) [between those elements. Remember, this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=388.375) [just the core of the solution, not a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=392) [concrete implementation. It is up to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=396) [developer to determine what implementation](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=399.1875) [is appropriate, for the specific problem.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=401.375) [Finally, we have the consequences of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=404) [pattern. Each pattern has a cost. This is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=407.23076923076917) [something that's often ignored. As](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=410.66666666666663) [developers, we like to talk about the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=412.3333333333332) [advantages of the patterns that we use,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=414.6666666666664) [and how a particular pattern was the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=416.99999999999994) [perfect solution to a problem. But, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=419.33333333333314) [reality is that every benefit comes with a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=421.7058823529412) [cost. When we're talking about design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=424.5294117647061) [patterns, the cost is often added](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=426.64705882352973) [complexity. We need to weight these](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=429.3333333333332) [carefully against the benefits. If the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=432.13333333333304) [costs outweigh the benefits, then we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=434.7368421052631) [probably do not want to use the pattern in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=436.9473684210525) [our code. We also need to understand the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=440.26315789473654) [consequences, so that we can accommodate](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=442.76470588235304) [for them in our code. We'll see some](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=444.5294117647061) [specific examples of those once we start](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=447.0714285714285) [looking at individual patterns. Design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=449.5714285714283) [patterns catalogs will often have other](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=451.3125) [elements as well, but these are the four](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=453.1875) [parts that should be included in every](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=455.6875) [catalog. As an example, many pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=458.25) [descriptions include a concrete](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=460.5) [implementation as a reference example.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=462) [This shows how the conceptual pieces fit](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=464.5) [together in actual code. Now, let's take a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=468) [look at a particular catalog: The Gang of Four Design Patterns.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=1&mode=live&start=474)

[Who Are The Gang of Four?](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live)

[We've mentioned the Gang of Four several](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=1) [times now, so, who are they? Well, they're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=3.692307692307692) [these four people right here. And we talk](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=6.8235294117647065) [about them, because they wrote this book,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=10.117647058823533) [Design Patterns: Elements of Reusable](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=13) [Object-Oriented Software. This is one of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=15.5) [the ground breaking works on design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=18.5) [patterns, and it was originally published](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=21.45) [way back in 1994. Now the first thing you](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=24.149999999999995) [might ask is, 1994? How long ago was that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=28.19999999999999) [in computer years? That's like 300 years](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=31.999999999999993) [ago isn't it? But, the book is still](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=34.79999999999998) [relevant today. My personal copy is the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=38.35294117647058) [36th printing from July 2008, and the same](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=41.64705882352939) [1994 edition is still in print today. One](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=45.050000000000004) [of the main reasons this book is still](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=47.850000000000016) [relevant, is that we still have the same](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=50.65000000000003) [problems to solve in our programming](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=53.49999999999998) [environment. Our tools have definitely](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=55.6428571428571) [changed over the years, but we still face](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=57.599999999999994) [those same problems. Let's go back to our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=60.79999999999998) [architectural patterns for a moment. We](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=65) [saw that we have a number of patterns for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=68.25) [how to cover a space. These patterns have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=70.5) [been around for thousands of years. Does](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=72.5) [that make them any less relevant?](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=75.69230769230766) [Absolutely not. We still face same the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=78.92307692307686) [architectural problem, the need to cover a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=82.14285714285715) [space. So we still need the same core](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=85.14285714285717) [solution. But we do have much better](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=88.57142857142861) [materials and building techniques today,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=91.11764705882356) [so we can implement these patterns much](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=92.88235294117653) [more quickly and effectively than we could](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=95.4) [100 years ago. And the same is true for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=98.20000000000005) [software design patterns. Even though we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=101.8000000000001) [have progressed 300 years in computer](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=104.125) [terms, we still face the same problems.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=106.375) [And we have better development](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=109) [environments so we can implement these](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=110.66666666666664) [patterns much more quickly than when they](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=112.66666666666661) [were first described. So which design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=115.41176470588235) [patterns are cataloged by the Gang of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=118.23529411764704) [Four? The Gang of Four actually describes](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=121.52941176470586) [23 different design patterns. And these](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=124.625) [are grouped into categories to help us](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=127.25) [more easily find the types of patterns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=129.85714285714283) [that we might need. The categories include](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=131.85714285714278) [creational patterns, structural patterns,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=135.70000000000002) [and behavioral patterns. From the Gang of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=139.30000000000004) [Four book, creational design patterns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=143.8461538461538) [abstract the instantiation process. They](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=146.15384615384608) [help make a system independent of how its](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=148.46666666666667) [objects are created, composed, and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=152.20000000000002) [represented. So these are about, "How do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=154.53333333333336) [we actually instantiate our objects? "](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=157.8235294117647) [Structural patterns are concerned with how](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=160.6470588235294) [classes and objects are composed to form](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=163.4) [larger structures. So this is all about,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=166.20000000000005) [how our different pieces fit together. And](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=169) [the behavioral patterns are concerned with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=172.5) [algorithms, and the assignment of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=175.5) [responsibilities between objects. In this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=177.86666666666667) [course, we'll be touching on eight of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=180.20000000000002) [these 23 patterns. The Observer, Proxy,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=184.14285714285714) [Iterator, Chain of Responsibility, Facade,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=190.99999999999997) [Factory Method, Decorator, and Adapter.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=196.71428571428567) [When we look at these patterns, we'll see](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=200.58823529411765) [that we still use them regularly, even 20](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=204.82352941176472) [years later. In fact, these patterns have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=208.875) [become so foundational that our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=211.9375) [development environment provides built in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=214.125) [implementations for many of them. As we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=216.3125) [see, the. NET framework includes](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=219.375) [implementations of the Observer and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=221.5625) [Iterator patterns, as well as interfaces](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=223.47368421052636) [that make it easy to build our own](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=225.6842105263159) [implementations. And we can get Visual](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=228.6315789473686) [Studio to generate proxy objects for us](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=231.5) [very easily. We're going to get a general](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=235) [understanding of these eight patterns, and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=237.5789473684211) [how they can be useful to us. Once we're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=239.1578947368422) [comfortable with that, we'll be ready to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=241.66666666666669) [take a deeper dive into the detailed](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=244.00000000000009) [resources that are available to us. So,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=246.33333333333348) [after all this effort to tell you how](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=251.23809523809524) [important the Gang of Four is in the world](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=253.14285714285717) [of design patterns, and how their work is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=255.28571428571433) [just as relevant today as it was back in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=257.50000000000006) [1994, I'm going to tell you not to read](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=260.20000000000016) [this book -- yet. Don't get me wrong. This](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=263.28571428571433) [book is extremely valuable, and I think](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=267.14285714285734) [that every developer should read it at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=270.14285714285745) [some point in their career. The problem](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=272.5789473684211) [is, that the presentation is not very](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=274.78947368421063) [friendly to people who are new to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=277) [design patterns world. This book sat on my](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=279.8000000000002) [shelf for three years, before I actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=282.60000000000036) [read it. I tried reading it several times](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=284.99999999999994) [during that period, but I wasn't ready for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=287.66666666666646) [it yet. I didn't have enough experience](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=290.333333333333) [and the right background to be able to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=292.50000000000006) [follow along. But, once I was ready for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=294.90000000000015) [it, I was able to expand my appreciation](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=297.35) [for the world of design patterns. There](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=300.1500000000002) [are a number of excellent resources that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=302.60000000000036) [give us a gentler introduction to the Gang](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=305.0588235294118) [of Four patterns, including this course,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=307.8823529411767) [and the Pluralsight design patterns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=310) [library course. Once you're ready for the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=312.1666666666667) [full experience the Gang of Four book will be an excellent addition to your library.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=2&mode=live&start=315.20000000000005)

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And we've also talked about the Gang](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=8.133333333333333) [of Four book, that's more geared towards](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=10.461538461538462) [application architects, than day-to-day](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=13.692307692307693) [developers. And this leads to the question](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=15.53846153846154) [why should we care? As a developer who](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=17.894736842105253) [needs to crank out code, on a regular](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=20.421052631578924) [basis, do design patterns really matter to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=23.166666666666668) [me? It turns out there are several reasons](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=25.888888888888893) [we should care about design patterns.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=29) [First, design patterns are well-described](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=32) [solutions. Someone way smarter than we are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=34.5) [has already thought about the problem and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=38) [has come up with a solution. There are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=40.499999999999986) [very few times when we want to reinvent](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=42.89999999999996) [the wheel. It's almost always better to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=45.5) [start with someone else's working](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=49) [solution. We can always make tweaks to it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=51.5) [for our specific application if we need](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=54.33333333333335) [to. Next, design patterns provide a shared](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=56.6666666666667) [vocabulary. Other professionals, such as](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=59.76923076923076) [doctors, lawyers and accountants, all have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=62.07692307692306) [specialized words that they use to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=64.75) [communicate specific concepts with each](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=67.375) [other. Design patterns give software](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=69.5625) [developers that same type of specialized](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=72.18181818181819) [language. And the shared vocabulary allows](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=75.45454545454547) [us to use the concise language that design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=78.00000000000003) [patterns offer. Instead of saying, I have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=81.20000000000007) [a class that publishes an event, and then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=83.47058823529413) [notifies a set of subscribers when an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=85.82352941176474) [internal state changes by firing that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=88.28571428571429) [event, I can simply say, I am using an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=90.85714285714288) [observer here. And when we're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=94.4736842105263) [communicating at the design level, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=96.31578947368418) [concept is more important than the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=98.52631578947363) [specific implementation. Design patterns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=101.5) [also encourage us to stay in design mode](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=103.75) [longer. Since patterns give us the core of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=106.75) [the solution, we can think about how these](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=109.63157894736841) [big pieces fit together, before we ever](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=112.15789473684205) [start thinking about what specific classes](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=114.36842105263149) [we need to implement. This is a great way](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=116.33333333333331) [for sketching out a design on the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=119.33333333333327) [whiteboard. Whether it's a full](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=121.66666666666657) [application design, or a much smaller](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=123.25) [design, that deals with a particular](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=125.125) [function of our application. This way, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=127) [have a general idea of where we're going](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=129.44999999999996) [before we write a single line of code.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=132.24999999999991) [Now, this does not mean that our designs](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=135.00000000000003) [never change as we're writing our code, it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=137.66666666666677) [just means that we've got a fairly decent](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=140.3333333333335) [big picture view of where we're headed.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=143.76923076923072) [Finally, if we start talking in the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=147) [language of design patterns, it will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=149.05882352941168) [encourage developers around us to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=150.82352941176455) [investigate and start learning about](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=152.4375) [patterns themselves. After all, if a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=154.625) [developer hears two developers talking](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=157.25) [about the facade pattern, and how it was a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=159.3125) [good solution for a particular](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=162.125) [application, then that developer will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=163.6875) [probably be curious enough to find out](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=165.33333333333337) [what a facade is and what makes it a good](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=167.66666666666677) [solution. And this helps us propagate the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=170.875) [use of the design patterns language throughout our industry.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=3&mode=live&start=173.0625)

[Summary](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live)

[So, now we have a good idea of what design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=1) [patterns are, where they come from, and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=3.999999999999999) [why they matter to us as everyday](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=6.099999999999998) [developers. We started with Christopher](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=9.399999999999999) [Alexander's definition. "Each pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=11.846153846153847) [describes a problem that occurs over and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=13.692307692307693) [over again in our environment, and then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=16.666666666666664) [describes the core of the solution to that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=18.99999999999999) [problem, in such a way that you can use](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=21.666666666666647) [the solution a million times over, without](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=24.608695652173907) [ever doing it the same way twice. " We](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=26.891304347826075) [took a look what some of the common](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=29.805555555555557) [problems are in our environment such as,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=32.250000000000014) [getting notification when a process](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=34.388888888888914) [completes. We also saw the design patterns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=36.5) [do not specify a particular](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=40) [implementation; instead they give us the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=42.5) [core of a solution. That way, we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=44.84210526315791) [tailor our implementations to the specific](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=47.78947368421057) [problem and environment that we have at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=50) [hand. We saw the primary parts of a design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=53.5) [pattern, which include the pattern name,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=57.111111111111086) [the problem, the solution, and the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=59.4444444444444) [consequences. And we make sure that we do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=61.94117647058823) [not ignore the consequences of a pattern.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=65.70588235294116) [Then, we talked about the Gang of Four.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=69) [They produced a book way back in 1994 that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=71.52631578947364) [contains patterns that are just as](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=74.36842105263149) [relevant to us today as they were when](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=76.5) [they were first published. And probably,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=79.5) [most importantly, we looked at why we, as](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=81.76923076923077) [every day developers, should care about](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=84.84615384615387) [design patterns. They give us](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=87.79999999999998) [well-described solutions. They allow us to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=90.79999999999995) [speak in a concise, shared vocabulary, and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=93.39999999999998) [they allow us to stay in design mode](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=95.84999999999994) [longer. So hopefully you're motivated to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=98.64999999999989) [start learning about the various design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=101.00000000000003) [patterns that are available. We'll start](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=103.40000000000006) [our journey into specific patterns, by](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=105.66666666666666) [looking at some design patterns that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=107.66666666666663) [use every day, even if we don't realize](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=109.99999999999993) [it. Once we recognize these patterns, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=112.875) [can start using them more intentionally in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=115.5) [our code. First up, we'll take a look at the observer and proxy patterns.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m1-overview&clip=4&mode=live&start=120)

[Patterns You Already Use: Observer and Proxy](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live)

[Overview](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live)

[It turns out we already use](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=0) [implementations of design patterns all the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=3.2307692307692304) [time. We'll start by taking a look at two](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=6.461538461538461) [of those patterns, Observer and Proxy. For](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=10.71428571428571) [both of these patterns, we'll look at the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=13.789473684210526) [Gang of Four description, consider a real](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=16.105263157894733) [world example that shows the concept of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=18.131578947368425) [the pattern, and then take a look at a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=20.14285714285714) [common C# implementation that's right in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=22.7142857142857) [the code we use regularly. Once we've seen](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=24.42857142857141) [the everyday usage, we'll look at a more](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=28) [specialized example and consider the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=32) [consequences of the pattern. Taken](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=34.35294117647059) [together, these will help us become more](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=36.11764705882352) [comfortable with the design patterns we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=38.58823529411763) [already use. Once we're able to recognize](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=40.736842105263165) [the patterns, we can start to use them](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=43.31578947368424) [more intentionally based on the problems](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=46.2631578947369) [that we face in our programming environment.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=0&mode=live&start=51)

[Observer Pattern Described](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live)

[We'll start by looking at the observer](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=1) [pattern. Here's the Gang of Four](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=3.8823529411764697) [description: Define a one-to-many](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=6.352941176470589) [dependency between objects so that when](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=8) [one object changes state, all its](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=10.625) [dependency's are notified and updated](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=13.25) [automatically. As mentioned, the Gang of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=15.466666666666667) [Four descriptions are not necessarily the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=18.26666666666666) [most easily approachable, but this doesn't](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=21.06666666666665) [mean that understanding the patterns needs](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=24.15384615384616) [to be difficult. In this case, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=27.3846153846154) [Observer Pattern is simply a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=30.818181818181813) [publish/subscribe relationship. Our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=33.09090909090908) [publisher, which is also referred to as](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=34.40909090909091) [the subject, is the object that we want to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=37.27272727272725) [watch for a state change. Then we have one](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=40.95454545454541) [or more subscribers, also referred to as](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=44.66666666666666) [observers. These are the dependent objects](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=47.58333333333331) [that will be notified when the state](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=50.3076923076923) [changes. When our publisher changes state,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=53.53846153846152) [for example if we have a new article](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=55.99999999999999) [posted to a blog, it notifies all of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=59.19999999999998) [subscribers that a new article is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=62.77777777777777) [available. How the actual notification](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=65.11111111111109) [happens is up to the implementation. As an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=67.05555555555551) [example of where we find the observer](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=70.16666666666666) [pattern in real life, let's think about](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=72.88888888888886) [Twitter. Specifically, the Follow](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=75.61111111111106) [capability allows us to set up an observer](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=77.74999999999999) [relationship. When I follow someone on](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=82.41666666666661) [Twitter, whenever that person's state](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=84.9047619047619) [changes by adding a new tweet, I get](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=86.8095238095238) [notified of it. And it's not just one](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=89.85714285714283) [person who gets notified of that state](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=92.74999999999997) [change, everyone who is a follower gets](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=95.19999999999993) [notified. It turns out that if you've used](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=97.64999999999989) [an event handler in. NET, you've used the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=100.47058823529416) [observer pattern. Let's take a look at a quick example in code.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=1&mode=live&start=103.29411764705891)

[Demo: Everyday Observer](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live)

[So here we are in Visual Studio to find](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=1) [out how when we hook up an event handler,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=3.4545454545454533) [we're actually using an implementation of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=5.909090909090906) [the observer pattern. Let's run this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=8) [application to see what we have. So right](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=11) [now we have just a very simple form. It](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=14.521739130434781) [has one button on it and this button](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=16.869565217391298) [doesn't actually do anything when we click](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=18.956521739130423) [on it right now. Let's go to the code](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=21.199999999999996) [behind and actually hook up some event](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=24.799999999999983) [handlers. So we'll start out and we'll say](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=27.599999999999973) [ClickMeButton. Click and we'll say += and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=30.94736842105264) [Visual Studio offers to create an event](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=33.89473684210527) [handler for us. I'm going to go ahead and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=36.53846153846153) [hit Tab to accept that and then it asks](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=38.96153846153843) [what we want to name it. Let's go ahead](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=41.38461538461533) [and call this Observer1 since that's what](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=44.199999999999996) [we're actually creating, an observer. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=46.999999999999986) [in our event handler, we'll just do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=49.25) [something very simple. There's a TextBlock](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=51) [on the form, so let's just set this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=52.5) [TextBlock to Hello from Observer 1. And to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=54.900000000000006) [show that we can have multiple](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=58.50000000000003) [subscribers, let's go ahead and create a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=61.200000000000045) [couple more of these. Let's go ahead and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=63.833333333333336) [just copy and paste a couple more. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=66.05555555555551) [we'll add an Observer2 and an Observer3.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=68.7) [And for Observer2 we'll set the TextBlock2](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=73.60000000000002) [to Hello from Observer 2 and for Observer3](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=78.50000000000004) [we'll do something a little bit different,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=83.16666666666666) [we'll actually set a MessageBox and we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=85.88888888888886) [say Hello from Observer 3. So now when we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=88.61111111111106) [run the application, we'll actually see](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=94) [this publish/subscribe relationship in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=97.75) [action. When we click the button, it's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=100.16666666666666) [actually changing state. That's the state](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=104.24999999999996) [that we want to be notified about. So when](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=107.14285714285714) [we click the button, all three of our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=110.57142857142856) [observers are notified of that. So you can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=113.61904761904759) [see we have our TextBlock that says Hello](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=116.3333333333333) [from Observer 1, our other TextBlock that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=118.99999999999993) [says Hello from Observer 2, and our pop-up](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=121.46666666666667) [that says Hello from Observer 3. So here](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=125.20000000000002) [we see an implementation of the observer](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=128.75) [pattern, that's all there is to it. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=131.375) [key here is that design patterns are not](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=134.25) [difficult to understand. Once we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=136.25) [understand the basic concepts, it's very](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=137.73684210526318) [easy to see how we have these](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=139.94736842105272) [implementations in our code and we use](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=142.52631578947384) [them all the time. Now that we've seen a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=145.04999999999998) [very simple implementation of the observer](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=148.19999999999993) [pattern, let's think about some of the consequences.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=2&mode=live&start=150.2999999999999)

[Observer Consequences](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live)

[So let's match up the code that we just](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=1) [looked at to our description of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=4) [observer pattern. The publisher is the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=6.333333333333331) [button and the event handlers are the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=8.833333333333334) [subscribers. Whenever the button state](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=12.041666666666671) [changes, in this case the click state, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=14.078947368421055) [event fires, which causes all of the event](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=17.236842105263165) [handlers to fire. In this particular case,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=20.333333333333332) [we don't have a payload, we just want to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=22.666666666666657) [know when the click happens. But as we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=25.666666666666647) [see, we can get much more complex in the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=28.200000000000003) [type of information that we're passing](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=30.90000000000001) [using the observer. There are a number of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=32.7) [things that we need to consider when using](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=37.25) [the observer pattern. The first is that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=39.25) [the observer may never receive a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=41.599999999999994) [notification. If the state that we care](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=43.999999999999986) [about never changes, then we'll never get](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=46.799999999999976) [notified about it. This means that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=49.19999999999999) [should be prepared with a valid initial](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=51.29999999999997) [state and not rely on receiving a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=53.39999999999995) [notification. Next is that we may get](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=56.222222222222214) [repeated notifications depending on how](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=59.333333333333314) [the publisher behaves. As an observer, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=61.55555555555553) [need to be prepared to get a duplicate](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=64.2105263157895) [notification and deal with it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=67.1578947368421) [appropriately. If we're performing simple](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=69) [work with the notification, we may not](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=71.33333333333334) [care about duplicates, but if a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=74.60000000000002) [notification kicks off a longer process in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=76.8181818181818) [the observer, then we need to check to see](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=78.72727272727266) [if the state data that we care about is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=81.18181818181806) [really different. Another consequence is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=84.8235294117647) [that we may receive notifications very](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=87.17647058823528) [quickly. In the example that we just](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=90) [looked at, the frequency of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=92.3333333333333) [notifications depends on how quickly the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=94.33333333333327) [user can click the button, but in another](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=96.42105263157895) [environment, such as realtime diagnostics,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=99.7894736842105) [we may end up getting several hundred or](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=101.89473684210523) [thousand notifications per second. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=105.23529411764704) [observer needs to keep this in mind to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=107.29411764705878) [determine the best course of action. It](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=110.58823529411757) [may be that each notification is processed](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=112.99999999999997) [or it may be that a sampling of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=115.33333333333327) [notifications are processed, such as every](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=118.46153846153847) [tenth record or every 2 seconds. Basically](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=121.23076923076927) [when we use the observer pattern, we need](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=124.53333333333333) [to be prepared for unexpected updates.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=128.79999999999998) [Another thing to be concerned with has to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=132) [do with how we handle the subscription](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=134.5) [process. If we use strong references in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=136.6875) [the subscription, we may end up preventing](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=139.33333333333331) [the garbage collector from disposing of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=142.05555555555551) [those subscribers, even when they're no](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=144.5) [longer used. This list of consequences is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=147.5) [not exhaustive. There are other](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=151) [consequences to be aware of, but these are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=152.68181818181816) [the most common that we have to deal with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=154.49999999999991) [in our day to day programming. Let's take](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=156.5454545454544) [a look at another example that uses a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=159.33333333333331) [different implementation of the observer](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=162.4444444444444) [pattern, and in this example we'll be able](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=164.33333333333334) [to see some of the consequences that we see here in an actual application.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=3&mode=live&start=167.00000000000009)

[Demo: Stock Ticker](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live)

[So here we are in Visual Studio. This time](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=1) [we'll be looking at the project called](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=5.23529411764706) [Observer-StockTicker. This will show the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=8.529411764705884) [EventAggregator in action. Now one of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=10.333333333333336) [cool things about the EventAggregator is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=12.666666666666673) [it's designed to work with publishers and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=14.666666666666677) [subscribers that don't know anything about](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=17.571428571428566) [each other. So rather than a publisher and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=20.142857142857128) [subscriber knowing directly about each](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=23.25) [other, a subscriber will subscribe to an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=25.125) [event and then a publisher will publish](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=27.94736842105263) [that event. So let's see how this works in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=31.263157894736835) [action. First we'll run our application to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=35.52631578947367) [see what we have in place right now. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=37.71428571428571) [you can see we have two windows, we have a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=40.36842105263158) [Stock Generator window and a Stock](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=44.052631578947405) [Receiver window. In the Stock Generator](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=46.2631578947369) [window, we have a drop-down with different](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=48.64705882352942) [stock IDs that we can select. Then when we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=51.529411764705905) [click the Generate One button, it will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=55.00000000000001) [generate a stock value for that selected](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=57.33333333333336) [item. If we click Generate 100, it will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=59.66666666666671) [actually generate 100 items all at the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=62.625) [same time. And we can see if we change to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=65.25) [a different stock and click Generate, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=68.66666666666663) [can see those items come up and we can do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=70.99999999999993) [either Generate One or Generate 100 for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=74.36842105263158) [all of these. Now notice our Stock](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=76.9473684210526) [Receiver isn't doing anything right now.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=79.52631578947363) [That's because we haven't actually hooked](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=81.83333333333334) [up our subscriptions yet. So let's dive](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=84.33333333333337) [into the code of this application and see](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=87.3125) [how things are put together. We'll start](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=90.8125) [by looking at the App. xaml. cs file. This](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=93.72727272727272) [is where all of our windows get created,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=96.99999999999996) [and more importantly it's where our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=99.90909090909084) [EventAggregator gets created. Again, in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=102.41176470588235) [this situation, our two windows do not](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=104.76470588235293) [know anything about each other, they](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=108.05882352941174) [communicate through the EventAggregator.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=110.75) [So if we look in our application's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=112.5) [OnStartup event, you can see the first](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=115.5625) [thing we do is create an instance of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=118.625) [EventAggregator. Then we create a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=122.5625) [StockGenerator window and a StockReceiver](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=124.77777777777777) [window. Notice that both of these items](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=126.99999999999999) [take an EventAggregator as a parameter.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=130.11111111111114) [This way, each window knows about the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=132.75) [EventAggregator so it can either publish](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=135.8125) [or subscribe to an event as appropriate.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=138.38888888888889) [Now the EventAggregator lets us be very](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=141.1111111111111) [creative when it comes to the types of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=143.8333333333333) [events we publish and the payload that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=146.7647058823529) [send along with it. In this case, we have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=149.58823529411754) [an event called a StockTickerEvent. This](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=153.66666666666666) [descends from the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=156.86666666666665) [CompositePresentationEvent, which is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=158.46666666666664) [another items that's in the Prism](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=159.66666666666669) [Framework. But what's important here is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=161.66666666666674) [that CompositePresentationEvent takes a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=163.6666666666668) [generic parameter type. In this case, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=165.4) [created a custom type called](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=168.66666666666669) [StockTickerPayload. This lets us create an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=171) [object that has all of the data that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=173.28571428571428) [want to pass to our subscribers. In this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=176.7142857142857) [case, we have a StockId, which is a string](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=179.84210526315792) [and a StockValue, which is a float value.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=183.63157894736855) [So now that we've seen the event itself,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=187) [let's go to our StockGenerator window and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=189.79999999999995) [see how this event gets published. Our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=192.24999999999991) [StockGenerator class has four private](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=195) [fields. These are the items that we use to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=197.5) [keep track of things internally. Our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=202) [currentValue will be the value of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=204.66666666666663) [stock. We're actually randomly generating](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=207.58333333333323) [numbers here just so that we can have a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=209.5) [variety of outputs. Next, we have an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=212.875) [instance of the EventAggregator. Again,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=215.68421052631584) [this is what we can use to publish our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=217.78947368421063) [events. After that, we have a Random](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=221.57894736842127) [object. This lets us randomly generate](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=225) [numbers for our StockValues. And then the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=228) [last item we have is a list of stockIds,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=230.59999999999997) [and these are just the list of IDs that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=232.39999999999986) [show up in that drop-down list. Let's go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=234.19999999999976) [to our constructor and see how everything](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=237.46153846153845) [gets initialized. Now as a reminder, our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=241.76923076923075) [StockGenerator class takes an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=245.30769230769226) [EventAggregator as a parameter. This is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=247.15384615384608) [how we get that instance that's shared by](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=249.76923076923077) [our entire application. So you can see the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=252.84615384615387) [first thing we do is we assign that to our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=255.34615384615387) [local field so that we can access it in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=258.0384615384616) [other methods. Then we do some](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=260.46153846153857) [initialization. You can see we're setting](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=262.2631578947369) [up our random value, we're also putting in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=264.1578947368422) [our list of stockIds, then we're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=266.68421052631595) [populating our Combo box with those IDs](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=268.8421052631578) [and we're setting the default value to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=271.42105263157873) [first item, which is ABC. When we look at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=274.3) [our Button\_Click event handlers, we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=277.0000000000001) [see that these both call](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=278.8000000000002) [GenerateTickerEvent, either 1 time or 100](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=280.7142857142857) [times. Inside our GenerateTickerEvent, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=285.00000000000006) [actually do the work to create one of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=288.57142857142867) [these stock notifications. So what we do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=291.9090909090909) [in here is setup a delta value, and this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=294.13636363636357) [will give us a value between -1 and 1 that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=297) [we can use to alter the value of our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=300.8095238095241) [current StockValue. Then we get the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=304.23809523809575) [StockId from our Combo box. After that, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=306.79999999999995) [apply that delta value to our current](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=310.39999999999986) [StockValue and then we create an output](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=313.5499999999998) [string. This is so we can add it to our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=315.6363636363635) [local list on the StockGenerator screen so](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=318.36363636363603) [that we can see all of the items that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=320.2857142857143) [we've generated. Now that we have that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=322.8571428571428) [basic information, we can publish the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=324.8571428571427) [event. So here we create an instance of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=326.7777777777778) [the StockTickerPayload object and we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=329.88888888888914) [assign the values for the StockId and the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=331.8333333333337) [StockValue. After that, we actually use](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=336.0769230769232) [our EventAggregator. Now the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=339.76923076923106) [EventAggregator uses a very fluent](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=341.79999999999995) [interface. So the first thing we do is we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=343.79999999999984) [call GetEvent and we pass in the event](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=347.39999999999964) [that we're looking for, in this case, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=350.53846153846143) [StockTickerEvent. Once we have that, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=353.6153846153843) [call Publish and we pass in the payload as](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=356.5) [the parameter. So this has the effect of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=361) [firing the StockTickerEvent with the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=364.66666666666674) [StockId and StockValue that we just](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=366.888888888889) [created. And this will notify anyone who](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=369.55555555555577) [subscribed to the StockTickerEvent. So now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=373) [that we've seen how the event gets](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=375.66666666666663) [published, let's see how we subscribe to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=377.99999999999983) [this event. For this we're going to go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=380.33333333333303) [over to our StockReceiver window. Let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=382.6363636363635) [pop this open and take a look at what we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=384.272727272727) [have inside. Our StockReceiver window is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=387) [actually fairly simple. We have a couple](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=390.33333333333326) [of private fields, we have an int value](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=393.4000000000001) [that will hold the number of received](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=396.2000000000003) [notifications, this is so that we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=398.65000000000043) [display on screen how many notifications](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=401.39999999999986) [we've actually gotten. Then we have a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=403.7999999999997) [field for the stockFilter. We'll see how](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=406.17647058823536) [this works in just a bit. If we look at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=408.23529411764724) [the constructor, we see that this takes](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=411.33333333333326) [two parameters, the EventAggregator, and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=413.66666666666646) [an optional StockId that we can use for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=415.33333333333303) [filtering. So we can see here we take the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=418.10000000000014) [stockID parameter that's coming in from](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=421.25000000000034) [our constructor and assigning it to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=423.375) [stockFilter field that we have on our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=426) [class. Then we have an if/else statement.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=428.625) [If the stockFilter property is empty, then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=431.39999999999986) [we just want to add a standard](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=434.1999999999997) [subscription, else, if it's not empty, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=437) [want to include a subscription with a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=440.2666666666665) [filter. So let's see how we implement](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=443.53333333333296) [this. So just like with our publisher, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=445.82608695652164) [first thing we need to do is get an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=448.26086956521715) [instance of the event we want to subscribe](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=451) [to. So we'll go to the EventAggregator and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=453.9473684210525) [we'll call GetEvent and we'll tell it that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=456.894736842105) [we would like the StockTickerEvent. And](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=459.8421052631578) [then again, since this is a fluent](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=462.05263157894717) [interface, we can just hit dot and we have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=464.6315789473681) [the option to subscribe to the event. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=467.6666666666665) [this Subscribe method actually has quite a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=470.3636363636364) [number of overloads. The simplest one is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=472.909090909091) [that we pass in the event handler that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=475.33333333333326) [want to be called when this event fires.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=478.3333333333331) [Now we already have an event setup below](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=481) [called ProcessStockTickerData, so let's go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=486.17647058823513) [ahead and add that. And to make things](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=489.4117647058821) [easier to see, we'll go ahead and just](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=492.8421052631579) [break up our line a little bit. So the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=494.52631578947376) [result of this is that when someone](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=496.875) [publishes the StockTickerEvent on the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=499.9375) [EventAggregator, our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=502.125) [ProcessStockTickerData method will run and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=503) [notice that our ProcessStockTickerData](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=505.9166666666666) [method takes a StockTickerPayload as a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=508.24999999999983) [parameter. So we actually get the data out](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=510.99999999999994) [of that event and we can use it to update](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=513.6666666666667) [our UI. If we run the application now,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=517) [we'll actually be able to see the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=519.5263157894733) [notifications happening on our Stock](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=521.7368421052624) [Receiver. So now if we click the Generate](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=523.3157894736842) [One button, you can see our Stock Receiver](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=525.8421052631575) [has received that item. If we click](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=528.3684210526308) [Generate 100, we can see that our total](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=531.3809523809524) [number of received goes up quite quickly](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=535.1904761904763) [and in this case, we're not actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=538.5238095238096) [filtering our data, so if we change to a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=540.7999999999997) [different stock item, our Stock Receiver](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=543.4999999999993) [will receive that as well. And again, just](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=545.4285714285714) [by clicking the Generate 100, we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=548.857142857143) [generate a lot of events very, very](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=551.8571428571431) [quickly. So let's restart this application](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=554.6666666666667) [so we can talk a little bit about the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=556.666666666667) [consequences that we saw earlier. First,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=559.6666666666673) [we can't rely on ever getting a single](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=562.8571428571428) [notification. So notice our Stock Receiver](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=567.4285714285712) [window right now. It just says Total](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=569.7857142857144) [Received 0. And if no notifications are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=572.2857142857147) [generated, that's exactly the way this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=575.1428571428572) [window will stay. This isn't very useful,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=577.7142857142859) [we might actually want to have a little](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=580.4117647058824) [bit more information on this. So this is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=583.2352941176473) [something to keep in mind. We might not](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=586.1999999999999) [ever receive a notification. Now we saw](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=589.3999999999997) [that when you click the Generate One](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=591.7894736842106) [button, the notifications come in at a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=593.6315789473688) [fairly reasonable rate and we can actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=595.4736842105269) [see those numbers changing. But if we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=598.3684210526318) [click Generate 100, now we're getting 100](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=601.6842105263163) [events at a time. So in this case, just by](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=605) [clicking the button a few times, you can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=607.9166666666663) [see that I'm able to generate several](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=610.2499999999993) [thousand events that my Stock Receiver](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=612.5) [needs to be aware of. Now one thing I](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=615.5) [might do to mitigate this is just go in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=619.1666666666665) [and say, give me every tenth response, or](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=621.7916666666662) [I might even say, I'm just going to do a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=624.1249999999992) [sampling, get me a new value every 2](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=627.1875) [seconds. It really depends on what our use](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=629.6875) [case is. Even though we're getting](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=632.0999999999997) [notified of 100 values, we're not actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=633.8999999999994) [able to display all of those to our users.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=636) [Now we could just as easily add a ListBox](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=638.8636363636368) [to our Stock Receiver, but we need to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=641.7272727272737) [determine what's actually useful for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=644.4736842105262) [application. Now one of the other items](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=646.315789473684) [that we talked about as far as](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=648.894736842105) [consequences are concerned had to do with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=651.1428571428573) [whether we ended up with a strong](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=653.1428571428577) [reference or a weak reference when we hook](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=655.142857142858) [up this event. With a strong reference, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=657.9999999999999) [always have a reference to this object,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=661.1999999999997) [even if it's no longer being used. That](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=664) [would actually prevent the garbage](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=666.666666666667) [collector from picking it up. So in that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=668.3333333333338) [situation, we usually want to unsubscribe](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=671.1666666666667) [from an event before we're done with our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=673.5000000000002) [object. That way we know we're not holding](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=676.6111111111115) [any references. But another option is to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=679.7222222222224) [use a weak reference. This is a reference](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=682.4444444444448) [that doesn't keep the garbage collector](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=685.3333333333335) [from acting. So this means if our object](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=687.3333333333337) [is no longer being used, even if the event](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=689.9090909090912) [is still hooked up, the garbage collector](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=692.772727272728) [will pick it up. We actually have options](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=695) [for that in the EventAggregator. This is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=698.0769230769229) [one of the consequences that was addressed](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=700.7692307692307) [specifically by this object. So let's look](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=703.4615384615382) [at the overloads that we have on our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=706.1538461538461) [Subscribe method. Notice our value is bool](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=709.2307692307689) [keepSubscriberReferenceAlive. That tells](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=713.0000000000001) [us whether we want a strong reference or a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=714.8000000000002) [weak reference. So if we set this to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=719.8181818181818) [false, that means that we don't actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=723.0909090909088) [want to keep this alive. So if our class](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=725.9545454545449) [goes out of scope, even though this event](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=729.1428571428573) [is still hooked up, the garbage collector](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=731.428571428572) [is free to pick up the object. Now one](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=733.4285714285724) [other really cool feature of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=736.6666666666669) [EventAggregator is that it allows us to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=738.9523809523813) [pass in filters so that we can only react](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=741.6190476190482) [to payloads that we care about. In this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=745.4285714285716) [case, we can actually filer the items we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=748.8) [receive based on the stockID. Let's go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=751.9999999999998) [ahead and hook up that subscription, and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=754.6666666666667) [we can do that here in our else block. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=757.0000000000003) [just like above, we'll say](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=760.5333333333333) [EventAggregator. GetEvent and we'll pick](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=763.1999999999998) [the StockTickerEvent, and then we'll say.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=765.8666666666663) [Subscribe and we still hook up our same](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=769.5) [method, ProcessStockTickerData. Now the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=775.5) [overload that we use will actually be this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=777.5882352941176) [one right here that takes four parameters.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=779.9411764705878) [The second one is a ThreadOption. This is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=782) [actually pretty cool because this allows](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=784.9473684210525) [us to choose where our event will run,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=787.1578947368419) [either on the BackgroundThread, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=790.5) [PublisherThread or the UIThread. We'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=793) [just choose the UIThread here. Then we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=795.4117647058823) [have the option to keep the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=798.2941176470586) [SubscriberReferenceAlive, so we'll set](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=800.7647058823525) [that to false. And then finally we have a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=802.4285714285714) [predicate for the filter. For this we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=806.2857142857144) [use a lambda expression. So here I'll just](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=809.4545454545455) [say p for payload, and we'll say p.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=812.3636363636365) [StockId equals this. stockFilter, so this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=815.2727272727275) [will actually setup a filter so that our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=818.2222222222222) [subscription will only respond to events](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=822.6666666666665) [that have a particular payload. Now let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=826) [go back to our App. xaml. cs and hook up a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=830.3333333333331) [couple more receivers. So here we have a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=837.1428571428567) [second Receiver window and this is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=840.904761904762) [actually set so it will only respond to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=843.1904761904765) [stock ABC. Then we have a third Receiver](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=846.2380952380958) [window and this is set to only respond to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=849.8235294117649) [stocks XYZ. Let's go ahead and take care](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=854.0588235294122) [of a few logistical items so that we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=856.9090909090912) [actually show these in the right](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=859.772727272728) [locations. So now when we run the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=861.6818181818193) [application, we actually end up with three](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=864.4705882352939) [different Stock Receiver windows. Our top](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=867.3529411764702) [window is setup with no filters, so it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=869.9333333333334) [should receive all stock events. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=873.666666666667) [second window is setup to respond only to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=876.3695652173913) [stock ABC and the third one is setup to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=879.3260869565213) [only respond to stock XYZ. Let's see if](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=882.6521739130426) [this actually works. So if we say Generate](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=885.3863636363635) [One on ABC, we see that our first two](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=887.7499999999995) [windows are responding. If we change it to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=890.4090909090901) [RUFF, we see that now only our top window](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=894) [is responding and if we set it to XYZ, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=898.5) [see that both our top window and our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=903.3076923076923) [bottom window is subscribing. And again,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=905.7692307692304) [this is true of the Generate 100 as well.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=907.6666666666667) [So we can setup multiple subscribers to a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=910.6666666666671) [single event very easily and with the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=913.333333333334) [EventAggregator, subscribers only care](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=916.1875) [about the event, they don't actually need](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=917.9375) [to know about the publisher. So if our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=921) [Stock Receiver and Stock Generator were in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=923.8235294117649) [completely different modules of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=926.2941176470591) [application in different assemblies, all](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=928.125) [they need to know about is the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=930) [EventAggregator that they can use to setup](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=932.625) [the subscription and to publish the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=935.7692307692307) [events. So now that we've seen a more](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=938.5384615384614) [advanced implementation of the observer](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=941.3333333333336) [pattern, let's go back and review some items about it.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=4&mode=live&start=943.0000000000005)

[Observer Review](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live)

[In our StockTicker example, we saw that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=0.5) [the observer pattern simply describes a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=3.4999999999999996) [publish/subscribe relationship and using](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=6.071428571428572) [the EventAggregator to setup that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=8.23076923076923) [relationship, our publisher and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=11.115384615384613) [subscribers can be completely isolated](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=13.42307692307692) [from each other. This is a little bit](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=15.333333333333336) [different from our standard event handler](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=17.999999999999996) [that we saw earlier where the subscriber,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=20) [which was the Button\_Click handler, needed](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=22.722222222222225) [to be aware of the publisher directly, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=25.05555555555556) [button, in order to setup that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=28.5) [relationship. But our StockTicker also](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=31.5) [showed us some of the consequences of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=33.230769230769226) [pattern. We may not get an initial](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=35.69230769230768) [notification. Also, notifications may come](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=39) [quickly or repeatedly as we saw when we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=41.5) [generated 100 stock events at a time. How](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=45.40909090909091) [we handle these issues should be based on](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=48.68181818181816) [the needs of our application. We also saw](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=51.95454545454541) [how the EventAggregator helps mitigate one](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=54.94736842105264) [of the consequences, which has to do with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=56.84210526315791) [whether an event keeps the garbage](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=59.36842105263161) [collector from collecting an object. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=62) [far, we've seen two implementations of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=65) [observer pattern, but there's another](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=68.4375) [built in mechanism to help us implement](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=70.625) [the observer pattern. In. NET 4. 0, we got](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=73.6875) [a new set of interfaces that are designed](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=77.18181818181816) [for the observer pattern, IObserver of T](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=80.09090909090904) [and IObservable of T. These interfaces are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=82.63636363636355) [fairly straightforward to use. The generic](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=86.59999999999997) [type parameter T is the payload we want to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=89.73684210526315) [use. This would be similar to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=93.05263157894733) [StockTickerPayload class from our last](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=95.63157894736835) [example. The observer has three methods,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=98.85714285714283) [OnNext, OnCompleted, and OnError. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=103.14285714285708) [OnNext method is called by the publisher](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=106.38461538461539) [when a notification is available. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=109.0769230769231) [OnNext parameter will contain the payload](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=111.6) [of that notification. The OnCompleted](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=115.19999999999996) [method can be called to let the observer](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=117.66666666666666) [know that there will be no further](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=120.33333333333329) [notifications. And OnError can be called](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=122.66666666666659) [if the publisher has a problem. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=125.5) [corresponding interface is IObservable of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=129) [T. This interface is implemented by the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=131.5) [publisher. This is just a single method,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=134.4705882352941) [Subscribe, which takes an IObserver of T](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=137.35294117647052) [as a parameter. The entire Observer object](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=140.4) [is passed into the publisher. This allows](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=143.66666666666669) [the publisher to keep track of all of its](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=146.66666666666669) [subscribers. When it needs to publish a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=149.66666666666677) [notification, it simply calls the OnNext](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=151.89473684210532) [method of each of the subscribers and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=153.78947368421063) [passes in the appropriate payload. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=156) [Subscribe method returns an object that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=159.85714285714283) [implements IDisposable. This means that if](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=163.71428571428567) [we want to unsubscribe at some point in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=165.90909090909088) [the future, we just need to call Dispose](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=167.72727272727263) [on the object that's returned from the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=169.5454545454544) [Subscribe method. So this is not a turnkey](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=171.7647058823529) [implementation of the observer pattern. We](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=174.58823529411754) [need to create the Publisher and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=176.77777777777777) [Subscriber objects, but by using these](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=179.1111111111111) [interfaces, we have a nice framework on which to hang our code.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=5&mode=live&start=181.4444444444444)

[Proxy Pattern Described](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live)

[For our next pattern, we'll take a look at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=1) [the proxy. Here's the Gang of Four](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=4.15) [Description: Provide a surrogate or](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=6.599999999999998) [placeholder for another object to control](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=8.5) [access to it. This just means that we have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=11.5) [more than one way to access an object that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=15.099999999999998) [is transparent to the user. From the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=18.250000000000007) [outside, interacting with a proxy and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=20.875) [interacting with the original object look](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=23.5) [the same. The proxy generally adds](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=26.125) [functionality that improves performance](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=28.599999999999994) [such as controlling access to an object](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=30.19999999999999) [across the network. A real world example](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=33) [of a proxy is someone with power of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=36.53846153846155) [attorney. My brother spent 10 years in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=39.61538461538464) [Africa. During that time, he gave me power](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=42.625) [of attorney. Note, I'm not an actual](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=46.125) [snowboarder, but I do play one in video](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=48.78571428571427) [games. What this means is that from a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=51.6428571428571) [legal standpoint, a person can interact](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=54.33333333333335) [with me as his proxy exactly as if they](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=56.333333333333364) [were interacting with him directly. So if](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=59.31578947368421) [a person wants to enter into a contract](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=61.5263157894737) [with my brother, she can go through the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=64.0526315789474) [process of contacting him oversees and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=66.94444444444443) [trying to arrange signatures and so forth,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=69.27777777777774) [or she can go through me as the proxy.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=72) [This allows me to sign legally binding](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=75.14999999999995) [agreements on my brother's behalf. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=77.59999999999991) [contract is treated just as if my brother](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=79.85714285714286) [had signed it directly. And in case you're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=83.2857142857143) [curious, no I did not abuse my power of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=86.33333333333331) [attorney while he was out of the country.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=89.33333333333327) [If you have voting shares of stock in a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=92) [corporation, you may have been asked to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=94.69999999999997) [sign a proxy agreement. This would allow](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=96.79999999999995) [someone else, your proxy, to vote on your](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=99.25000000000001) [behalf. This is quite common since it's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=102.58333333333339) [usually required that a person be present](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=104.99999999999997) [to vote. The proxy allows the voting](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=107.33333333333327) [process to be handled by a small group of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=109.57894736842103) [people rather than having everyone show up](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=112.42105263157887) [to vote. It turns out that if you've](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=114.69999999999999) [consumed a SOAP Service with Visual](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=117.49999999999994) [Studio, you've used the proxy pattern.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=119.59999999999991) [Let's take a look in an example that shows just that.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=6&mode=live&start=123)

[Demo: Everyday Proxy](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live)

[To explore the Proxy Pattern, we're going](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=1) [to take a look at how Visual Studio](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=3.3333333333333335) [handles service references for SOAP](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=5.999999999999998) [Services. For this, we have two projects](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=8.076923076923077) [we'll be looking at. Proxy-SOAPService is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=11.846153846153845) [a WCF SOAP Service that exposes a set of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=15) [methods. Proxy-ServiceProxy is an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=19.5) [application that will consume that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=22.000000000000004) [service. We want to call those methods and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=25.333333333333343) [display the results in an output box.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=28.99999999999999) [Let's just run the application to see what](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=32) [our starting point is. So, here's our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=34.39999999999998) [application, we have a Click Me button and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=36.49999999999996) [when we click it, nothing happens at this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=39.5) [point. So let's start by taking a look at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=43.5) [the SOAPService. The first thing that I'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=48) [do is Collapse to Definition so that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=50.25) [can see this a little bit easier. Now we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=52.25) [can see that our Service only has a single](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=54.76190476190476) [method called GetPeople, and this returns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=58.190476190476176) [a list of Person objects. If we click into](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=60.47619047619045) [the Person class, we'll see a very simple](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=64.5) [object that just has four public fields.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=68.5) [This is the shape of our data, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=72) [FirstName, the LastName, the StartDate,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=75.5) [and the Rating. When we look at the method](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=77.6875) [itself, we see that it's simply a hard](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=80.5) [coded list. So this simply creates a list](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=82.5) [of seven Person objects and then returns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=84.99999999999997) [them, so there's not much going on in the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=87.33333333333327) [service itself. So now let's flip over to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=90.42857142857143) [our other project and see how we would](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=93.85714285714288) [actually consume this service. Well the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=97.28571428571432) [first thing that we would do is add a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=99.57142857142858) [service reference, so I'm going to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=102.14285714285721) [right-click and say Add Service Reference,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=103.85714285714296) [and I'll click the Discover button, which](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=105.63157894736841) [will find all of the services that are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=107.84210526315785) [part of this solution. I'll go ahead and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=110.36842105263149) [give it a Namespace of MyService just so I](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=112.90909090909088) [can find it again, and I like to work with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=115.7727272727272) [generic lists, list of T, so I'm going to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=119.5) [change the default collection type to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=124) [Generic. List. When we click OK, Visual](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=127) [Studio will add the service reference for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=129.84210526315795) [us, but that service reference is actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=132.42105263157907) [a proxy. Let's take a look at how we use](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=135) [this proxy in code. Let's go ahead and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=138.84615384615387) [open up the code behind on our form. Here](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=141.92307692307696) [we already have a Click event handler](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=145.3) [stubbed out for our button, so what do we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=147.4000000000001) [need to do? The first thing we need to do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=150.1000000000002) [is get an instance of the Proxy class that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=153.2272727272727) [Visual Studio just generated for us. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=156.090909090909) [that's named PersonServiceClient and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=158.46666666666667) [notice I'm not getting IntelliSense at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=160.33333333333334) [this point, that's because I haven't added](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=163.13333333333335) [the using statement for that namespace.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=166.421052631579) [But also notice this little blue underline](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=169.26315789473696) [under the p, that's Visual Studio offering](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=172.57894736842127) [to help me. So if I press control., I](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=175.33333333333337) [actually get a pop-up that says hey, do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=178.33333333333346) [you want to add a using statement for the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=181) [namespace? I can go ahead and select that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=183.34782608695664) [and it adds the using statement at the top](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=185.43478260869588) [of my file automatically. Now if I were to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=188.00000000000003) [capitalize things differently,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=191.0000000000001) [unfortunately it wouldn't actually find](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=192.00000000000014) [the class, so you do need to type it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=193.76190476190476) [exactly. So we'll call this a serviceProxy](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=197.19047619047618) [and we'll just new this up to a new](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=199.85714285714283) [PersonServiceClient. So how do we use the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=204) [serviceProxy? Well, we say serviceProxy.,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=207.5) [and notice we have an option to call the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=209.60000000000002) [GetPeople method. That's exactly what we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=213.20000000000007) [want to do. And we can see this returns a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=215.41176470588232) [list of person. Now what we want to do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=218.94117647058812) [with this is actually put it into our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=222.00000000000006) [ListBox. So we'll just assign this to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=224.6666666666668) [ItemSource property of our PersonListBox.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=228.5) [Now when we run our application, we'll see](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=231) [that when we click the button, we actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=233.79999999999995) [do populate items from that service. It's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=236.5999999999999) [really easy to take the SOAP proxy process](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=239.61538461538464) [for granted. This is the way that we've](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=243.92307692307702) [been consuming SOAP Services for a number](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=246.42857142857144) [of years, and since the services are self-](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=248.09523809523813) [describing and the communication is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=250) [language independent, we can generate](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=252.1875) [proxies in a number of development](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=254.375) [environments, whether Visual Studio,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=257) [Eclipse, Delphi or any number of other](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=259.66666666666674) [IDEs. But let's think about what's really](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=264.33333333333354) [happening. The SOAP Service is a resource](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=266.9999999999999) [that lives somewhere on the network. It's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=269.3333333333331) [expecting that we communicate with it with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=271.8888888888889) [SOAP packets, which is an XML document](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=275.0000000000001) [with specific elements included. If we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=278.1111111111113) [wanted to communicate directly with the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=280.33333333333326) [service without a proxy, we would need to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=282.33333333333314) [create an XML SOAP request packet with our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=285) [request, make an HTTP call to send it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=287.909090909091) [across the wire, wait for a response,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=290.818181818182) [parse the XML SOAP response package, and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=293.39130434782606) [then turn it into a CLR object that we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=296.1304347826085) [easily use in our code. Or, we can use a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=300.04347826086916) [proxy generated by our development](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=304.24999999999994) [environment. Let's go back to our service](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=306.4999999999999) [for a moment. Let's think about how we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=309.6499999999998) [would access this class if it were local](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=312.875) [to our application. We would create an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=315.875) [instance of PersonService and then call.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=318.75) [GetPeople so it would look like](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=321.375) [PersonService. GetPeople. Now, let's look](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=324) [at the Proxy class that was generated by](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=327.0000000000001) [Visual Studio, PersonServiceClient. How do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=331.8000000000003) [we use this class? We create an instance](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=334.5) [of it and then call. GetPeople, exactly](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=338.5) [the same way we would access it if it were](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=342) [a local class. If we click into the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=345.478260869565) [GetPeople method, we can see the actual](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=348.26086956521704) [proxy class. Here it calls base where base](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=351.0588235294117) [is a ServiceModel. ClientBase, and then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=355.29411764705856) [calls Channel. GetPeople. This method will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=358.4705882352937) [do the steps that we described above](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=361.3529411764707) [generating the SOAP request, sending it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=364.64705882352973) [across the wire, waiting for the response,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=367.3888888888889) [parsing the SOAP response back into CLR](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=370.1111111111113) [objects, and then returning the result. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=372.8333333333337) [in this case proxy controls access to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=375.8947368421052) [remote service and also gives us the same](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=379.6842105263156) [interface as if we were accessing the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=383.46153846153845) [service as a local class. Now that we've](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=386.6923076923076) [seen the proxy in action, let's consider some of the consequences.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=7&mode=live&start=392)

[Proxy Consequences](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live)

[As noted, there are consequences with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=1) [every pattern. With the proxy, the biggest](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=3.333333333333333) [consequence is that we are often hiding](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=6.055555555555557) [the fact that the object we want to access](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=8.857142857142858) [is in a different process, or even across](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=12.714285714285717) [a network. In our example, we knew exactly](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=16.142857142857146) [what we were doing. After all, we were the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=18.714285714285708) [ones who added the service reference to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=21.28571428571427) [our project and created an instance of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=23.5) [PersonServiceClient. But imagine this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=27.5) [scenario, what if a developer were given](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=29.3125) [this application in its current state? We](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=32.375) [simply tell the developer to use the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=35.4375) [methods that are available on the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=38.5) [PersonServiceClient object. That developer](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=41.125) [may not realize that whenever a call is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=42.54545454545455) [made to one of those methods, that it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=44.727272727272734) [results in a call across the network since](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=46.90909090909092) [it's hidden by the proxy. Another](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=49.47368421052633) [consequence is that the proxy class just](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=51.68421052631582) [be kept synchronized with the real object.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=54.2631578947369) [If we add a method to our service, then we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=56.66666666666668) [will want to update our proxy to reflect](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=60.000000000000036) [those changes. Fortunately, Visual Studio](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=62.84210526315789) [gives us a really easy way to do that with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=64.94736842105262) [SOAP Services. We just need to right-click](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=69.15789473684207) [on the service reference and choose Update](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=72.14285714285715) [Service Reference. As with all patterns,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=75.14285714285717) [we need to be aware of the consequences so](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=77.09090909090907) [that we can help mitigate them in our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=79.54545454545446) [code. One thing that helps with this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=81.72727272727259) [particular example is how we name our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=84.57142857142858) [variables. We called our local variable](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=87.5714285714286) [Service Proxy and ideally it should have a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=89.57894736842103) [more descriptive name in an environment](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=92.10526315789467) [that has multilevel services, but this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=94) [name will hopefully convey to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=96.33333333333331) [developer that any calls made on this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=98.66666666666663) [object will result in calls to a remote service.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=8&mode=live&start=102)

[Proxy Review](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live)

[So we see that the proxy pattern is just a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=1) [way of setting up a surrogate, and we saw](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=3.8000000000000016) [that when we consume a SOAP Service,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=6.320000000000004) [Visual Studio generates a Proxy object for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=8.444444444444445) [us. That allows us to interact with the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=11.555555555555557) [service proxy exactly as if we were](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=15.111111111111114) [interacting with the Service class](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=18.272727272727266) [directly. It handles all of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=20.545454545454533) [communication with the SOAP Service.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=22.999999999999993) [Before we leave the proxy pattern, I want](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=25) [to mention something that's in the Gang of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=26.904761904761898) [Four book that shows how times have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=28.809523809523796) [changed since 1994 in some ways and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=30.93333333333333) [haven't changed at all in others.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=34.2) [Networking speeds in 1994 were much slower](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=37) [than we have today and many of us were](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=39.45000000000001) [connecting to other systems with dial-up](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=42.60000000000002) [modems. Because of the slow speeds, images](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=44.888888888888886) [took a long time to travel across the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=47.999999999999986) [network. The Gang of Four saw the proxy](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=51.55555555555553) [pattern could be useful in this situation.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=54.49999999999998) [Instead of immediately showing an image,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=57) [we could instead show a placeholder, which](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=60) [could be a generic image. Then when the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=63.5) [user clicks on the placeholder, the actual](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=67.05882352941178) [image is loaded from across the network.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=69.52941176470594) [The idea is that the network resource is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=72) [not requested until the user actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=75) [wants it. We still see this sort of thing](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=77.25) [today with thumbnail images, and even](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=80.3333333333333) [though our wired network bandwidth seems](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=82.33333333333327) [unlimited compared to what we had in 1994,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=84.42105263157895) [our mobile network speeds are going](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=87.7894736842105) [through the same evolution. So this same](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=90.31578947368418) [use of the proxy pattern is very relevant](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=92.85714285714288) [in a wireless scenario where we want to conserve network resources.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=9&mode=live&start=95.14285714285721)

[Summary](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live)

[We've looked at two of the Gang of Four](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=1) [design patterns so far, and we've seen](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=3.4545454545454533) [that there isn't really a mystery about](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=5.363636363636361) [them. They simply give us solutions to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=7.5) [common problems. The observer pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=11) [describes a publish/ subscribe](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=13.5) [relationship. We saw how event handlers](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=15.470588235294118) [in. NET are really an implementation of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=18.294117647058815) [the observer pattern. We also took a look](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=21.588235294117627) [at the EventAggregator class from the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=24.923076923076916) [Prism library. This allows us to setup a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=27.230769230769216) [similar relationship, even if the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=29.66666666666667) [publisher and subscriber don't know about](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=31.055555555555564) [each other directly. And if neither of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=32.722222222222236) [these solutions fit our needs, we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=35.333333333333314) [always create our own implementation of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=38.055555555555515) [the observer pattern. And with. NET 4. 0](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=40.42857142857143) [or higher, we can use the built-in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=43.857142857142875) [interfaces IObservable of T and IObserver](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=46.85714285714289) [of T to create that implementation. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=49.470588235294116) [proxy pattern simply describes a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=52.76470588235293) [placeholder that can act as a stand in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=55.11764705882351) [that controls access to a real object. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=58.565217391304344) [real object may be a service or other](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=61.69565217391303) [resource on the other end of a network](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=64.82608695652173) [connection. We saw that Visual Studio](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=67.74999999999997) [generates a proxy for us whenever we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=69.84999999999994) [consume a SOAP Service. That service proxy](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=72.2999999999999) [allows us to interact with the service](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=75.00000000000003) [exactly as if it were a local resource and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=77.80000000000007) [the proxy handles all of the communication](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=81.41666666666667) [with the real service. We'll continue our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=84.33333333333337) [exploration of patterns you already use](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=87.3846153846154) [with the iterator pattern. This is one of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=90.1538461538462) [my personal favorites and I use the built-in implementations all the time.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m2-observer&clip=10&mode=live&start=96)

[Patterns You Already Use: Iterator](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=0&mode=live)

[Overview](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=0&mode=live)

[We'll continue our exploration of Patterns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=0&mode=live&start=0) [That We Already Use by taking a look at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=0&mode=live&start=2.666666666666667) [the Iterator pattern. As with previous](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=0&mode=live&start=6.666666666666669) [patterns, we'll look at the Gang of Four](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=0&mode=live&start=8.714285714285712) [description and then take a look at a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=0&mode=live&start=10.61904761904761) [common C# implementation that's right in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=0&mode=live&start=12.523809523809508) [the code we use every day. We run across](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=0&mode=live&start=14.473684210526315) [the iterator pattern all the time and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=0&mode=live&start=17.789473684210524) [implementation of the iterator is included](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=0&mode=live&start=20.5) [in pretty much every collection in. NET.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=0&mode=live&start=23.5) [We'll take a closer look at the interfaces](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=0&mode=live&start=27) [that make up this implementation. Then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=0&mode=live&start=29.461538461538453) [we'll create our own classes that use the iterator pattern.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=0&mode=live&start=32)

[Iterator Pattern Described](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live)

[Here's the Gang of Four description of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=1) [iterator pattern: Provide a way to access](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=3.526315789473685) [the elements of an aggregate object](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=5.736842105263159) [sequentially without exposing its](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=8.5) [underlying representation. Let's take a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=11.5) [look at a real world example of an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=13.85714285714286) [iterator to get a better idea of what this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=16.14285714285715) [means. A television remote control has a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=18.71428571428571) [built-in iterator, the channel up button.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=22) [Whenever we click this button, we're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=25) [asking for the next available channel in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=27.210526315789473) [the collection and we don't care how the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=29.789473684210524) [television determines what the next](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=32.55555555555556) [channel should be. For example, it will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=33.94444444444445) [skip channels that don't have a signal or](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=35.8888888888889) [maybe we've programmed it to skip the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=38.19999999999999) [shopping channels because our garage is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=40.29999999999997) [full and the credit card is maxed out. But](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=42.09999999999995) [we don't care about the internals, we just](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=45.347826086956516) [want the next channel when we ask for it.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=48.478260869565204) [So with this in mind, let's take another](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=52) [look at our definition. First, we have an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=54.5263157894737) [Aggregate object, which could be our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=57.0526315789474) [collection of available television](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=59.38461538461538) [channels. Then we have the iterator. This](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=61.23076923076922) [is the part we actually interact with. As](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=64.4) [the consumer, we just say next please by](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=67.60000000000005) [clicking the channel up button and the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=70.8000000000001) [iterator provides us with the next item.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=73.60000000000002) [If we click the button again, the iterator](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=76.40000000000006) [provides us with the next item in the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=79.60000000000011) [sequence, and this continues until we've](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=82.3333333333333) [gone through all the channels. As the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=84.33333333333327) [consumer, we don't care about how the next](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=86.72727272727272) [channel is selected, we just want the next](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=89.6363636363636) [one, and the iterator gives that to us.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=92.54545454545448) [Now analogies usually break down at some](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=95.09090909090907) [point. When we get to the end of channels](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=96.99999999999993) [on our television, when we click the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=99.45454545454533) [channel up, it wraps around and starts](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=101.92307692307693) [over. In the programming world, once we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=104.61538461538464) [get to the last item in the sequence, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=107.11764705882356) [iterator stops. The iterator pattern shows](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=110.29411764705891) [up all the time in. NET code. In fact, if](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=112.52380952380952) [you've used a foreach loop, you've used an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=116.33333333333331) [implementation of the iterator pattern. Let's take a closer look at that.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=1&mode=live&start=120)

[Demo: Everyday Iterator](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live)

[So here we are back in Visual Studio. What](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=1) [we'll see here is that the foreach loop is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=4.428571428571429) [actually an implementation of the iterator](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=7.857142857142861) [pattern. Let's start by running our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=10.200000000000001) [application to see what we have. So right](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=12.600000000000003) [now we have a ListBox and a button and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=15.666666666666668) [when we click the button, nothing happens](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=18.666666666666657) [at this point. Inside our project, we have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=20.999999999999982) [a static People class. Now notice this has](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=24.222222222222214) [a single method called GetPeople, which](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=27.777777777777757) [returns a list of Person objects. In our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=30.363636363636363) [Person class, just like we saw before, is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=33.27272727272728) [a set of four public properties,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=36.181818181818215) [FirstName, LastName, StartDate, and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=38.6) [Rating. And if we're to look inside the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=41.00000000000001) [GetPeople method, we would see that it's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=45.80000000000002) [just a hard coded list of Person objects.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=48.75000000000001) [So let's actually go into our application](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=51.55000000000002) [and use this class. Here we have the code](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=54) [behind for our form and as you can see, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=57.521739130434774) [already have an event handler setup for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=61.434782608695635) [the ClickMeButton. Inside the event](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=64.05882352941177) [handler, I'm just going to create an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=65.82352941176474) [IEnumerable of Person called people and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=68.2941176470589) [we'll use that to hold the result of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=71) [People. GetPeople method. So we'll call](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=75.5) [our static class People and the static](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=77.89999999999999) [method GetPeople, that will return a list](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=79.99999999999997) [of Person objects and we'll populate that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=82.09999999999995) [in our local variable. Then we'll just do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=84.60000000000002) [a foreach loop, so we'll say foreach](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=87.80000000000007) [person in people, PersonListBox. Items.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=90.60000000000011) [Add person. So the foreach loop will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=94) [iterate through the people collection and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=99.25) [for each item it finds it's going to go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=103.29411764705883) [ahead and put those into our ListBox. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=105.94117647058826) [now if we run the application and click](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=108.36363636363636) [the button, we see that our ListBox does](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=111.27272727272724) [get populated with those items. But now,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=114.18181818181812) [let's take a closer look at foreach. Let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=116.625) [go ahead and open up Help. I'll press F1](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=119.125) [and if we look at this, we see that the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=122.28571428571429) [foreach statement repeats a group of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=126.5714285714286) [imbedded statements for each element in an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=129.14285714285714) [array or an object collection that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=131.94444444444443) [implements the IEnumerable or IEnumerable](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=134.27777777777774) [of T interface. So that means foreach](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=136.22222222222217) [works on anything that implements](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=140.18181818181813) [IEnumerable. Now we'll be taking a closer](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=143.36363636363626) [look at these interfaces a little bit](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=145.14285714285722) [later, so we won't worry about the details](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=146.47619047619065) [just yet. For now, all we need to know is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=148) [that IEnumerable of T has a method called](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=152.76190476190482) [GetEnumerator and that returns an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=156.57142857142867) [Enumerator object. Now as you might have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=158.77777777777777) [guessed, in. NET instead of referring to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=161.49999999999997) [an iterator, it's called an enemator, but](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=164.22222222222217) [at its core it's exactly the same thing.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=167.30769230769226) [So let's see what would happen if instead](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=171) [of using the foreach loop, we actually use](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=173.79999999999995) [the methods of IEnumerable directly. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=176.5999999999999) [our first step is to get an enumerator out](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=178.8) [of our People object. So let's create a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=182.40000000000006) [variable called enumerator and we'll set](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=186.28571428571433) [this to people. GetEnumerator. Now notice](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=189.71428571428584) [since my variable people is of type](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=193) [IEnumerable of Person, we have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=196.5) [GetEnumerator available to us. Then we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=199) [use this to actually iterator through the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=202.28571428571425) [items of our collection. Now the way we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=205.28571428571416) [can do that is with a while loop. So we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=208.90476190476193) [say while and we'll say enumerator.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=213.66666666666674) [MoveNext. So MoveNext is that next please](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=216.52380952380963) [that we were looking at before. The first](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=219.00000000000006) [time we call MoveNext, it will go to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=221.6666666666668) [first item in the collection. Now MoveNext](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=224.77777777777777) [doesn't actually return that item, it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=227.49999999999997) [returns a Boolean, so it returns true or](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=229.8333333333333) [false, depending on whether that MoveNext](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=233.69230769230774) [was successful. To get the actual item,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=236.92307692307702) [the enumerator has a property called](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=240.0833333333333) [Current. So we'll say PersonListBox.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=242.58333333333323) [Items. Add enumerator. Current. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=245.58823529411768) [Current property, as you imagine, is the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=248.82352941176478) [current item that the iterator is pointing](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=253.35294117647072) [to. So what happens is when we call](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=256.4) [MoveNext, Current points to the first item](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=259.5999999999998) [in the list. When we call MoveNext again,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=262.35) [it points to the second item, we call](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=265.1500000000002) [MoveNext, Current points to the third](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=267.9500000000004) [item, and so forth. Once we're at the end](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=270.1052631578947) [of the collection, MoveNext will actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=273.42105263157873) [return false to indicate that there's no](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=275.6315789473681) [further items. That's why we can use](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=278.3333333333335) [MoveNext in this while loop. And if we run](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=281.0555555555559) [our application, we'll see that we get](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=284.2631578947369) [exactly the same results that we had](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=286.4736842105264) [before. And we see the enumerator in. NET](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=288.68421052631595) [is an implementation of the iterator](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=292.0000000000001) [pattern. Again, our definition is to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=294.5714285714288) [provide a way to access the elements of an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=297.2222222222223) [Aggregate object sequentially without](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=301.2222222222224) [exposing its underlying representation.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=303) [We'll be taking a closer look at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=305) [IEnumerable and IEnumerator in our next example.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=2&mode=live&start=308.5)

[Iterator Consequences](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=3&mode=live)

[There are a couple of consequences that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=3&mode=live&start=1) [need to be aware of when we use the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=3&mode=live&start=3.526315789473685) [iterator pattern. First, adding or](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=3&mode=live&start=6.3684210526315805) [removing items from the collection may](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=3&mode=live&start=8.625) [invalidate the iterator. In fact, in. NET](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=3&mode=live&start=11.874999999999996) [if you try to add or remove an item inside](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=3&mode=live&start=14.92857142857143) [a foreach loop, you'll get an exception.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=3&mode=live&start=18.500000000000007) [Even if we're using a different](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=3&mode=live&start=21) [implementation that does not throw an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=3&mode=live&start=22.66666666666667) [exception, we need to realize that our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=3&mode=live&start=24.333333333333343) [iterator may no longer be valid when the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=3&mode=live&start=26.53846153846154) [underlying collection is changed. We also](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=3&mode=live&start=30.84615384615386) [need to be aware that we can have multiple](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=3&mode=live&start=33.705882352941174) [iterators acting on the same object. So we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=3&mode=live&start=36.88235294117646) [may have a bunch of iterators working on](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=3&mode=live&start=41) [the same underlying collection all at the same time.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=3&mode=live&start=49)

[Creating an Iterator with IEnumerable](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live)

[Based on what we've seen so far, if the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=1) [class implements the IEnumerable interface](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=4.789473684210526) [or IEnumerable of T interface, it contains](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=6.89473684210526) [an implementation of the iterator pattern.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=9.777777777777779) [It turns out that pretty much every](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=12.111111111111114) [collection in the. NET Framework class](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=14.83333333333334) [library implements IEnumerable. This means](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=17.647058823529406) [that we can use foreach on any of these](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=19.705882352941163) [collections, but we can also create our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=23) [own objects that implement IEnumerable to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=25.94736842105264) [T and we don't have to restrict ourselves](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=28.473684210526333) [to collections of existing objects, we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=32) [create calculated sequences as well. Let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=35.5) [take a look at the interfaces, then we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=38.36363636363637) [see what we need to implement our own](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=41.63636363636367) [iterator in a class. The IEnumerable of T](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=44.545454545454604) [interface has a single member, a method](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=48.15384615384616) [called GetEnumerator. This returns an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=51.92307692307694) [object that implements the IEnumerator of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=54.63636363636364) [T interface. The IEnumerator of T](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=57.90909090909092) [interface has a few more members, but](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=60.599999999999994) [still not that many. First we have a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=63.399999999999984) [property called Current. This is the item](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=66.55555555555554) [that the enumerator is currently pointing](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=69.27777777777774) [to. This is of type T to match the generic](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=71.61111111111106) [parameter of the interface. So if we have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=75.46153846153848) [a strongly typed list of string, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=78.55555555555554) [Current property would be of type string.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=81.27777777777774) [The MoveNext method will update the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=84) [Current property with the next item in the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=85.99999999999997) [sequence. This method returns true if the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=88.6666666666666) [process is successful. However, if the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=91.09999999999997) [current item is at the end of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=93.19999999999993) [sequence, MoveNext will return false.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=96) [Because of this behavior, we can use the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=97.94444444444443) [MoveNext method in a while loop like we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=101.05555555555551) [did in our last example. Next, we have the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=104.28571428571429) [Reset method. This will reset the state of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=108.14285714285717) [the enemator. It will be in the same state](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=110.99999999999997) [as a brand new enumerator, meaning calling](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=113.99999999999993) [MoveNext will update Current to the first](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=116.5) [item in the sequence. Finally, we have the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=120) [Dispose method. This allows us to clean up](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=123.19999999999999) [any resources that we might use during the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=125.59999999999997) [iteration process. Now that we've seen the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=128) [members of these interfaces, let's create](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=130.88235294117644) [our own class that implements them. We](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=133.35294117647052) [often think of iterators as returning](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=137.33333333333334) [items from a collection, but they can also](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=139.3333333333334) [be used to get items out of a calculated](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=142.00000000000014) [sequence. Our first example with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=145.23529411764704) [IEnumerable will be a class that generates](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=147.29411764705878) [a Fibonacci Sequence. The Fibonacci](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=150.17647058823522) [Sequence is a numerical sequence where](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=152.33333333333337) [each number is the sum of the previous two](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=155.0000000000001) [numbers, so the first numbers in the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=159) [sequence are 1, 1, 2, 3, 5, 8, and 13.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=162.7058823529412) [Let's go ahead and implement this in an actual class.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=4&mode=live&start=168)

[Demo: Fibonacci Sequence](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live)

[So here we are in Visual Studio. We're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=0.5) [going to implement the Fibonacci Sequence](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=4.264705882352941) [with an iterator. What that means is we're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=7.088235294117648) [going to create a class that has the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=10.500000000000002) [IEnumerable interface. In the folder](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=13.700000000000005) [SequenceIterator, we have two projects. We](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=15.9) [have Iterator-SequenceLibrary and this is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=18.699999999999992) [where we'll have our sequence and the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=21.033333333333317) [enumerator, and then we also have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=24.73076923076924) [Iterator-SequenceViewer. This is our UI](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=27.96153846153848) [project. Let's go ahead and run the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=29.911764705882348) [application to see what we have. So you](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=32.38235294117646) [can see we have a ListBox along with a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=35.131578947368425) [button, and currently the button doesn't](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=37.973684210526336) [do anything. The first step is that we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=39.86842105263161) [need to implement our Fibonacci Sequence.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=42.500000000000014) [Let's go ahead and open up our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=44.5) [FibonacciSequence class to see what we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=47.382352941176485) [have to start with. So right now, we have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=49.852941176470615) [a constructor that takes a number of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=52.86363636363637) [values, an integer, and then we store that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=54.77272727272728) [into a local property. This allows us to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=56.95454545454547) [choose how many items in the sequence](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=59.97058823529413) [we're going to return. So, since we want](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=62.852941176470615) [to be able to iterate over this sequence,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=66.39473684210526) [we want to add the IEnumerable interface.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=70.18421052631578) [And this will be IEnumerable of int](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=73.5) [because our values will be integers. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=76.19230769230771) [notice the blue underline underneath the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=78.91176470588235) [I. That's Visual Studio offering to do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=81.38235294117644) [something for us. If I press Control.,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=84.26470588235287) [we'll see that we get an option to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=87.05555555555554) [implement the interface IEnumerable of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=90.16666666666663) [int. If we select that, it will stub out](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=92.11111111111106) [all of the methods that we need. Now it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=95.16666666666663) [turns out that IEnumerable of int has one](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=98.61111111111111) [method, GetEnumerator, but IEnumerable of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=103.05555555555557) [int also inherits from IEnumerable, which](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=105.83333333333336) [means we also have a non-generic version](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=109) [of the IEnumerable interface. So, we also](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=112.5) [have an explicit IEnumerable.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=116.08823529411765) [GetEnumerator. Now the most common way of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=118.20588235294119) [implementing this is to simply return the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=121.91176470588238) [strongly typed enumerator that's coming](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=124.73076923076923) [from our other method. So we can just say](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=126.26923076923076) [this. GetEnumerator and we'll return](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=130.35714285714292) [what's coming from there. Now for our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=133.21428571428584) [GetEnumerator method, we actually need to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=136.78571428571425) [return an IEnumerator of int. We need to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=139.35714285714275) [create that class. Well we have a starting](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=142.91176470588235) [point for that class in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=146.67647058823528) [FibonacciEnumerator. Here we have a number](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=149.02941176470586) [of fields to start with, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=151.00000000000006) [numberOfValues, which again will be the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=152.80000000000013) [total number of items in the sequence, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=154.6000000000002) [currentPosition, which tells us where we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=157.2647058823529) [are in that sequence, the previousTotal](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=159.38235294117638) [and the currentTotal are going to be used](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=161.5) [for the calculations for the Fibonacci](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=165) [Sequence itself. And we can see that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=167.625) [have a constructor that populates the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=170.16666666666663) [numberOfValues field with a parameter](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=171.83333333333326) [that's coming in. Now we need this class](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=173.22222222222211) [to implement IEnumerator of int, so let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=178.28947368421046) [go ahead and add that. And again, we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=183.07894736842093) [say Control. to implement the interface](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=188) [and we see all of the members coming in.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=191) [Now I'm going to reorder these just a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=195.5) [little bit so that we have a more logical](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=198.16666666666674) [order. This also does have a non-generic](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=201.16666666666683) [version of the enumerator, so let's go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=203.50000000000006) [ahead and move this up with our other](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=205.83333333333346) [value. So you can see we have a property](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=208.5) [called Current, which is of type int, and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=212.18181818181816) [then we also have an IEnumerator. Current,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=215.4545454545454) [which returns an object. So we have one](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=218.3235294117647) [strongly typed current and one current](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=221.61764705882348) [that's just object. So for the Current](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=224.08823529411757) [property, we'll just return the value from](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=226.90000000000003) [our field and then for the non-generic](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=229.70000000000007) [version, we'll just access the strongly](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=232.5) [typed version. Now let's go ahead and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=235.5) [continue reordering these methods. Let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=239) [go ahead and move Dispose down to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=241.5) [bottom and we'll make sure that MoveNext](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=245.5) [is next in our list. Now when you say](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=249) [implement interface, Visual Studio](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=253) [actually puts the members in alphabetical](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=254.5) [order, but I'd like to move them around so](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=256.75) [that they're a little more logical. Let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=259.1153846153846) [go ahead and implement the MoveNext](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=260.8333333333333) [method. Now what we need to do here is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=262.8333333333332) [make sure that our current field is set to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=265.83333333333303) [the next item in our iteration. We also](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=269.2142857142858) [need to keep track of whether we've](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=272.64285714285734) [already returned the requested number of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=275.64285714285745) [items. That's how we decide if we return](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=277.83333333333326) [true or false. Now Fibonacci Sequences are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=280.4999999999998) [a classic computational sciences problem.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=283.7222222222222) [A lot of times they are solved with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=286.5) [recursive methods, I'm going to do things](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=288.9000000000001) [a little simpler with these backing fields](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=291.00000000000017) [just so that we don't get confused in the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=293.0454545454545) [method. Now as we noted when we were](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=295.4999999999998) [looking at the definition, the first item](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=297.6818181818178) [is always 1, so we'll check to see if our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=299.97368421052624) [currentPosition is 0, meaning we're on the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=303.65789473684185) [first item, then we'll make sure our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=307.16666666666663) [currentTotal equals 1. Otherwise, we want](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=312.99999999999983) [to do a calculation based on the previous](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=316.6538461538461) [two totals. So here we'll say int newTotal](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=319.73076923076894) [equals previousTotal plus currentTotal and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=326.125) [then we'll swap our previousTotal and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=330.8125) [newTotal. So we'll set previousTotal equal](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=335.9375) [to the currentTotal and we'll set the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=338.5625) [currentTotal equal to the newTotal. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=341.625) [that's basically just swapping the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=344.0999999999999) [variables after we do our calculation. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=346.0999999999998) [other thing we'll do is increment our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=348.85) [currentPosition. And we do actually need](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=351.3000000000002) [to return a true or false value depending](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=353.4000000000003) [on whether we're at the end of our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=356.11538461538464) [sequence or not. So what we'll do is we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=358.5769230769232) [return currentPosition less than or equal](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=362.92857142857133) [to numberOfValues. So if we've exceeded](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=366.35714285714266) [the numberOfValues that have been](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=369.03846153846143) [requested, we'll return false. Otherwise,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=370.9615384615382) [we'll return true and our Current property](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=372.9375) [will be pointing to that currentTotal](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=376) [backing field. So the result of this is we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=378.625) [will get the next item in the Fibonacci](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=381.95000000000016) [Sequence in our Current property. Now for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=384.75000000000034) [the other two methods, these are actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=387.11538461538464) [fairly easy to implement. In reset, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=389.2692307692309) [just need to set back to our 0 state, so](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=391.7272727272728) [we'll set currentPosition equal to 0,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=395.81818181818215) [we'll set previousTotal equal to 0, and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=398.27272727272776) [we'll set currentTotal equal to 0. And for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=401.5) [the Dispose method, we don't actually have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=405.5) [anything special that we're doing here. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=409) [what we'll do is we'll just call](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=411.4999999999999) [SuppressFinalize on the garbage collector.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=413.8333333333331) [Since we don't have anything to dispose,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=415.5) [this will give us a little bit of a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=417.8333333333332) [performance enhancement. So now that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=420.83333333333303) [have our enumerator, we can go back to our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=422.6428571428571) [sequence and actually use it in our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=425.2142857142856) [GetEnumerator method. So for this, all we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=427.21428571428555) [need to say is return new](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=430.3571428571429) [FibonacciEnumerator and then we need to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=433.2142857142858) [pass in the numberOfValues, so we'll just](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=436.07142857142867) [pass through our NumberOfValues property.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=440.6111111111111) [And that's all we need to do. Let's go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=444.5) [ahead and build our application and make](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=447.12500000000017) [sure that all of these files are fine. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=449.16666666666697) [let's go to our application that's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=451.95454545454544) [actually displaying these values. In the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=454.6818181818181) [code behind, we do have a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=457.16666666666663) [ClickMeButton\_Click event handler, and you](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=459.1666666666665) [can see we're currently clearing out the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=460.8333333333331) [list. Now all we need to do is new up an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=463.22727272727275) [instance of the FibonacciSequence and then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=467.22727272727286) [we can foreach through that and output the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=469.4090909090911) [results to our UI. So, let's say var](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=473.2777777777777) [sequence equals new FibonacciSequence and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=477.72222222222206) [let's ask for 10 values. Then we can do a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=480.5) [foreach loop and say for each item in the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=485.08333333333314) [sequence we want to populate our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=489.208333333333) [OutputListBox, so we'll just add the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=491.86842105263156) [current item. And again, the reason we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=494.0789473684209) [use foreach on this Sequence object is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=497.0263157894734) [because it implements IEnumerable, so we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=500.1000000000001) [are allowed to iterate through it. Let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=503.30000000000024) [go ahead and run our application and when](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=506.8) [we click the button, we'll see the first](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=509.2000000000001) [10 Fibonacci numbers in our ListBox. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=511.6000000000002) [this does seem like a lot of work. We had](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=514.1363636363635) [to create an entire Enumerator class just](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=518.2272727272723) [so that we can return it in our sequence.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=521.0909090909084) [It turns out that C# has a statement that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=523.833333333333) [can make our code a bit more compact. This](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=526.4583333333327) [is the yield return statement. When we use](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=529.5588235294117) [yield return, the compiler generates an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=533.7941176470586) [enumerator internally. This means that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=536.9705882352937) [can use it in our GetEnumerator method of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=539.6875) [our Sequence class. Let's see how we would](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=543.1875) [do that. Well, the first thing we would do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=546.8684210526318) [is comment out our FibonacciEnumerator and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=551.131578947369) [now we need the code to actually calculate](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=554.0454545454545) [that FibonacciSequence. It turns out we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=558.4090909090905) [can borrow a lot of the code from the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=560.717391304348) [MoveNext method, so let's go ahead and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=563.456521739131) [just copy this over and then we'll start](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=565.5869565217399) [making some changes to it. Now you can see](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=568.404761904762) [our code is extremely unhappy at this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=571.8333333333337) [point so let's go ahead and start adding a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=574.5) [few things. First, let's add a couple](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=577.6500000000002) [local variables for the previousTotal and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=580.1000000000004) [the currentTotal. Instead of using the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=583.3666666666666) [currentPosition, we'll just use a for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=588.9666666666662) [loop. So what I'll do is I'll highlight](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=594.5666666666659) [this section and I'm going to do Control K](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=598.6818181818185) [S, which is surround with for a snippet](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=602.7727272727279) [and I can actually ask for a for loop. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=606.8333333333333) [now we can say for i equals 0, i less than](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=613.4999999999995) [NumberOfValues, and this will give us a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=620.8333333333325) [loop that will go through however many](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=622.8043478260872) [times we need to based on the total number](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=624.3260869565223) [of values requested. So now we can replace](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=626.2826086956532) [this currentPosition with i and we don't](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=630) [actually need to increment this anymore](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=633.5) [because our for loop is handling that for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=636.25) [us. But what about the return? Previously](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=639.25) [we were actually returning a true/false](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=641.7777777777778) [value depending on whether we were at the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=643.4444444444448) [end of the collection. Instead, what we're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=645.6666666666674) [going to do is return the actual value. In](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=648.8333333333335) [this case, it will be currentTotal. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=653.8333333333334) [the problem with this is we can't just use](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=656.166666666667) [a standard return statement here, but we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=659.1666666666673) [can use the yield return that we talked](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=661.8333333333334) [about. Again, this is a special construct.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=665.388888888889) [What this will do is it will internally](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=668.5) [create an enumerator that looks very](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=671.6111111111113) [similar to the FibonacciEnumerator that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=673.9444444444448) [created. Whenever we say yield return,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=676.5) [that internal Current property will get](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=679.5) [set to this currentTotal and MoveNext will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=682.5) [return true or false depending on whether](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=685.6052631578947) [we've gotten to the end of this method](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=688.1842105263156) [yet. It does take a little bit of time to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=691.1315789473681) [wrap your head around this the first time](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=693.3000000000004) [you see it, but once you get used to it,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=694.9000000000008) [the yield return statement is really cool](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=697.2) [and it makes your code much more compact](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=699.6500000000002) [and it's actually easier to follow from a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=702.4500000000004) [logical standpoint. Let's go ahead and run](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=705.2500000000001) [our application and make sure that it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=707.7000000000003) [still works the same way. So now when we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=710.1500000000004) [click the button, we see we get exactly](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=713.282608695652) [the same results, and just to show that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=716.065217391304) [I'm not doing anything tricky here, let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=718.9117647058823) [go to our FibonacciEnumerator class and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=721.7941176470586) [comment it out. So I'm just going to use](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=724.2647058823525) [the shortcut Control K C to comment out](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=727.9705882352939) [the entire class. So now we know this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=731.2647058823525) [FibonacciEnumerator no longer exists. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=734.5588235294116) [only enumerator that we're getting is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=736.6176470588232) [actually this internal one created by the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=739.0882352941171) [yield return statement, and if we run our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=741.7105263157894) [application and click the button, again we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=744.6578947368419) [get exactly the same results we expected.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=747.3888888888889) [This example shows that we can implement](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=750.5000000000001) [the IEnumerable interface, which gives us](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=753.6111111111113) [an implementation of the iterator pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=755.9736842105262) [and we can do this to create a sequence](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=758.1842105263156) [based on a calculation. We don't](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=761.5) [necessarily need a collection of items](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=764.3000000000002) [already in place. Another common way to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=767.1000000000004) [implement the IEnumerable pattern is to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=769.9117647058824) [use an internal collection and return the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=772.0294117647061) [enumerator from that collection. That's what we'll see in our next example.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=5&mode=live&start=774.5)

[Demo: MP3 Catalog](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live)

[For our next example, we'll create a class](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=1) [that will iterate over the MP3 files that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=3.666666666666667) [we have in a particular location. The idea](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=6.333333333333331) [is that we point our class at a particular](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=8.954545454545455) [folder and it will locate all of the MP3](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=11.81818181818182) [files in that folder and its subfolders.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=14.681818181818185) [If we look at the way iTunes stores our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=17.18181818181818) [data, what we'll see is we have a root](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=20.45454545454545) [music folder that has all of the artists](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=23.636363636363633) [in it and when we click into the artists,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=26.181818181818166) [we have folders for each of the albums and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=29.045454545454515) [when we click into the albums, we see the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=32.25) [MP3s. So we actually want to be able to go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=35.625) [through all of those different levels to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=38.25) [pull out the MP3 files that we care about.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=40) [Now there are. NET classes that help us](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=42.38095238095238) [with this folder transversal, but for this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=45.428571428571416) [example, I want a bit more functionality](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=48.095238095238074) [that what the built-in classes provide. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=50.8) [we'll wrap the existing functionality,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=53.59999999999999) [which just returns strings so that we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=55.59999999999998) [return a more useful type for our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=58.79999999999999) [application. Now we have two projects](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=61.59999999999998) [here, we have Iterator-MP3Library, which](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=64.10526315789473) [will have our enumerator in it, and we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=66.21052631578945) [have Iterator-MP3Viewer. If we run our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=69.57894736842101) [application, we'll see we actually have a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=72.35294117647058) [Search box on this screen, a Click Me](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=75.64705882352939) [button, and a ListBox. Right now, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=79.3125) [Click Me button doesn't do anything. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=82.375) [let's start by looking at the class that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=85.5) [will implement IEnumerable. We've called](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=89.5) [this MP3Locator and we'll go through](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=91.63157894736841) [exactly the same process that we did in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=93.52631578947364) [our last example. So we'll add the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=96.05263157894728) [IEnumerable interface and for the type, I](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=98.84615384615387) [want FileInfo. So this will give me a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=102.07692307692314) [little bit more information about the file](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=104.99999999999997) [instead of just the path. And again, we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=107.33333333333327) [say Control. to implement the interface](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=110.6875) [and for our explicit implementation of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=114.0625) [GetEnumerator, we'll just return our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=117.4375) [strongly typed enumerator. If you want](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=120.5) [more information on interfaces, how we've](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=124.25) [actually implemented these and what it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=128) [means to have explicit implementation, you](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=130.00000000000006) [can be sure to check out the C# Interfaces](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=132.0000000000001) [course on Pluralsight. For now, let's flip](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=135.58823529411765) [over to our MP3Enumerator class and start](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=139.29411764705884) [filling this in. Now notice this takes a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=143) [string of the startingPath as the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=147.26666666666665) [parameter. So we're going to point this at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=150.46666666666664) [a folder and it should get all of the MP3](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=153.0416666666666) [files out of this folder and expose them](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=155.95833333333317) [in a way that we can iterate through them.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=158.35294117647058) [So let's start by implementing the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=161.5294117647058) [interface. So this will be IEnumerator of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=163.64705882352928) [FileInfo, and again we'll say Control. to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=167) [implement the interface, and then we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=170.5) [reorder things like we did above. So we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=173.3) [move this Current up with the other](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=175.7000000000001) [Current and we'll move Dispose down to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=177.80000000000018) [bottom. Now what we're going to do is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=181.11764705882354) [piggyback on an existing enumerator. In.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=185.3529411764706) [NET, there's a class called Directory and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=188.5) [this has a method called EnumerateFiles.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=192) [This returns an IEnumerable that we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=195) [use. So, we can also use that enumerable](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=197.86363636363635) [to get the enumerator out of it. Let's go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=201.1363636363636) [ahead and create a private field for that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=204.73684210526318) [enumerator. So we'll have a private](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=207.6842105263159) [IEnumerator of string, because again](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=209.89473684210543) [that's what the Directory class returns.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=212.0769230769231) [And we'll call this fileEnumerator. Now in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=215.30769230769238) [our constructor, we need to get this out](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=218.66666666666669) [somehow. So what I'll do is I'll create](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=221.33333333333343) [files variable and we'll set this to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=224.00000000000017) [Directory. EnumerateFiles and this has](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=229) [several overloads. The first parameter is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=234) [the path, so we'll say startingPath, then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=237.6470588235294) [our next parameter is a searchPattern. In](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=240.52941176470583) [this case, I'll say \*. mp3. And then the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=243.5) [third option is what our search options](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=248) [are. So we can say SearchOption.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=251.5) [AllDirectories and it will traverse all of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=253.84210526315795) [the child directories and all of the child](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=256.421052631579) [directories' child directories. So this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=259.4736842105263) [will pull out all of the MP3 files that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=261.8421052631578) [are in this folder. Now again, the one](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=266.1052631578945) [problem with this is that this returns a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=269.33333333333326) [string. Since we want to return a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=271.9999999999998) [FileInfo, we'll need to do a little bit of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=274.333333333333) [manipulation with this. Now that we have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=277.5454545454546) [our variable called file, and this is an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=280.09090909090924) [IEnumerable of string, we can actually get](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=283) [the enumerator out of that and assign it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=285.5789473684209) [to our local field. So we'll say](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=288.5263157894734) [FileEnumerator and we'll set that equal to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=291.74999999999994) [file. GetEnumerator. Now the rest of this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=295.83333333333314) [class becomes extremely easy. I'm actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=298.8421052631578) [going to do Current last because that's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=301.05263157894717) [the most complicated one, but for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=303.6315789473681) [MoveNext, all we need to do is call the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=306.6470588235293) [internal FileEnumerator's. MoveNext](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=311.411764705882) [statement. For Reset, we just need to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=313) [return the internal enumerator's Reset.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=318.8333333333332) [And the same for Dispose. So you can see](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=323) [that we can actually use an existing](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=325.8636363636363) [enumerator and that way we don't actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=328.090909090909) [have to implement all of these ourselves.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=330.4736842105263) [And we actually need to return the result](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=333.7894736842104) [of MoveNext since again, that returns a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=337.5789473684208) [Boolean. So now let's go up to our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=340.8461538461538) [Current. Now it's really easy for our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=344.53846153846143) [explicit implementation because just like](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=347.11764705882365) [before, we're going to return the strongly](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=348.8823529411767) [typed Current property, but our strongly](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=351.7857142857143) [typed Current property is of type](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=356.49999999999994) [FileInfo. Our FileEnumerator is actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=361.2142857142856) [returning a string, so what do we do? Well](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=364.33333333333326) [it turns out that we can create a FileInfo](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=369.35) [based on the path that's coming back from](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=372.5000000000002) [our directory. So all we need to do here](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=375.3000000000004) [is return a new FileInfo and for the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=378.73913043478245) [parameter we're just going to take our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=381.86956521739097) [enumerator's. Current property. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=384.6086956521734) [fileEnumerator. Current is a string with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=387.2857142857142) [the path to the file. We'll pass that to a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=390.71428571428555) [constructor for FileInfo and then we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=395.1052631578948) [return that value as our Current property](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=397.63157894736855) [from our strongly typed MP3Enumerator. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=400.57894736842127) [now that we have this, we can go back to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=403.24999999999994) [our MP3Locator class and actually return](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=407.74999999999983) [that instance. So we'll return a new](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=410.53333333333336) [MP3Enumerator. Now this does want a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=414.2666666666669) [startingPath. Fortunately we have that in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=417.46666666666704) [the constructor so we can just return the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=419.9999999999999) [startingPath here. Now let's build our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=423.1999999999997) [project and make sure we don't have any](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=425.41176470588243) [compiler errors in our library. Okay,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=428.2352941176473) [everything looks good, so let's switch](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=430.3) [back to our UI application and let's go to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=432.1000000000001) [code behind of our MainWindow. xaml. cs.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=434.8000000000002) [So now let's implement the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=437.6875) [ClickMeButton\_Click event with the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=440.5) [information of our newly created](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=442.75) [enumerable. Now for this, I do need the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=445.3809523809524) [startingPath, so I'm going to flip back](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=448.4285714285717) [over to my MP3 library and let's go up to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=451.0952380952385) [the root path that we actually want, which](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=454.38888888888886) [is this one right here. So I'll just copy](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=456.61111111111103) [this and we'll create a variable for that.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=459.81818181818176) [So we'll just call this mp3s and we'll say](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=463.45454545454527) [new MP3Locator and we need to pass in the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=467.5454545454542) [startingPath, so we'll just do this. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=474.2857142857142) [this will create a new instance of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=479.36842105263156) [MP3Locator, our class that implements](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=482.31578947368405) [IEnumerable and it has the startingPath as](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=484.15789473684185) [our parameter. Now obviously in a real](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=486.7058823529412) [application, we'd probably want to get](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=489.1764705882355) [that information from configuration, but](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=491.2941176470591) [this shows us exactly how things are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=493.6363636363637) [working. So now that we have this, we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=497.4545454545456) [do a foreach on it. So we can say foreach](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=504.0799999999999) [mp3 in mp3s, OutputListBox. Items. Add](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=511.67999999999984) [mp3. And that's all we have to do now that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=516.2399999999998) [we have this enumerator in place. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=520.0000000000003) [again, because MP3Locator implements the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=522.5) [IEnumerable interface, we can actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=525) [loop through it with the foreach loop. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=527.5) [I do have a data template setup so if we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=531.0909090909091) [run our application and click the Click Me](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=534.7272727272729) [button, we'll see all of our MP3s coming](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=537.6363636363639) [in. And this actually shows three](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=540.4705882352943) [different parts of this. It shows the name](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=542.5882352941179) [of the file, the name of the artist, and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=545.5555555555557) [the name of the album. But we can make](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=549.0555555555559) [this even more interesting. Since our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=553) [class implements IEnumerable, that means](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=556) [we can use the LINQ extension methods that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=558.5) [we have available to us on the IEnumerable](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=562.5) [interface. So we can put a filter on our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=566.5) [MP3's object that will filter based on our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=570.1111111111113) [search criteria. Let's go ahead and do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=573.2222222222226) [that. First, let me put some curly braces](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=575.1904761904759) [around this so that we don't get confused](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=577.0952380952374) [of where our different blocks start. Then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=579) [I'm going to say, mp3s. Where and we're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=583.2000000000002) [going to add a conditional. Now this is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=588.0000000000003) [going to get a little bit long so the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=591.6000000000001) [first thing I'm going to do is actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=593.4000000000005) [move this down to the next line. We're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=595.0000000000009) [going to use a lambda expression here](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=596.9473684210525) [because that's the easiest way to work](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=599.1578947368416) [with LINQ. So the first thing we'll do is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=601.3684210526308) [we'll see if the Name of the MP3 file](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=604.8636363636361) [Contains the value that's in our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=608.545454545454) [SearchTextBox. Text. As something else](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=611) [that we can check for, we can see if m.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=614.4210526315792) [Directory. Name Contains our Search](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=621.2631578947376) [criteria. Now because we pulled this out](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=624.55) [as a FileInfo class, that means that Name](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=628.3999999999996) [will be the name of just the file itself,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=632.7999999999993) [not the fully qualified path. When we say](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=636.9999999999999) [Directory. Name, that will be the parent](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=640.1999999999997) [directory that this file lives in. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=643) [again, because of the way our files are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=645.9473684210527) [organized in that iTunes library that will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=649.3157894736844) [actually be the name of the album. We can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=651.9545454545456) [also go up one more level and check the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=654.8181818181824) [name of the artist. So we can say m.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=657.6818181818193) [Directory. Parent. Name and we'll compare](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=662.5714285714284) [this to what's in our Search box. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=665.9999999999998) [before I show this in action, I want to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=670.2272727272727) [scroll down just a little bit because we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=672.2727272727275) [also have a DoubleClick event on our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=674.0909090909095) [OutputListBox. This is setup so that if we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=676.0500000000001) [double-click on one of the items, it will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=678.8500000000003) [actually open Windows Media Player and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=681.6500000000004) [start playing that item. So let's go ahead](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=684.1052631578948) [and run our application and check the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=687.4736842105265) [results. So here, if I want to check for A](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=690.3478260869565) [Flock of Seagulls, I can type in Flock and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=693.8260869565215) [it will actually give me a filtered list](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=696.95652173913) [based on the artist. From here, we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=699.7500000000001) [actually double-click on an item and we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=702.5500000000003) [see Windows Media Player starts up and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=705) [actually starts playing the file. Now I](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=708.5) [won't play too long of this, because](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=711.5263157894738) [otherwise we'll get sued for copyright](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=713.3684210526319) [infringement, but we can see that this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=714.9473684210532) [actually does work. And we can do this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=716.75) [based on the file name, so if we wanted to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=718.75) [type in something like I Ran, we can see](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=721.25) [we actually get the file names with that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=725) [search string in it. So as a last step,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=729) [let's go ahead and convert our MP3Locator](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=732.9999999999999) [so that instead of calling an explicit](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=735.7999999999997) [enumerator, it actually uses the yield](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=738.5999999999996) [return statement. This is actually quite](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=741.9166666666669) [simple. So first we'll comment out this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=745.4166666666671) [line because we no longer need it, and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=747.894736842105) [we'll see var files equals Directory.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=750.4210526315783) [EnumerateFiles, just like we did before,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=752.5294117647059) [we'll pass in the startingPath, our filter](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=755.705882352941) [to look for \*. mp3, and our SearchOption](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=759.411764705882) [where we say, yes please do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=764.3333333333331) [AllDirectories. Now since files is an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=768.3333333333329) [IEnumerable, we can actually foreach over](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=771.5) [this. So we can say foreach var file in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=774.5) [files, yield return new FileInfo with that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=781.666666666667) [file in it. So we can see this code is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=787.5000000000006) [much, much more compact so we're actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=792.4500000000002) [iterating over our internal values coming](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=794.9000000000003) [back from this Directory object and inside](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=797) [our foreach loop we're doing a yield](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=799.9473684210527) [return, which again is returning FileInfo](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=802.8947368421054) [object. As soon as this foreach loop is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=805.6) [done iterating, our iteration will end.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=810.4000000000002) [Let's go ahead and run the application and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=814) [make sure we get the same results. And](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=816.1333333333332) [there's our results coming back and let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=818.3636363636364) [just go ahead and try a search string and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=820.909090909091) [we can see the filters are working as](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=824.1818181818184) [well. And just like before, if we wanted](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=827.1666666666667) [to we could completely remove that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=830.277777777778) [MP3Enumerator class from our application.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=832.6111111111115) [So this shows that we can piggyback on an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=834.8823529411766) [existing implementation of IEnumerator so](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=839.1176470588239) [that we don't have to manually implement](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=841.3157894736842) [all of the members ourselves, we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=843.5263157894733) [simply pass through that functionality to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=845.7368421052624) [the existing class. When a class](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=847.8235294117646) [implements IEnumerable, which is an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=850.2941176470586) [example of the iterator pattern, it picks](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=852.3529411764702) [up a lot of functionality automatically](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=855.3636363636365) [in. NET. We can use the foreach loop and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=858.0909090909095) [we can also use all of the LINQ extension](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=861.130434782609) [methods and this makes it a very important interface and a very useful interface.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=6&mode=live&start=863.8695652173919)

[Summary](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live)

[So we've seen that the iterator pattern is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=1) [just a way of getting items sequentially](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=4) [out of an aggregate object. And since](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=6.625) [collections are aggregate objects, we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=9.184210526315791) [use an iterator to run through the items](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=11.236842105263165) [of a collection. This way, the person](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=13.97368421052633) [using the collection doesn't need to know](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=16.263157894736842) [anything about the internals, he just has](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=18.473684210526304) [to call out next please, and the next item](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=20.684210526315766) [will come right to him. We've seen that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=24.076923076923066) [the iterator pattern is quite important in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=27.235294117647054) [how we interact with collections in. NET.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=30.117647058823515) [In fact, an implementation of the iterator](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=33) [is built into pretty much every collection](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=35.79999999999999) [type. We also saw how the foreach loop](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=38.59999999999998) [uses an iterator, or an enumerator as it's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=41.33333333333335) [referred to in the. NET world, and we took](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=44.000000000000036) [a closer look at the IEnumerable](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=47.16666666666666) [interface. It has a single method,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=49.49999999999997) [GetEnumerator, that returns an object that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=51.833333333333286) [implements IEnumerator. The Enumerator](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=54.5) [object has the functionality to actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=56.5) [iterate through the collection. We created](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=59.5) [our own classes that implement IEnumerable](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=62.6923076923077) [and IEnumerator. The first was a class](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=65.92307692307692) [that returned the FibonacciSequence. Then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=68.84210526315788) [we saw how we could use the yield return](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=70.68421052631575) [statement as a syntax shortcut. This](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=74) [allows us to write more compact code and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=76.09999999999997) [it handles the creation of an enumerator](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=78.89999999999992) [for us. As another example, we created a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=81.42857142857143) [class that could locate all of our MP3](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=84.85714285714288) [files in a specified folder. In this case,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=88.28571428571432) [we wrapped another class, the Directory](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=91.77777777777777) [class, and then added our own](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=94.44444444444443) [functionality so that we could get a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=97.11111111111109) [richer object back. This allowed us to use](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=99.84210526315788) [the IEnumerable implementation that was](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=102.78947368421048) [supplied by another class. Finally, we saw](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=104.63157894736835) [that LINQ provides us with a large number](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=107.21052631578945) [of extension methods on the IEnumerable](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=110.15789473684205) [class. This means that we can use those](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=112.4375) [methods to modify how our iterations work.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=115.9375) [For example, we can use the Where method](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=119) [to filter data or the Select method to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=122.11111111111109) [transform it. All in all, IEnumerable is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=125.22222222222217) [very powerful in. NET and this is all](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=127.9047619047619) [based on the iterator pattern that was](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=130.95238095238093) [described by the Gang of Four. We'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=133.6190476190476) [continue our exploration of Patterns You](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=136.21052631578954) [Already Use with the Chain of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=138.42105263157907) [Responsibility and Facade patterns. As](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=140.6315789473686) [we'll see, both of these patterns are quite easy to understand.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m3-iterator&clip=7&mode=live&start=145)

[Patterns You Already Use: Chain of Responsibility and Facade](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live)

[Overview](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live)

[We'll continue our exploration of patterns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=0) [that we already use all the time by taking](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=1.8) [a look at the Chain of Responsibility and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=4.499999999999999) [Facade Patterns. As with the previous](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=7.23529411764706) [patterns, we'll look at the Gang of Four](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=9.70588235294118) [description, consider a real world example](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=13) [that shows the concept of the pattern, and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=14.800000000000004) [then take a look at a common C#](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=17.20000000000001) [implementation that's right in the code we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=19.909090909090907) [use regularly. Once we've seen the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=23.09090909090908) [everyday usage, we'll look at some more](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=25.411764705882348) [specialized examples and consider the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=27.882352941176457) [consequences of the patterns. This will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=29.64705882352939) [help us become more comfortable with the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=31.944444444444446) [design patterns that we already use. Once](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=34.66666666666665) [we're able to recognize the patterns, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=37.31578947368421) [can start to use them more intentionally](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=39.5263157894737) [based on the problems that we face in our programming environment.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=0&mode=live&start=41.736842105263186)

[Chain of Responsibility Pattern Described](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live)

[Here's the Gang of Four description of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=1) [Chain of Responsibility Pattern: Avoid](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=3.8235294117647065) [coupling the sender of a request to its](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=5.588235294117646) [receiver by giving more than one object a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=8.647058823529413) [chance to handle the request. Chain the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=11.941176470588239) [receiving objects and pass the request](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=14.875) [along the chain until an object handles](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=17.5) [it. Rather than breaking this description](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=20.5625) [down right away, let's take a look at a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=22.750000000000007) [real world example of the chain of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=25.90000000000002) [responsibility pattern. Have you ever had](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=29) [to contact tech support? If so, you've](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=32.64705882352941) [probably experienced the chain of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=35.5294117647059) [responsibility firsthand. Here I am](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=37.58823529411767) [without my snowboarding gear. I had a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=39.400000000000006) [problem with my internet connection so I](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=41.850000000000016) [had to contact my DSL provider. The first](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=44.300000000000026) [stop is level 1 tech support. This is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=48) [often a person asking common questions](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=52) [from a script. They might ask, is your](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=55) [modem plugged in, have you tried turning](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=57.80000000000001) [it off and on again? I have to think that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=60.25000000000002) [these questions often solve the issue.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=63.38888888888889) [Otherwise, I can't imagine they would](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=65.05555555555554) [bother to ask them. As an aside, when I](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=66.72222222222217) [called my DSL provider for help, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=69.90909090909088) [computer asked me if I'd tried turning it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=72.4545454545454) [off and on again before ever letting me](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=75.34782608695652) [talk to a real person. If level 1 tech](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=78.13043478260865) [support can handle the problem, which](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=81.26086956521729) [we'll refer to here as the message, then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=83.44444444444444) [the issue is closed and everything stops](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=86.99999999999999) [right there. However, if level 1 cannot](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=90.11111111111109) [handle the issue, it gets passed on to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=92.57894736842103) [next member of the chain. This is level 2](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=95.42105263157887) [tech support and this person often is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=98.39130434782606) [sitting in front of a computer so that she](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=100.82608695652168) [can run diagnostics. For example, she can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=103.95652173913032) [try to communicate to my modem from the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=106.19999999999999) [switching center and perhaps find a fault](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=108.59999999999997) [somewhere along the way. If level 2 tech](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=110.69999999999995) [support can handle the problem, then the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=114.00000000000001) [issue is closed and things stop there. But](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=117.00000000000003) [if level 2 is unable to resolve the issue,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=120.33333333333333) [it gets passed on to the next member of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=123.33333333333329) [the chain. This is probably someone in a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=126.33333333333324) [truck driving out to check wiring and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=129.57142857142853) [hardware. Tech support gives us a good](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=132.57142857142844) [example of how the chain of responsibility](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=135.00000000000006) [pattern works. The sender of the message](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=137.33333333333346) [is not responsible for making sure it gets](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=139.7647058823529) [to the right person. Instead, the message](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=142.58823529411754) [is sent to the first member of the chain.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=145.04999999999998) [If that member can handle it, then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=148.19999999999993) [everything stops. If not, the message is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=150.6499999999999) [passed onto the next member of the chain.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=153.14285714285717) [If that member can handle it, then the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=156) [message stops. Otherwise, the message is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=158.94736842105272) [passed onto the next member of the chain.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=161.15789473684225) [So we can see that the chain of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=164.00000000000003) [responsibility pattern is all about how a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=166.66666666666677) [message is processed and handled. It turns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=169.00000000000017) [out that if you've used a try/catch block](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=171.47368421052636) [in. NET, then you've used an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=174.42105263157907) [implementation of the chain of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=176.6315789473686) [responsibility. Let's take a look at some code that shows just that.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=1&mode=live&start=181)

[Demo: Everyday Chain of Responsibility](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live)

[To see an example of the chain of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=1) [responsibility in action, we're going to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=4.199999999999999) [look at exception handling in. NET. Here,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=6.600000000000001) [we have a very simple project that just](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=9.31578947368421) [has one screen. I'm actually going to run](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=11.842105263157896) [this application without debugging. You'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=14.36842105263158) [see why in just a moment. So in our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=16.2) [application, we have a drop-down box where](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=19.799999999999986) [we can select a different type of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=22.599999999999977) [exception and when we click the button, it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=25.47058823529411) [throws that exception. Now I wouldn't](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=28.76470588235292) [recommend writing an application that does](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=31.36363636363636) [this yourself. However, I have to say I've](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=34.09090909090908) [had some of my users treat my applications](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=37.10000000000001) [as if this is what happened. So if we were](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=39.90000000000002) [to click the button right now, we don't](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=43) [have any exception handling so our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=45) [application will simply shut down. Let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=46.5) [take a look at the code that actually runs](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=49.28571428571428) [this. If we go to the code behind on our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=54.4285714285714) [form, we'll see that the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=59.736842105263165) [ClickMeButton\_Click event handler calls](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=62.36842105263159) [Method1. Method1 calls Method2 and Method2](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=64.47368421052633) [actually throws the exception. Now this is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=67.5) [a bit of a contrived application so that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=71) [we can see how the message moves from](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=74.625) [method to method in this case. Normally](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=77.125) [though, we would have these method calls](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=79.29411764705883) [across different classes or even different](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=81.35294117647061) [modules in our application. So let's start](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=83.11764705882356) [by adding a try/catch block to Method2.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=86.90909090909093) [What we'll do is wrap this entire section.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=92) [So I'm going to highlight it and I'm going](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=94.28571428571433) [to use the keyboard shortcut Control K,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=96.85714285714296) [Control S. This will give me a list of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=99.3125) [snippets to choose from. Since I want a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=103.25) [try/catch block, I'll type in try and if I](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=106.5) [hit Enter, it will surround the code that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=109.875) [I just highlighted with a try block and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=112.875) [then it creates a catch block for me. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=115.52173913043477) [in this particular case, we want to catch](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=118.26086956521735) [the AccessViolationException. And what](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=120.69565217391298) [we'll do is we'll just set the TextBox. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=122.90909090909092) [there's TextBlock1. Text and we'll set it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=128.75) [to Caught in Method2. And we'll remove the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=134) [code that re-throws the exception. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=138.39999999999998) [we'll move up to Method1 and actually do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=140.49999999999994) [the same thing. So we'll highlight our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=143.2999999999999) [code, Control K S, type in try, and then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=145.81818181818187) [hit Enter to surround that with a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=149.09090909090924) [try/catch block. This time we'll look for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=151.63636363636385) [a NullReferenceException. And again, we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=155.5294117647059) [set the TextBlock and we'll say Caught in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=158.47058823529417) [Method1. And again, we'll remove the code](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=163.33333333333331) [that re-throws it. Now you're probably](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=167.99999999999991) [getting the idea at this point. If we go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=170.68181818181816) [up to the Click event handler, we'll do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=172.72727272727263) [the same thing, Control K S, try, and for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=174.5454545454544) [this exception we'll choose the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=179.84615384615375) [ArgumentException. And we'll set our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=183.30769230769215) [TextBlock to Caught in Click. So now that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=186.09523809523807) [we have these try/catch blocks in place,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=190.28571428571422) [we can actually look at how the exception](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=193.95238095238085) [walks through the call stack. Let's go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=197.33333333333331) [ahead and run the application. Again, I'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=200.05555555555551) [start it without debugging so that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=202.66666666666669) [don't end up in the debugger. So if we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=205.00000000000009) [choose AccessViolationException, we see](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=208.71428571428575) [that the exception is caught in Method2.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=211.00000000000009) [If we select NullReferenceException, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=215) [see that it's caught in Method1 and it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=216.84210526315795) [looks like we've got a small typo in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=219.78947368421066) [Method1 as well. And if we click on](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=222.7) [ArgumentException, we see that it's caught](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=225.49999999999994) [in the Click event handler. So let's think](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=227.5999999999999) [about what's actually happening here. If](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=231.10526315789468) [we go down, let's go ahead and just fix](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=234.2631578947367) [the method as long as we're here. So what](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=239) [happens is when we throw an exception,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=242.27272727272737) [each catch block in the call stack gets a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=244.81818181818198) [chance to handle it. So in this case, if](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=248.26315789473688) [we throw an AccessViolationException, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=252.0526315789475) [catch block in Method2 is able to handle](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=254.1578947368423) [it. And what happens at that point? Well,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=257.2105263157894) [everything's handled so the exception does](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=260.1578947368419) [not propagate. Now if we throw a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=262.4) [NullReferenceException, what will happen](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=265.1999999999998) [is that we end up in the first catch block](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=266.7999999999997) [in Method2 and it says, are you an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=270.8888888888889) [AccessViolationException, oh you're not, I](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=274.44444444444457) [can't handle you. You need to go to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=276.66666666666686) [next link in the chain. That happens to be](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=279.875) [Method1. It also has a catch block and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=282.6875) [this says hey, are you a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=285.49999999999983) [NullReferenceException? In this case it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=287.6428571428568) [says yes I am, so it gets handled right](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=289.68421052631584) [here. And the same process continues. If](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=293.47368421052647) [we throw an ArgumentException, Method2's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=296.3529411764706) [catch block looks at it and says, well](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=298.11764705882365) [you're not an AccessViolationException, go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=300.9411764705885) [to the next member of the chain. Method1](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=302.66666666666663) [looks at it and says well, you're not a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=305.33333333333314) [NullReferenceException, go to the next](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=308.4117647058824) [member of the chain. And then the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=310.47058823529426) [ClickMeButton's catch block looks at it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=313.3529411764709) [and says oh, you are an ArgumentException,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=315.7058823529412) [let's go ahead and handle you right here.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=318.1764705882355) [But there is a consequence of the chain of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=321) [responsibility that we definitely need to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=324.5000000000002) [be aware of. Let's go ahead and start our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=326.8333333333337) [application again. If we select](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=330.25) [AccessViolationException, it gets caught](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=332.125) [in Method2. If we select](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=333.625) [NullReferenceException, it gets caught in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=336.79999999999995) [Method1. If we select ArugmentException,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=340.2999999999999) [it gets caught in the Click event handler.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=342.66666666666674) [But what happens if we just choose a plain](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=346) [old exception? Well, our application shuts](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=351.0625) [down. What's just happened is that the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=354.4375) [message has fallen off the end of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=357.10000000000014) [chain, and that's the primary consequence](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=359.9000000000003) [of the chain of responsibility pattern. If](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=362) [the message is not handled by any members](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=364.45000000000016) [of the chain, it ends up just falling off](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=367.25000000000034) [the end. Now in the world of exceptions,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=370.33333333333326) [we normally recommend that we put in a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=372.9999999999998) [global exception handler so that we don't](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=375.6666666666663) [have this happen in our code. Let's go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=377.9999999999999) [ahead and do that. If we go to our App.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=380.6666666666664) [xaml. cs, we can see that we already have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=384.52631578947376) [an UnhandledException handler setup. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=388.3157894736844) [let's go ahead and uncomment this. I'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=390.3157894736842) [use the keyboard shortcut Control K,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=392.52631578947376) [Control U to uncomment the blocks of code.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=394.4210526315791) [And we'll do Control K U again. And so](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=397.6956521739131) [what this will do is make sure that the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=402.78260869565247) [message does not fall off the end of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=407.8695652173918) [chain. We need something that will handle](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=411.45000000000016) [any exception that doesn't get handled by](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=413.9000000000003) [one of our catch blocks. Now this should](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=416.35714285714283) [be a very exceptional case. Our code](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=419.2142857142855) [should be written so that we're catching](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=421.6) [any exceptions that we expect may be](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=423.7000000000001) [thrown, but if something comes along that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=425.8000000000002) [we weren't expecting, the best thing to do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=427.9130434782608) [is go ahead and log it so that we're aware](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=430.34782608695633) [of it, and then we can update our code to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=433.3913043478257) [put appropriate exception handling in the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=436.8000000000002) [local place that had the failure. So if we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=438.9000000000003) [run our application now and choose our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=442.43478260869557) [standard exception, what we see is that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=445.7826086956519) [end up in the global exception handler.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=449.6086956521734) [And what does this do? Well it pops up a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=452.7368421052631) [message box that says, something bad](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=456.42105263157873) [happened, please contact the Help Desk for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=458.6315789473681) [more information. And when we click OK,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=461.47058823529426) [the application shuts down. Now what](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=464.3529411764709) [exactly we do in the global exception](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=466.47058823529414) [handler really depends on what our needs](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=468.11764705882365) [are. If you notice here, I have a TODO](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=469.76470588235316) [statement saying, we really should be](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=472.8000000000002) [logging this somewhere, and that's all the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=474.9000000000003) [chain of responsibility is. We pass the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=477.3333333333333) [message to the first member of the chain,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=479.6666666666665) [if they can handle it, great, if not, it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=482.33333333333303) [gets passed to the next member. If that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=485.4545454545455) [member can handle it, great, if not, it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=488.3636363636365) [gets passed to the next member. We can see](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=491.2727272727275) [that exception handling does just that. It](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=494.6923076923075) [ends up walking the entire call stack](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=497.375) [until it finds a handler for our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=500) [exceptions. And if we don't provide a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=502.625) [global exception handler, we're in danger](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=504.80000000000007) [on an exception falling off the end of our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=506.60000000000014) [chain and causing our application to crash.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=2&mode=live&start=510)

[Chain of Responsibility Consequences](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live)

[As with all patterns, the chain of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=1) [responsibility pattern has consequences.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=4.818181818181818) [The biggest one we need to be aware of is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=7) [that if none of the members are able to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=9.5) [handle the message, then that message](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=11.75) [could fall off the end of the chain. We](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=13.333333333333334) [saw this in our example with exception](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=16.333333333333336) [handling. If we did not have a global](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=18.66666666666666) [exception handler or some other catch](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=21.79999999999999) [block that would handle a generic](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=24.19999999999998) [exception, then the exception would fall](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=26.599999999999973) [off the end of the chain and cause our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=28.470588235294112) [application to crash. This is one of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=31.117647058823515) [primary reasons that it's a good idea to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=33.66666666666668) [have a global exception handler in our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=36.333333333333364) [applications. Hopefully, we never hit that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=38.666666666666714) [global handler, but we have it there as a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=40.5625) [safety net. And if we find we do hit the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=43.375) [global handler, we can take a look at the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=46) [exception that was thrown and add more](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=48.25) [appropriate error handling elsewhere in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=50) [our code. This consequence also applies to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=52.1875) [our tech support example that we looked at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=55.25) [earlier. Level 3 tech support is basically](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=58.5) [the end of the chain. If the person](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=61.125) [checking the wires in your house is not](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=63.78260869565217) [able to figure out what the issue is, then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=65.8695652173913) [you might just be out of luck. Your](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=68.21739130434781) [message will drop off the end of the chain](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=70.9047619047619) [and you won't get the problem fixed. So we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=74.33333333333331) [definitely need to be aware of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=77.52631578947367) [consequence, but we can also use this to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=79.36842105263152) [our advantage. I used this consequence as](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=81.4736842105262) [part of the process of an approval engine that I built for an application.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=3&mode=live&start=87)

[Chain of Responsibility as Approval Engine](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live)

[I once built an approval engine for an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=1) [application using the chain of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=4.199999999999999) [responsibility pattern. Rather than](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=6.200000000000001) [looking at the code, which is more](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=7.6) [detailed than we really care about here,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=9.700000000000003) [let's walk through the process so that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=11.800000000000008) [can get an idea of the pattern in action.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=14.217391304347828) [The idea was that a user would submit a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=16.95652173913044) [request for a quantity of a particular set](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=19.695652173913054) [of items. We had rules to determine which](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=22.45000000000001) [of these requests required extra approvals](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=25.25000000000002) [from the Management Team. These rules were](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=27.36842105263158) [based on the reason for the request, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=29.94736842105263) [number of items requested or the dollar](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=32.89473684210527) [value associated with those items. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=35.64705882352942) [rules could get quite complex, for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=38.11764705882355) [example, examining the total number of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=40.58823529411768) [items across all requests for a particular](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=43.6923076923077) [individual. So here's how the workflow](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=47.46153846153848) [worked. When a request came in, it was](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=49.94444444444443) [compared against the first rule. If the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=53.055555555555515) [rule determines that the request requires](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=55.736842105263165) [approval based on the criteria, it is put](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=57.94736842105266) [into an appending approval state and a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=60.89473684210532) [message is sent out to alert the approver.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=63.400000000000006) [If the request is approved, it goes back](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=66.19999999999997) [through the approval engine again. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=69) [request goes to the first rule. This time](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=71.50000000000003) [the rule sees that approval has already](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=74.66666666666666) [been granted based on the rule. Because of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=76.99999999999996) [this, the request is passed to the next](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=79.71428571428572) [member of the chain. The second rule goes](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=82.57142857142861) [through the same process. If it finds that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=85.26315789473682) [the request requires approvals based on](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=87.78947368421046) [this rule, it puts it into the pending](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=89.6842105263157) [approval state. This process continues. If](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=93.5) [a rule does not apply or a rule applies,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=96.33333333333333) [but already has approval, then the rule](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=99.33333333333329) [simply passes the request along the chain.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=101.66666666666659) [And once all of the rules are satisfied,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=104.35000000000001) [the request drops off the end of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=107.95000000000003) [chain. At this point, the request is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=111.55000000000005) [considered to have all of the required](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=114.09999999999997) [approvals and it is ready for processing.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=116.54999999999993) [So we see how the chain of responsibility](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=119) [helps us here. The request does not need](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=121.5454545454545) [to know all of the rules. Instead, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=124.09090909090901) [approval engine points it to the first](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=126.69999999999999) [rule, and since each rule knows the next](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=129.14999999999995) [member of the chain, the request can be](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=131.9499999999999) [easily passed along until a rule is broken](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=135.14285714285708) [or until the request drops off the end.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=138.5714285714284) [Now you might be thinking that this is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=142) [unnecessary overhead. We're reprocessing](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=144.66666666666674) [rules that are at the beginning of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=146.0000000000001) [chain. As with all designs, this is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=148.85714285714283) [something to take into consideration. For](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=151.85714285714275) [this particular application, the volume](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=154.38888888888889) [was low enough that the extra processing](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=156.33333333333331) [overhead was not a concern. In addition,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=159.05555555555551) [the rules were subject to change, removal,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=161.90909090909093) [and addition. Since all rules are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=165.0909090909092) [processed each time through the approval](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=167.33333333333337) [engine, new rules would be taken into](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=169.33333333333343) [account automatically on requests that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=171.66666666666683) [were already in progress. As mentioned,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=173.88235294117646) [this code is quite complex, but since we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=176.70588235294116) [can talk about this at the pattern level,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=180.31578947368422) [using the chain of responsibility to pass](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=182.84210526315798) [messages along until someone handles it,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=185.0526315789475) [it is much easier for us to grasp the high](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=187.4) [level concepts. In fact, even though this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=192.0666666666667) [diagram describes an existing system, it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=194.50000000000006) [could just as easily be a high level](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=196.30000000000013) [design document that we can use to work](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=198.70000000000022) [out our implementation before we ever](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=201.80000000000004) [start coding. Now that we understand the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=204.20000000000007) [chain of responsibility, it's time to move onto the facade.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=4&mode=live&start=210)

[Facade Pattern Described](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live)

[Here's the Gang of Four description of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=1) [facade pattern: Provide a unified](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=3.9473684210526305) [interface to a set of interfaces in a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=5.789473684210525) [subsystem. Facade defines a higher level](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=9.125) [interface that makes the subsystem easier](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=12.5) [to use. This simply describes a way to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=15.875) [hide complexity behind an easier to use](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=20) [interface. As a real world example of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=23.5) [facade pattern, let's think about an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=26.79999999999999) [entertainment system. More specifically,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=29.19999999999998) [my entertainment system. I have a number](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=30.705882352941174) [of remote controls, each for a different](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=33.17647058823528) [piece of equipment. If I want to watch a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=35.64705882352939) [DVD, I need to perform the following](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=39.5) [steps. Turn on the TV if it isn't already](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=42.5625) [on. If the TV is already on, then I need](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=45.782608695652186) [to leave it that way. Set the TV to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=49.26086956521742) [component input. Turn on the stereo if it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=53.133333333333326) [isn't already on. Set the stereo to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=57.39999999999998) [auxiliary input. Turn on the DVD player if](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=61) [it isn't already on. And press Play on the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=65) [DVD player. This doesn't seem very complex](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=68.8181818181818) [to me because I use the system all the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=71.36363636363632) [time. But this is way too complex for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=74.63636363636355) [someone who doesn't know how things are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=77.1875) [hooked together. In fact, when my friend](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=79.375) [stops by to check on the cats when I'm out](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=81.30434782608695) [of town, I usually leave everything in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=83.91304347826086) [watch TV mode since that's what she's most](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=85.7391304347826) [likely to do. So our entertainment system](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=88.94736842105262) [is a complex subsystem that we'd like to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=91.89473684210523) [make easier to use. One way of doing this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=95.33333333333333) [is with a universal remote control. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=99.33333333333331) [one we have here is programmed with all of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=102.26666666666667) [the details of the system. If we want to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=104.66666666666666) [watch a DVD, we just press the button that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=107.27999999999997) [says Watch a DVD and it takes care of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=110.15999999999991) [rest, making sure that all of the right](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=113.35999999999984) [components are turned on and making sure](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=115.42857142857144) [that they're all set to the correct](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=117.09523809523813) [inputs. This hides the complexity and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=118.76190476190482) [makes our subsystem easier to use. Back in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=122.1818181818182) [our definition, our universal remote would](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=127) [be the unified interface. This makes some](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=130) [easy to use functions available to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=133.26315789473688) [user. The television, stereo, and DVD](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=136.2105263157896) [player are our subsystems. Our universal](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=138.73684210526335) [remote gives us a higher level interface,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=141.58823529411765) [Watch a DVD, that makes the subsystems](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=145.29411764705884) [easier to use. But we use the facade](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=149) [pattern in our everyday programming as](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=152.73333333333335) [well. We looked at the foreach statement](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=155.53333333333336) [earlier when we were talking about the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=158.11764705882348) [iterator pattern, but foreach is also an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=160.58823529411754) [example of the facade pattern. Let's take a look at that.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=5&mode=live&start=165)

[Demo: Everyday Facade](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live)

[So here we are back in Visual Studio. This](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=1) [time, we'll consider the facade pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=4.6) [and how the foreach statement is actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=7.000000000000002) [an example of that. Let's start by running](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=10.166666666666668) [our application. Here we have a ListBox](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=14.83333333333334) [and a button, and our button doesn't do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=17.470588235294112) [anything at this point. This looks very](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=19.823529411764692) [similar to the other applications that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=22.38461538461538) [we've seen so far. If we open up our code](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=25.15384615384614) [behind, let's take a look at the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=30) [ClickMeButton\_Click event handler. So you](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=33.5) [can see that we have a static People class](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=35.76190476190476) [that has a GetPeople method and this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=39.190476190476176) [returns an IEnumerable of Person. As we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=41.85714285714283) [saw earlier, IEnumerable is the interface](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=45.15384615384616) [that foreach requires. So if we have an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=48.3846153846154) [object that implements IEnumerable, we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=51.94444444444443) [use foreach to iterate over the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=54.27777777777774) [collection. So let's do just that. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=56.61111111111106) [we'll say for each var person and people,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=60.666666666666686) [PersonListBox. Items. Add person.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=65.5555555555556) [Hopefully this code is looking familiar by](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=68) [now, we've seen it quite a few times at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=70.3333333333333) [this point. Now if we run the application,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=73.33333333333326) [we'll see that our ListBox now gets](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=76.09999999999997) [populated, but as we saw earlier, there's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=78.54999999999993) [another way to do this, and that's to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=81) [manually use the enumerator. Let's go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=84.33333333333337) [ahead and extract this out into another](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=86.88888888888889) [method. So I'm going to right-click, say](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=89.99999999999999) [Refactor, Extract Method, and we'll go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=93.11111111111109) [ahead and call this ForeachEnumeration.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=96.19999999999999) [And we can see it created a new method for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=98.94999999999997) [us that had that block of code. But we're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=104.44999999999995) [actually not going to use it at this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=107.82352941176475) [point. Let's go ahead and do the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=110.6470588235295) [ManualEnumeration. We saw this earlier](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=113.21052631578945) [when we were talking about the iterator](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=115.05263157894733) [pattern. So, we just need to get an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=117.63157894736835) [instance of an enumerator out of our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=120.43478260869561) [People object, and then from there we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=122.86956521739123) [use the while loop. We say enumerator.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=125.65217391304336) [MoveNext, and then inside our while list](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=130.33333333333337) [we say PersonListBox. Items. Add, and we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=135.38888888888897) [say enumerator. Current. And if we run the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=140) [application, we'll see that we have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=144) [exactly the same results that we had](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=147) [before. Now I'm going to go ahead and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=150.00000000000003) [extract this into a method as well. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=152.66666666666677) [we'll right-click, we'll say Refactor,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=155.84615384615384) [Extract Method, and we'll call this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=160.07692307692304) [ManualEnumeration. Now you might be](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=165.15384615384608) [wondering why I'm actually extracting](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=167.26315789473688) [these out. It's because we're going to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=168.84210526315798) [look at the intermediate language that's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=171.0526315789475) [generated by the compiler. By looking at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=173.23529411764704) [these methods, we'll be able to see what](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=176.11764705882348) [the compiler actually does behind the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=179.27272727272728) [scenes. Now I'm going to go ahead and do a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=180.90909090909096) [build to make sure that we have the latest](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=183.63636363636377) [executable out there. Now I've added](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=187.28571428571433) [ILDasm to my Tools. ILDasm is the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=190.71428571428584) [intermediate language disassembler that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=194.5) [ships with the. NET Framework. If you want](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=196.5) [information on how to add this to your](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=199.85714285714283) [Tools menu, you can visit the link to my](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=202.14285714285705) [website. This has full instructions of how](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=204.71428571428555) [you can add it as a tool so that when we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=206.61538461538464) [click on it, it will open up the assembly](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=209.57692307692315) [that we're currently in. So if we open up](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=212) [ILDasm at this point, it actually opens up](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=216.73684210526304) [the Facade\_foreach project, we can drill](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=220.9473684210524) [into the MainWindow class, and we can see](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=224.22222222222217) [both the ForeachEnumeration method and the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=228.66666666666652) [ManualEnumeration method. Let's start by](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=232) [looking at the ManualEnumeration. We'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=235.88888888888886) [just double-click this and it will bring](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=239.33333333333334) [up the intermediate language. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=241.66666666666674) [unfortunately this is a bit hard to read,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=243.4) [so I'll be pointing out the important bits](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=246.60000000000005) [as we go. So we've set our windows so we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=249.8000000000001) [can see both the ManualEnumeration in the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=253.21052631578954) [intermediate language, as well as the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=255.42105263157907) [ManualEnumeration source code. So let's go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=257.5833333333333) [ahead and walk through this. If we look at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=261.0833333333332) [the code, we'll see that there's a call to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=265.42857142857133) [GetEnumerator. That should be no surprise](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=268.6428571428568) [because that's exactly what we're doing in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=271.6470588235293) [this first line of code. And if we look at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=275.35294117647027) [this, we have the MoveNext call. Now this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=279.7391304347825) [is the way that IL sets up a while loop.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=282.5217391304345) [So our MoveNext is actually closer to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=286) [bottom of our method, but there's pointers](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=288.2857142857142) [to make it skip up and down through the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=290.28571428571416) [code. So we can see that MoveNext is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=293.3125) [actually called on our enumerator. Then if](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=296.8125) [we go back above, we're getting the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=299.9473684210526) [PersonListBox object. Then in the next](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=303.2631578947367) [line, we're calling GetItems. That will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=306.1052631578945) [actually return us the Items property from](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=308.66666666666663) [our source code, and you can see a little](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=310.99999999999983) [bit below that we have the get\_Current](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=313.99999999999966) [method being called on the Enumerator](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=316.81818181818176) [object. Now again, Current is a property,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=319.5454545454544) [so that corresponds to the enumerator.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=322.47058823529426) [Current in our source code. So now that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=324.9411764705885) [have that Current item, we call the Add](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=328.4545454545455) [method on the Items collection, and that's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=331.3636363636365) [how we populate our ListBox. So we can see](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=333.9090909090911) [that the methods are in a little bit](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=336.6363636363635) [different order from our source code, but](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=338.81818181818153) [all of the main members are there. Up at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=340.7272727272723) [the top, we have GetEnumerator and then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=345) [down at the bottom we have MoveNext and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=348.5) [then we get our PersonListBox, we get the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=352.35) [Items from our PersonListBox, we get our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=355.1500000000002) [Current object out of Enumerator, and then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=357.60000000000036) [we add that to the Items collection. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=360.2631578947369) [let's compare this to the IL that's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=363.63157894736855) [generated by the foreach method. So let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=366.57894736842127) [go back to ILDasm and we'll double-click](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=370.52941176470574) [on ForeachEnumeration and we'll arrange](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=374.6470588235291) [our windows the same way. Now the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=377.3) [interesting thing that we'll see is that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=379.4000000000001) [even though we're using a foreach syntax,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=381.50000000000017) [we won't see foreach anywhere in the IL](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=384.33333333333337) [that's generated. Instead, what we'll see](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=389.66666666666686) [is the underlying enumeration code that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=392.33333333333326) [have when we manually iterate through our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=394.66666666666646) [collection. So let's go ahead and take a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=397) [look at this. We'll scroll down just a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=400.478260869565) [little bit and if we move over, we'll see](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=403.95652173913004) [that we have get\_Current. The reason that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=407.7619047619048) [we have this is because the foreach loop](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=410.4285714285717) [has that var person in the source code, so](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=413.47619047619094) [we need to have that variable available](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=417.1875) [higher in our code. So we actually get the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=420.25) [current item closer to the top of our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=424.1428571428572) [code. Now notice down at the bottom we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=427.5714285714288) [have the same MoveNext code that we had in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=430.5789473684209) [our manual operation. And then if we look](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=433.894736842105) [at the rest of this method, it will look](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=436.5625) [very similar. So first, we get the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=439.375) [PersonListBox, then we call get\_Items on](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=442.1428571428572) [the ListBox, and then we call the Add](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=444.7142857142859) [method on that Items collection, and in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=448.14285714285745) [this case it will put in the Current](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=450.8421052631578) [property that we pulled from above. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=453.7894736842103) [what we can see is the foreach loop is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=456.3333333333333) [actually acting as a facade. It's taking](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=459.33333333333314) [the complex system of having to manually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=461.70000000000005) [deal with an enumeration and giving us a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=464.1500000000002) [very easy to use syntax. Now a couple](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=466.9500000000004) [other interesting things that might](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=469.8421052631578) [encourage you to use foreach is that it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=471.6842105263156) [actually puts in a try/finally block as](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=474.6315789473681) [well. So if we look at the top of this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=476.67999999999984) [method, we do see a try block that wraps](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=479.47999999999956) [that entire iteration, and then if we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=482) [scroll down, we see that we have a finally](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=485.294117647059) [block. And what do we have in here? We](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=489.5294117647063) [have the Dispose method. Remember, one of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=492.8000000000002) [the methods of our IEnumerator interface](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=495.25000000000034) [is Dispose so that we can handle cleaning](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=497.53846153846155) [up any non-managed objects. So in this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=501.8461538461539) [case, the foreach syntax is actually a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=505.0588235294118) [little bit safer than our standard syntax.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=507.5294117647061) [Now in this case we don't really need to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=510) [worry about it because our People](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=512.3684210526314) [collection doesn't have anything that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=513.9473684210527) [needs disposal, but if we did have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=515.3684210526316) [something that needs disposal, the foreach](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=517.9473684210525) [syntax would handle that for us and make](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=520.1578947368419) [sure that Dispose gets called. So the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=523.2631578947369) [foreach statement is really a higher level](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=526.2105263157896) [interface that allows us to easily work](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=529.1578947368423) [with the more complex subsystem. When we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=531.8421052631578) [use the ManualEnumerator, we need to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=534.4210526315787) [understand the IEnumerable interface in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=536.6315789473681) [order to call GetEnumerator and we need to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=539) [understand the IEnumerator interface so](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=543) [that we know how to call MoveNext and how](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=545.3333333333334) [to check the Current property. Foreach](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=548.3333333333337) [hides all of this. It gives us easy access](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=550.2857142857143) [to the Current property in the form of our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=552.8571428571433) [Person variable in this case. And it also](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=555.4285714285724) [takes care of getting the enumerator and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=558.3999999999999) [calling MoveNext to iterate through the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=561.1999999999997) [items. Let's take a quick look at another](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=563.5999999999996) [example of the facade pattern, the BackgroundWorker component.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=6&mode=live&start=571)

[Demo: Facade in Components](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live)

[The BackgroundWorker Component implements](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=2) [the facade pattern quite effectively. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=3.7777777777777786) [component is designed to execute an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=6.416666666666667) [operation on a separate thread. It does](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=8.916666666666666) [this through threading, but completely](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=11.875) [conceals those threads from the user of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=14.0625) [the component. Instead, it exposes an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=17.125) [event-based interface where events fire](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=19.555555555555557) [either on the UI thread or on the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=21.500000000000004) [background thread. The totality of this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=24.611111111111118) [interface consists of three methods, four](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=27.35294117647058) [properties, and three events, a highly](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=30.176470588235276) [simplified interface. All of the threading](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=33) [is hidden and internal. The advantage that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=36.60000000000001) [we get is the current thread, usually the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=40.16666666666666) [UI thread, stays responsive while the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=43.27777777777774) [background operation is executing. By](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=45.61111111111106) [calling RunWorkerAsync on the UI thread,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=47.882352941176464) [the DoWork event will fire on the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=50.70588235294116) [background thread. When the DoWork event](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=54) [handler has completed, it fires the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=56.25) [RunWorkerCompleted event on the UI thread.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=58.5) [In order to report progress, we call the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=61) [ReportProgress method in the background](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=65) [operation, which will fire the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=67.5) [ProgressChanged event on the UI thread.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=69.39999999999998) [And we also have a way to flag the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=71.49999999999994) [background operation for cancellation with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=74.64999999999989) [the CancelAsync method. This gives us a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=76.68421052631578) [very easy way to put a long running](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=79.6315789473684) [operation onto a background thread so that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=83) [our UI stays responsive. But it does](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=86.81818181818183) [conceal all of that threading from us and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=90.26315789473684) [gives us a very easy to use interface.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=93.6315789473684) [Let's take a quick look at how the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=97) [component is used so that we can get a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=98.81818181818187) [better appreciation of the facade pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=100.86363636363647) [that's implemented. So here we are in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=104) [Visual Studio. This time we're looking at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=109.84210526315788) [the Facade-Component project to see how](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=112.4210526315789) [the BackgroundWorker component is an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=114.63157894736835) [example of the facade pattern. Let's run](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=117) [our application to see how it works. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=120.5) [here we have a UI. When I click the Start](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=124.31818181818181) [button, it starts a labor intensive](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=127.49999999999994) [process, but it does that on the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=129.40909090909082) [background thread. Because it does it on](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=131.75) [the background thread, our UI stays](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=134.375) [responsive. It responds while that long](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=136.625) [running process is happening. And as we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=138.74999999999997) [saw in the slide, it also does progress](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=141.19999999999993) [reporting and we have cancellation that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=144) [works as well. So let's take a look at the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=146.4705882352941) [code. If we look at the code behind of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=150.58823529411757) [form, this contains all of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=155.0000000000001) [BackgroundWorker component methods. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=157.66666666666686) [this is where all of the code lives. If we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=159.36363636363637) [look through this code, we'll see the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=163.0000000000001) [event handlers and methods that we saw in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=165.54545454545473) [our slides, but we do not see any](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=168.21739130434787) [threading. We do not see a thread being](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=170.6521739130436) [allocated from the thread pool, we do not](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=173.08695652173935) [see operations being marshalled between](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=176.72727272727266) [threads. The component hides this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=179.45454545454533) [complexity from us, so if we look through](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=181.52380952380952) [all the methods, we do not see any](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=184.57142857142856) [threading and we don't see any dispatcher](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=187.6190476190476) [invoked calls to marshal calls between](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=190.30769230769232) [threads. This gives us a very easy to use](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=192.61538461538464) [interface, but it is also quite limited.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=196.73333333333335) [The BackgroundWorker component is limited](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=200) [to running one operation at a time and if](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=201.5789473684211) [we need to do complex threading](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=204.42105263157907) [operations, we can't since all of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=206.45454545454547) [threading is hidden. Now, we may consider](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=209.63636363636374) [this a fair trade. We get an extremely](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=212.1428571428571) [easy to use component at the cost of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=214.42857142857133) [limited functionality. In fact, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=216.71428571428555) [BackgroundWorker component is one of my](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=218.8461538461538) [favorite little tools. If you want to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=221.61538461538453) [learn more about the BackgroundWorker](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=224.17647058823525) [component, you can check out the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=225.6470588235293) [Pluralsight course on the. NET](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=227.41176470588218) [BackgroundWorker Component. Creating](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=229.6) [components is quite a common way to hide](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=231.2) [complexity. In my own applications, I've](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=235.46666666666664) [actually created a component that hides](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=238.35294117647058) [the generation of a complex URL. We had a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=241.17647058823528) [reporting system and it was very difficult](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=245.05882352941174) [to interact with manually because](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=247.5294117647058) [everything happened through URLs and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=249.2941176470587) [querystrings on those URLs. To simplify](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=251.41176470588235) [the interface, I created a component with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=254.23529411764704) [very easy to use methods. It was](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=257.52941176470597) [responsible for generating the really](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=260.47058823529426) [confusing querystrings and exposing a very](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=262.52941176470614) [easy interface to our other developers.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=265) [But one thing that happens when we do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=267.28571428571445) [that, we don't expose all of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=270.3333333333337) [functionality of the underlying API. This](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=273) [is actually one of the consequences of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=275.625) [facade pattern. Let's take a closer look at that.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=7&mode=live&start=279.125)

[Facade Consequences](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live)

[There are two primary consequences of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=1) [facade pattern. The first is that if we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=3.5789473684210518) [want to expose additional functionality of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=6.526315789473682) [our subsystem, we will need to update our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=8.833333333333332) [facade or maybe even create a new one.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=12.16666666666666) [This is also true if our subsystem](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=15.5) [changes. For example, if I were to get a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=17.97916666666667) [5. 1 surround sound box and add it to my](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=21.166666666666682) [entertainment system, I would need to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=25) [reprogram my universal remote. The next](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=28) [consequence is that the facade hides the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=30.608695652173914) [complexity of the API, which is why we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=32.7391304347826) [want to use it, but in making it easier to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=35.17391304347823) [use, it often hides functionality of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=38.84615384615384) [underlying API. In our BackgroundWorker](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=42.07692307692306) [component, we noted that this hides the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=44.235294117647065) [complexity of threading, but this also](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=47.11764705882355) [means that we cannot access those threads](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=49.58823529411768) [if we need to do something special with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=52.000000000000014) [them. And let's think about our foreach](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=54.6666666666667) [statement. When we were looking at the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=57.47058823529413) [IEnumerator interface earlier, we saw that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=60.352941176470615) [we had the Current property plus three](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=63) [methods, MoveNext, Reset, and Dispose. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=66.5) [foreach statement handles MoveNext and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=69.42105263157895) [Dispose for us, but there's no way for us](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=71.52631578947367) [to access the Reset method of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=75.31578947368418) [underlying enumerator. This would mean](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=77.94736842105262) [that our option would be to break out of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=79.52631578947364) [the existing foreach loop and startup a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=82.36842105263149) [new one. In most cases, we don't miss the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=84.8181818181818) [reset method, so we are willing to except](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=88.09090909090904) [the reduced functionality for the easier syntax of the foreach statement.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=8&mode=live&start=91)

[Summary](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live)

[We've looked at two more of the Gang of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=1) [Four design patterns and we've seen that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=3.4545454545454533) [there really is not a mystery about them.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=5.363636363636361) [They simply give us solutions to common](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=7.9411764705882355) [problems. The chain of responsibility](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=11.23529411764706) [pattern gives us a way to handle a message](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=13.588235294117649) [by passing it from one receiver to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=16.909090909090907) [next until someone is able to handle it.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=19.45454545454544) [We saw how try/catch blocks and exception](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=22) [handling are an example of the chain of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=24.88235294117646) [responsibility pattern. If an exception is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=28.176470588235272) [thrown, the first catch block gets a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=30.33333333333333) [chance to handle it. If it can, then the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=32.66666666666666) [exception stops. Otherwise, it moves up](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=35.9047619047619) [the stack until it finds a catch block](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=38.190476190476176) [that can handle the exception. And as we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=41.23809523809521) [saw, there's a danger of the exception](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=44.39999999999999) [falling off the end of the chain. If none](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=47.19999999999998) [of the catch blocks handle the exception,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=50.7) [it ends up as an unhandled exception and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=53.15000000000001) [our application shuts down. That's why](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=55.950000000000024) [it's a good idea to have a global](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=58.421052631578945) [exception handler just in case something](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=62.210526315789465) [slips through. We also saw how we could](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=65.05263157894736) [use the chain of responsibility pattern in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=68.09999999999997) [an approval engine, and this example](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=70.54999999999993) [really shows the power of patterns. We](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=72.64999999999989) [have an idea that we can talk about, a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=75.28571428571428) [rule checking a request against its](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=78.7142857142857) [criteria. If the rule is broken, then the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=81) [rule handles the request by marking it as](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=84.55555555555554) [needing approval. If the rule is not](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=88.11111111111109) [broken, then it passes the request to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=90.66666666666664) [next rule in the chain. This continues](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=93.33333333333327) [until all of the rules have had a chance](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=95.80000000000001) [to check the request. We did not look at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=99.40000000000006) [any code for this example, but because we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=102.1904761904762) [have a good understanding of the chain of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=104.09523809523813) [responsibility pattern, we can easily map](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=106) [the pieces needed for our application to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=108.66666666666666) [the parts of the pattern. Our request in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=111.77777777777776) [the application is the message that is to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=115.07142857142858) [be passed around. The rules in the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=117.92857142857147) [application are the receivers. Each one](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=120.05263157894734) [checks to see if it can handle the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=121.63157894736835) [message. If not, it passes it to the next](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=123.73684210526304) [member of the chain. The facade pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=126.90909090909088) [gives us a way to hide complexity behind](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=129.45454545454544) [an easy to use interface. We saw this in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=132.4) [our example of the universal remote](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=136.00000000000006) [control, which can hide the complexity of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=138.4000000000001) [our entertainment system. And we saw how](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=141.16666666666666) [the foreach statement is really a facade](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=143.88888888888886) [around the methods and properties of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=146.61111111111106) [IEnumerable and IEnumerator interfaces. It](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=150.59999999999997) [gives us an easier way of looping through](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=153.31578947368422) [an aggregate without having to directly](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=155.84210526315798) [interact with the iterator itself. And we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=157.7368421052633) [also saw how the BackgroundWorker](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=160.5) [component is a facade that wraps the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=163) [complexity of threading. It enables us to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=166.5) [easily put an operation onto a background](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=169.20000000000005) [thread without needing to worry about any](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=171.30000000000013) [of the complexities of threading.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=173.4000000000002) [Altogether, we've looked at five patterns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=175.79999999999998) [that we already use, observer, proxy,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=179.39999999999995) [iterator, chain of responsibility, and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=183) [facade. As we've seen, these patterns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=185.5) [provide basic solutions to common problems](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=188.5) [that come up in our environment. These](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=191.41176470588235) [problems are so common that there are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=194.29411764705878) [implementations baked right into the. NET](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=197.17647058823522) [Framework for us to use. But more](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=199.47368421052636) [importantly, we have a better](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=202.05263157894748) [understanding of these patterns and we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=203.89473684210543) [start to look for the parts of our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=206.33333333333337) [application that would benefit from them.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=209.0000000000001) [Then we can start using them more](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=211) [intentionally. Up next, we'll take a look](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=213.94736842105272) [at some more useful patterns. These aren't](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=216.89473684210543) [necessarily patterns that we use every](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=219.60000000000002) [day, but I have found them to be extremely](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=221.4000000000001) [useful in my applications. These are the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=224.1000000000002) [Factory Method, Decorator, and Adaptor patterns.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m4-facade&clip=9&mode=live&start=229)

[Useful Patterns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=0&mode=live)

[Overview](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=0&mode=live)

[We've looked at five of the Gang of Four](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=0&mode=live&start=0) [design patterns that we use regularly in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=0&mode=live&start=3.1500000000000004) [our code, probably without even realizing](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=0&mode=live&start=5.599999999999999) [it, and many of these patterns have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=0&mode=live&start=7.777777777777779) [implementations that are built in to the.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=0&mode=live&start=10.500000000000004) [NET Framework. Now that we're more](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=0&mode=live&start=13.222222222222229) [comfortable with patterns, we can start to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=0&mode=live&start=15.263157894736842) [look at some of the less common scenarios.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=0&mode=live&start=17.473684210526308) [What we'll see is that design patterns can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=0&mode=live&start=20) [help us with solutions to these problems](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=0&mode=live&start=22.35294117647058) [as well. Specifically, we'll take a look](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=0&mode=live&start=24.411764705882337) [at the Factory method pattern, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=0&mode=live&start=27.058823529411757) [decorator pattern, and the adapter](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=0&mode=live&start=29.529411764705866) [pattern, all very useful tools and a great addition to our toolbox.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=0&mode=live&start=31.588235294117624)

[Factory Method Pattern Described](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live)

[Here's the Gang of Four description of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=1) [Factory method pattern: Define an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=4.111111111111111) [interface for creating an object, but let](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=6.055555555555557) [subclasses decide which class to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=8.875) [instantiate. Factory Method lets a class](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=11.0625) [defer instantiation to subclasses. What](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=13.6875) [we're really looking for is a way to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=15.899999999999999) [create an abstraction on how a particular](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=19.499999999999993) [object is created. With this abstraction,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=22.649999999999988) [our Factory Method can make the selection](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=24.882352941176467) [for which concrete type to instantiate and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=26.941176470588225) [return. We'll do this by looking at an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=29) [application that uses pluggable](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=33.30769230769232) [repositories. The repository is a non-Gang](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=35.46153846153848) [of Four design pattern. We won't talk](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=37.84210526315791) [about the specifics of the pattern here.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=40.42105263157899) [What a repository allows us to do is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=43) [create an abstraction between our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=46.36842105263156) [application and our data access layer.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=48.47368421052629) [This makes it easier for us to access](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=51) [different data sources without having to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=54.111111111111086) [update our application code. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=56.4444444444444) [application itself is designed to make](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=58.45454545454545) [calls into a repository. In our case, this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=61.18181818181817) [is an interface. Then we have different](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=64.88235294117646) [concrete implementations of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=68.17647058823528) [repository, one to access data in a WCF](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=70.05882352941174) [Service, one to get data from a comma](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=72.82608695652172) [separated values file on the file system,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=75.26086956521735) [and one to fetch data from a SQL Server.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=77.39130434782602) [These all share the repository interface,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=81.15000000000002) [which allows us to easily plug in any of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=83.85000000000004) [them to our application. So let's take a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=87.57142857142858) [look at the application and we'll see how](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=89.85714285714292) [the Factory Method will help us to decide which of the repositories to instantiate.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=1&mode=live&start=92.14285714285725)

[Demo: Repository Factory](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live)

[We'll start our exploration of the Factory](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=1) [Method pattern by looking at an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=3.5789473684210518) [application that has needs for it. In this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=5.789473684210525) [solution, we have a number of shared items](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=8.705882352941178) [including the repositories that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=11.529411764705888) [mentioned earlier. We have repositories to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=13.294117647058831) [access a CSV file, a WCF Service, and a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=15.866666666666667) [SQL Server. These all implement the same](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=20.066666666666652) [IPersonRepository interface. This allows](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=23.666666666666675) [us to plugin whichever repository we want](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=25.800000000000015) [to use based on where our data is located.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=29.473684210526315) [The project that we'll be working on is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=33.73684210526315) [Factory-PeopleViewer. Let's start by](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=37.52631578947367) [running the application. Here we have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=39.10526315789475) [fetch buttons for each of our three](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=41.31578947368424) [repositories, and if we click on these, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=43.89473684210532) [can see the ListBoxes populated with data.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=46.9047619047619) [Notice that we get a pop-up message that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=49.571428571428555) [tells us the concrete type of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=52.61904761904759) [repository. This is how we know that we're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=55.000000000000014) [actually using the ServiceRepository](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=57.6666666666667) [class. We see the same thing when we click](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=59) [on the CSV Repository button and when we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=63.5) [click on the SQL Repository button. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=67.5) [let's look at the code behind this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=71.4) [application. We'll go to the MainWindow.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=76.30000000000003) [xaml. cs file and here we'll see our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=80.50000000000004) [button Click event handlers. Let's start](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=85.92857142857142) [by looking at the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=89.78571428571425) [ServiceFetchButton\_Click. Our first step](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=92.3571428571428) [is that we clear the ListBox. Next, we new](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=94.35000000000001) [up an instance of the ServiceRepository](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=98.40000000000003) [and assign it to an IPersonRepository](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=101.10000000000005) [variable. After that, we use the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=104.25) [repository to call the GetPeople method.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=107.625) [This will return us a collection of Person](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=111) [objects. From there, we iterate through](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=113.9473684210526) [the collection and we use them to populate](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=116.15789473684205) [the ListBox. Finally, we have a method](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=119.5) [called ShowRepositoryType and what this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=123) [does is takes an instance of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=125.5) [IPersonRepository and displays a message](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=128.41176470588235) [box that has the actual concrete type in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=130.76470588235293) [it. If we look at the CSVFetchButton\_Click](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=134.52941176470586) [event handler, we see exactly the same](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=138.4285714285715) [code. The only difference is that the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=142.4285714285716) [repository that's being newed up is the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=145.4705882352941) [CSVRepository instead of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=148.35294117647052) [ServiceRepository, but the rest of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=150) [code is exactly the same. And if we look](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=152.52631578947376) [at our SQLRepository, we'll see the same](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=156.3157894736844) [thing. We're newing up an instance of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=159.14285714285714) [SQLRepository, but other than that, all of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=162.19047619047618) [the code is exactly the same. So let's ask](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=164.85714285714283) [ourself a couple of questions about this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=168.5714285714285) [code. First, should our UI code really be](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=171.5714285714284) [responsible for figuring out what concrete](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=175.7058823529412) [Repository class to instantiate, probably](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=178.8823529411765) [not. Next, we have an awful lot of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=181.42857142857142) [duplicated code. I'm a big fan of the dry](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=184.85714285714275) [principle, don't repeat yourself. We have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=188.7142857142855) [the same code in multiple locations, so we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=191.10526315789477) [should ask ourselves how can we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=194.05263157894748) [consolidate this code? The good news is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=196.26315789473702) [we're already programming against an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=200.3333333333333) [interface, IPersonRepository. So that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=203.66666666666657) [makes our consolidation job that much](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=205.77777777777777) [easier. Let's create a Factory method that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=208.1111111111111) [will be responsible for figuring out which](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=210.8333333333333) [concrete repository to instantiate. For](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=213.77777777777783) [this, we'll start by creating a new](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=216.0000000000001) [project for our factory. So we'll just](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=219.1111111111113) [right-click and we'll say Add, New Project](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=223.3333333333333) [and we'll select Class Library and we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=227.9999999999999) [call this PersonRepository. Factory. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=232.57894736842104) [we do need a few things so that we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=235.47368421052624) [reference the other repositories. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=241.26315789473665) [first, we'll Add References to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=244) [Interface, as well as the CSVRepository,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=247) [as well as the ServiceRepository and the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=250) [SQLRepository. Next, let's rename our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=256) [class. We'll call this RepositoryFactory](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=262.6666666666666) [and when Visual Studio asks if we want to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=266) [rename the class as well as the file,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=270.5) [we'll go ahead and say yes. So first,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=274.3809523809524) [let's go ahead and bring in our using](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=277.4285714285717) [statements for the repositories we want to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=280.47619047619094) [use. So we'll say using PersonRepository.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=285) [CSV, PersonRepository. Service,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=291) [PersonRepository. SQL, and we also need a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=294) [reference to the interface, so we'll bring](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=297.38888888888886) [in the Interface project as well. So let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=299.33333333333326) [go ahead and create our Factory method.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=301.82352941176475) [First, we'll make our RepositoryFactory a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=304.7058823529414) [public static class and we'll give it a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=307.17647058823565) [public static method that returns an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=311.17647058823513) [IPersonRepository and we'll call this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=314.35294117647027) [GetRepository. Now we do want a parameter](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=317) [here and we'll pass this in, we'll call it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=320.3157894736841) [repositoryType and that will help us](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=324.5789473684208) [select which concrete type to actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=327.33333333333337) [instantiate. So first, let's create a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=330.0000000000001) [variable for the repository that we're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=332.66666666666686) [planning on returning. And then down at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=334.78947368421046) [the bottom of the method, we'll go ahead](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=336.6315789473682) [and return that repository. Now, let's go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=338.7368421052628) [ahead and add a switch statement. This](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=342.4999999999999) [switch statement will be based on our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=346.84615384615387) [parameter that's coming in,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=352.76923076923094) [repositoryType. So, if someone wants a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=356.1538461538464) [ServiceRepository, then we'll set repo to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=361.6428571428572) [a new ServiceRepository. If someone asks](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=367.2142857142859) [for a CSVRepository, then we'll set it to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=371.71428571428567) [a new CSVRepository. And if someone asks](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=376.2857142857141) [for a SQLRepository, we'll new up a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=381.66666666666674) [SQLRepository. Now one last thing we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=388.08333333333354) [do, instead of having a default break,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=390.50000000000006) [which would return null, we'll throw an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=392.60000000000014) [exception. So we'll throw a new](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=394.7000000000002) [ArgumentException and we'll say Invalid](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=397.9166666666666) [Repository Type. So let's go ahead and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=400.83333333333314) [build and make sure that that all](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=403.50000000000006) [compiles. Okay, and we're in good shape](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=405.60000000000014) [there. So what we've just created is a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=407.7000000000002) [Factory method. This is responsible for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=410.9473684210527) [deciding which item to new up. Now it is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=413.47368421052647) [doing it based on a parameter, but the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=416.99999999999994) [parameter just gives it some general](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=419.66666666666646) [instructions. The Factory method itself](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=421.66666666666634) [decides that it needs a ServiceRepository,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=424.4000000000001) [a CSVRepository or a SQLRepository. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=428.0000000000002) [let's go back to our PeopleViewer project](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=431.4375) [and add a reference to our new class. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=434.5) [we'll come in and we'll say Add Reference](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=438.7857142857143) [and we'll add PersonRepository. Factory.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=445.0714285714285) [Now in our button Click events, rather](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=449) [than us newing up a specific repository,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=451.45000000000016) [we can ask the Factory method to give us](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=453.9000000000003) [an instance of the IPersonRepository](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=457.41176470588243) [interface. So let's start by adding a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=459.76470588235316) [using statement for the new Factory](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=463.05882352941217) [method. Now what we'll do is we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=466.57142857142867) [consolidate our code. We'll start by](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=471.07142857142884) [extracting the method from our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=474.3636363636363) [SQLFetchButton\_Click event handler. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=476.6363636363635) [we'll just right-click, we'll say](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=478.7142857142857) [Refactor, Extract Method, and we'll call](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=482.28571428571433) [this FetchData. And now instead of using a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=486.57142857142867) [new SQLRepository, what we'll do is we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=490.39999999999986) [ask the Factory method for an instance of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=493.1999999999997) [the IPersonRepository. So, we'll say](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=497) [RepositoryFactory. GetRepository. Now this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=502) [wants a parameter, so let's go ahead and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=504.79999999999995) [create one. So we'll just call it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=507.9999999999998) [repositoryType and we'll create a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=510.7999999999996) [parameter on the FetchData. Now we will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=512.8571428571429) [need to update our SQL Click event handler](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=515.857142857143) [to give it that new parameter. So we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=519.2857142857146) [see that FetchData no longer references](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=524.2142857142856) [any concrete repositoryType. All it cares](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=528.0714285714282) [about is that it's getting an instance of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=531.0000000000001) [an IPersonRepository and it's asking the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=533.6666666666671) [Factory method for it. We can go ahead and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=535.6666666666673) [consolidate our code by adding this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=539.6000000000004) [FetchData to our other Click events. So we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=542.3000000000006) [can add it to our CSV and we can also add](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=546.6666666666667) [it to our Service button. Let's go ahead](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=555.8333333333338) [and build and make sure that everything](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=561.0000000000001) [compiles. Now we mentioned that our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=563.3333333333337) [application code that we have here no](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=565.3333333333339) [longer needs to know anything about the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=567.7857142857144) [concrete types. Let's go ahead and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=570.2857142857147) [emphasize that. We have using statements](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=572.6470588235293) [for the CSVRepository, let's delete that,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=575.1176470588232) [the ServiceRepository and the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=577.5882352941171) [SQLRepository, we'll get rid of both of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=579.3636363636365) [those. Now we do need the interface since](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=582.545454545455) [that's how we're interacting with these](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=585.2105263157891) [repositories, and we need the Factory as](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=587.1052631578941) [well because that's where we're getting](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=589.3888888888889) [the instances. But this also means that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=591.7222222222224) [inside the References for our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=594.4444444444448) [Factory-PeopleViewer project, we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=596.6666666666666) [actually remove the references to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=599.3333333333331) [concrete assemblies as well. So we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=603.3333333333329) [delete the CSVRepository, the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=607.9090909090909) [ServiceRepository, and the SQLRepository.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=610.4545454545454) [Now, our Factory-PeopleViewer project does](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=613) [not know anything about the concrete](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=615.9166666666669) [types. Now if we run the application,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=619.4166666666671) [we'll see that we have exactly the same](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=621.894736842105) [results that we had before. When we click](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=624.4210526315783) [on the Service Repository button, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=627.235294117647) [actually get an instance of that concrete](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=629.7058823529409) [ServiceRepository. For the CSV Repository,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=632.5882352941171) [we get that concrete type. And for the SQL](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=634.6842105263158) [Repository, we get that concrete type. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=638.4736842105265) [we see that our functionality has not](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=641.4444444444445) [changed. So even though we have exactly](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=644.5555555555557) [the same functionality, we have better](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=647.6666666666669) [organized code with a better separation of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=650.3636363636365) [concerns. Our PeopleViewer application](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=653.545454545455) [does not know anything about the concrete](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=655.5) [repository types. This means that if we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=659) [need to replace the SQLRepository that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=661.8421052631578) [have now, which uses Entity Framework with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=664.4210526315787) [a different repository, such as one that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=667) [uses ADO. NET, our PeopleViewer](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=670.5) [application does not need to change. We've](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=673) [outsourced the responsibility of selecting](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=676.5384615384615) [a concrete type to our Factory Method. Our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=679.2307692307693) [Factory Method decides which concrete type](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=683.4117647058823) [to instantiate, only it is aware of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=685.8823529411762) [various concrete repositories. And if we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=689.1764705882348) [wanted to get more creative, we can take](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=691.4000000000001) [this a step further and let the repository](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=694.2000000000003) [factory dynamically load assemblies and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=697) [instantiate an appropriate class. As with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=699.7777777777777) [all of our development, there are a lot of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=702.75) [possibilities that we can explore. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=706.125) [that we've seen an example of the Factory](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=709) [Method, let's move on to our next pattern, the Decorator.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=2&mode=live&start=717)

[Decorator Pattern Described](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live)

[Here's the Gang of Four description of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=1) [Decorator Pattern: Attach additional](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=4.199999999999999) [responsibilities to an object dynamically.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=5.800000000000001) [Decorators provide a flexible alternative](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=8.333333333333334) [to subclassing for extending](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=11.666666666666664) [functionality. The idea with the decorator](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=14.333333333333329) [pattern is that we wrap an existing class,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=16.9047619047619) [add our own functionality to it, and then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=19.95238095238094) [expose the same interface to the outside](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=23) [world. Because of this, our decorator](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=25.722222222222225) [looks exactly like the original class to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=28.05555555555556) [the people who are using it. So if we have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=30.76190476190476) [an application that expects a repository,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=34.571428571428555) [we can directly plug in a WCF Service](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=36.85714285714283) [Repository, or we can wrap the WCF Service](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=40.5) [Repository in a Decorator class that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=44.5) [exposes the same repository interface.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=47.5) [Because it exposes the same interface, it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=49.882352941176464) [will plug in to the application exactly](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=53.176470588235276) [the same way as the original Repository](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=56.470588235294116) [class. But the decorator can add its own](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=59.76470588235293) [behavior. In our example, we'll create a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=63.529411764705856) [decorator that adds client-side caching to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=67.19999999999999) [any existing repository. Let's take a look at that code.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=3&mode=live&start=70.39999999999998)

[Demo: Caching Repository](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live)

[We saw our various repositories in action](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=1) [in our last application. Now we'll see how](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=4.181818181818182) [we can use the Decorator pattern to add](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=7.75) [functionality to any repository. Let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=11.25) [look at our current application,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=13.571428571428571) [Decorator-PeopleViewer. When we run the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=16.428571428571427) [application and click the Fetch Data](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=19.285714285714292) [button, it actually pulls data from a WCF](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=22.199999999999996) [Service. If we come into our ASP. NET](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=25.399999999999984) [development server and click Stop, when we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=28.599999999999973) [try to fetch data, it will fail, it can't](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=32.15789473684211) [actually access the service. Network](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=36.894736842105274) [communication can result in a lot of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=39.31578947368421) [overhead. We'll try to reduce the number](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=41.5263157894737) [of network calls by adding a client-side](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=43.736842105263186) [cache to our repositories. That way, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=46.263157894736835) [can use local data while the cache is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=49.21052631578945) [valid, and when the cache expires, we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=52.57894736842101) [make a call out to the appropriate data](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=55.625) [store. Let's start by looking at our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=58.625) [current ServiceRepository. One way that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=61.47058823529413) [could add this functionality would be to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=63.94117647058826) [subclass an existing repository. Right](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=66.88888888888889) [now, we have a ServiceRepository, but we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=69.1111111111111) [could create a Descending class with the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=72.2222222222222) [caching functionality built in and call it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=75.63636363636364) [CachingServiceRepository. The problem is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=79.45454545454547) [that we would need to do exactly the same](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=81.26315789473684) [thing for our CSVRepository and our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=85.05263157894734) [SQLRepository. A better approach is to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=87.57894736842101) [come up with a class that can add this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=89.49999999999999) [functionality to any of the repositories.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=92.19999999999996) [And that's exactly what the decorator](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=94) [pattern gives us. Instead of sub-classing,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=96.33333333333331) [we create a class that wraps any existing](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=98.66666666666663) [repository. This new class will have the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=101.94117647058823) [caching functionality and expose itself to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=105.23529411764704) [the outside world just like any other](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=108.05882352941174) [repository. Now notice our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=111.8125) [ServiceRepository exposes itself to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=114.0625) [outside world as an IPersonRepository.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=116.875) [That's what our application is expecting.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=120.00000000000001) [So let's look at a CachingRepository that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=124) [we've already created. Here, we have a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=126.625) [project called PersonRepository.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=129.25) [CachingDecorator. Let's go ahead and open](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=130.72727272727272) [up the CachingRepository class. The most](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=135.09090909090904) [important thing about this is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=139.60000000000002) [CachingRepository implements](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=143.60000000000008) [IPersonRepository. We could use this in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=145.2000000000001) [our application and our application will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=148.00000000000003) [treat it exactly like all of the other](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=150.40000000000006) [repositories. Let's go ahead and walk](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=153.6000000000001) [through the functionality that we have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=155.6666666666667) [here. I'm going to start by collapsing to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=157.66666666666677) [definitions. So we'll say Outlining,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=161.26666666666668) [Collapse to Definitions. I actually want](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=163.60000000000002) [to start with the constructor. Notice that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=166.58823529411765) [our constructor takes a parameter of an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=170.29411764705884) [IPersonRepository. This is the repository](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=174) [that we're going to wrap and add](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=177.2142857142857) [functionality to. So we can see in the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=181.71428571428567) [constructor we're actually assigning it to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=184.60000000000008) [a local field. If we look at the other](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=186.20000000000016) [fields that we have at the top of our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=188.56521739130443) [class, we have a cacheDuration, which](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=190.91304347826107) [tells us our cache is going to be 30](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=192.4782608695655) [seconds long in this case. We have a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=195.2272727272727) [dataDateTime, which tells us the DateTime](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=197.7727272727272) [of our current cached data. We have our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=199.68181818181807) [personRepository, which is the repository](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=203.73333333333332) [that we're wrapping. And we also have an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=206.39999999999998) [IEnumerable of Person, a collection of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=210.66666666666666) [Person objects called cachedItems. This](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=213.86666666666665) [will be our locally cached data. So with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=216.4) [this in mind, let's go ahead and walk](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=219.60000000000005) [through the methods. First, we have a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=222.8000000000001) [property called IsCacheValid, and what](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=226) [this does, it compares the current time to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=228.5) [the data time. If the difference between](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=232.5) [those two is greater than our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=235.0526315789474) [cacheDuration, then we're going to go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=236.6315789473685) [ahead and return false. If the age of our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=238.2105263157896) [cache is less than our cache duration,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=241.21052631578954) [we'll go ahead and return true. So this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=243.78947368421066) [tells us whether we can use the local](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=246.66666666666669) [cache or whether we need to go and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=249.33333333333343) [re-fetch our data from the source. Now we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=252.00000000000017) [have two primary methods that are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=255.06666666666666) [interacting with our cache, ValidateCache](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=258.26666666666677) [and InvalidateCache. InvalidateCache, what](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=260.93333333333356) [we're doing is we're checking to see if](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=262.75) [our cachedItems are available, meaning our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=265.75) [collection is not null, and we're going to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=268) [see if our cache is valid. Now if our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=270.85714285714266) [cached collection is empty or our cache is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=274.0434782608695) [no longer valid, that means we need to out](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=276.8260869565215) [to our data source and get fresh data. And](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=279.95652173913004) [we can see here, we're calling our wrapped](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=283.66666666666674) [Repository. GetPeople method and assigning](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=287.2222222222224) [that to our cachedItems field. And then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=289.3157894736842) [we're updating the dataDate so that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=291.52631578947376) [know how old this data is. Now notice we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=293.7368421052633) [have a catch block here. In case we can't](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=297.5) [access our underlying repository, this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=302) [will just send out an empty default record](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=304.5) [to let us know that it was unable to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=307.5789473684209) [access the data. If we look at our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=310.894736842105) [InvalidateCache method, what this does is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=313.76470588235304) [it sets the cachedItems to null. This will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=315.8823529411767) [force a call to our underlying data source](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=318.9411764705883) [on the next call for the data. Now let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=322.70588235294144) [take a look at the methods that are part](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=326.57142857142856) [of the interface. If we look at the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=329.14285714285705) [GetPeople method, the first thing it does](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=331.76470588235304) [is it validates the cache. It's asking, is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=334.2352941176473) [my client-side data still valid? Whether](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=337.19999999999993) [the cache is valid or not, it will get](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=339.5999999999998) [updated in ValidateCache method so we know](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=343.1999999999996) [that cachedItems will be valid as a return](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=346.8571428571428) [value. If we look at the GetPeople method,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=351.4285714285712) [we see a similar pattern. We call](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=354.66666666666686) [ValidateCache and then we use the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=357.3333333333337) [cachedItems to get an individual record](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=359.61904761904816) [out. Now for our methods that actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=362.5) [update data, like AddPerson, what we're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=366) [going to do is call the AddPerson method](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=369) [on the WrappedRepository and then call](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=373.8000000000002) [InvalidateCache. When we call add, we're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=377.4000000000003) [assuming that we're putting a new record](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=379.13636363636374) [out in the data store, so the next time we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=380.727272727273) [ask for the data, we want to make sure](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=383) [that that call comes back. We'll see the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=386.27272727272737) [same basic pattern for UpdatePerson,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=389.18181818181836) [DeletePerson, and UpdatePeople. These will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=391) [call the underlying WrappedRepository and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=393.30769230769226) [then invalidate the cache so we have to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=395.6153846153845) [get fresh data the next time. So now that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=398.6666666666666) [we have this CachingRepository, let's go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=401.6666666666664) [ahead and use this in our application. If](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=403.6666666666663) [we go to the MainWindow. xaml. cs, we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=406.66666666666686) [see where we can add our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=409.7142857142861) [CachingRepository. Now this class works a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=412) [little bit differently from our last](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=414.7692307692307) [example. If you notice, we have a private](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=417.53846153846143) [field for our repository. Inside our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=421.5) [constructor, we're actually newing up an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=424.5) [instance of a repository and assigning it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=427.47058823529414) [to that field. That way, in our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=430.76470588235316) [FetchDataButton\_Click event handler, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=434.05882352941217) [can call the GetPeople method on this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=435.8421052631579) [internal field. All we need to do is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=438.78947368421063) [replace the ServiceRepository with our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=442.1578947368423) [CachingRepository. So let's change this to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=445.07692307692304) [a CachingRepository and again, this wants](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=449.2307692307691) [a parameter, which is an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=453.1111111111111) [IPersonRepository. So let's go ahead and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=455.8888888888888) [just add a new wrappedRepository and we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=459.22222222222206) [new up the ServiceRepository. Now the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=462.875) [primary reason I'm using the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=465.5) [ServiceRepository here is because it's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=467.6875) [really easy to simulate the disconnected](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=469.63157894736844) [state. That way we can tell whether our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=471.52631578947376) [data is coming from the client-side or if](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=474.0526315789475) [it's actually trying to access the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=477.0833333333334) [service. Now since CachingRepository](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=479.58333333333354) [implements the IPersonRepository](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=481.61538461538464) [interface, it looks exactly the same to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=483.2307692307693) [this application code. So when we call](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=487) [repository. GetPeople, our application](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=491.20000000000016) [doesn't know any different. Let's go ahead](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=493.60000000000025) [and run our application so that we can see](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=497.19999999999993) [this in action. Now when we click the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=500.7999999999997) [Fetch Data button, it's no surprise that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=503.59090909090907) [we actually do get data out of our WCF](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=505.81818181818176) [Service. But now, let's go to our ASP. NET](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=508.6818181818181) [development service and stop it. If we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=512.2727272727275) [clear the data and click Fetch again, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=515.1363636363636) [still have data. That's because we have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=518.5384615384615) [the 30 second client-side cache. So when](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=522.3076923076924) [we first ran our application, we saw that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=525.6315789473683) [once we turned off that development](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=528.1578947368416) [server, our application blew up. But now,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=530.0526315789466) [we have client-side data and if we wait](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=532.5652173913045) [just a little bit longer, we'll see that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=535.6956521739135) [the 30 seconds expired, it's now trying to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=538.8260869565224) [access the WCF Service to update the cache](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=542.5) [data. Now it finds the service is not](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=546.5) [running and since we had that try/catch](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=549.3333333333336) [block in place, it just returns the No](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=551.6666666666672) [Data Available record, so it doesn't even](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=554.4) [throw an exception back to our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=557.1999999999998) [application. So this example shows us how](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=559.5999999999997) [easy it is to add functionality to a class](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=562.0000000000002) [with a decorator. Our CachingRepository](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=565.0000000000006) [decorates any existing repository. We](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=567.1428571428571) [looked at an example with the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=569.9999999999999) [ServiceRepository because it's easy to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=573.4285714285712) [demonstrate that the client-side cache is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=575.4736842105262) [being used, but we can just as easily wrap](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=577.6842105263156) [our SQLRepository or the CSVRepository. We](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=581) [get this functionality without having to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=584) [create a variety of subclasses. We just](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=587) [create a single decorator that works with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=590.5999999999999) [all of our existing repositories. Now,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=594.333333333333) [let's move onto our final design pattern, the Adapter.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=4&mode=live&start=598)

[Adapter Pattern Described](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live)

[Here's the Gang of Four description of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=1) [Adapter Pattern: Convert the interface of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=4.111111111111111) [a class into another interface clients](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=6.444444444444446) [expect. Adapter lets classes work together](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=9) [that couldn't otherwise because of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=12) [incompatible interfaces. Let's say that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=14.5) [have two different systems in our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=19.555555555555557) [organization, a human resources system and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=21.888888888888893) [a financial system. Each of these systems](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=24.22222222222223) [has an Employee object, but each system](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=27.64705882352942) [has a slightly different implementation.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=31.35294117647061) [Here was can see the field names are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=34) [slightly different. FirstName compared to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=36.94736842105266) [First, and one of the fields has different](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=38.78947368421057) [data, MiddleName with the full name](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=42) [compared to just the middle initial. What](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=45) [happens if we need to use an employee from](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=48.294117647058826) [the HR system in the finance system? This](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=50.94117647058826) [could be a common occurrence. When an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=53.388888888888886) [employee is hired, he is entered into the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=56.111111111111086) [HR system. Then we want that employee to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=59.22222222222217) [be transferred to the finance system so](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=62.000000000000014) [that he can get paid. What we have here](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=64.33333333333336) [are incompatible interfaces. To resolve](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=67.55555555555554) [this, we can create and Adapter object](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=69.49999999999997) [that makes the HR employee look like a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=72.22222222222217) [finance employee. One common way to do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=75.57142857142858) [this is to create an object that inherits](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=78.5714285714286) [from the FinanceEmployee object and wraps](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=82) [an instance of the HREmployee. Then, when](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=85.27272727272728) [someone asks for the first property, it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=88.88888888888889) [returns the value of FirstName from the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=91.99999999999999) [wrapped object. If someone asks for the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=95.11111111111109) [middle initial property, it returns the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=97.76470588235297) [first character of the MiddleName property](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=99.88235294117653) [from the Wrapped object. This Adapter](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=102) [class looks like a FinanceEmployee to the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=104.66666666666666) [finance system, but it gets all of its](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=107.77777777777776) [data from an HREmployee object. This](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=111.16666666666666) [allows us to resolve the problem of having](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=113.49999999999997) [incompatible interfaces. For our sample](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=116.61111111111106) [application, we'll create an adapter](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=119.28571428571428) [that's a little bit simpler. It will deal](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=122.14285714285712) [with the mismatch between an Application](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=126.26315789473684) [class and a SQL data entity that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=128.78947368421052) [represents that class. The differences are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=131.73684210526324) [the types of the StartDate and rating](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=134.09090909090912) [fields. In the application class, these](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=136.63636363636374) [are non-nullable types. In the SQL data](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=139.5) [entity, these are both nullable types.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=143) [This doesn't seem to be like that big of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=146) [an issue, but because of the difference in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=148.5714285714285) [these types, we have incompatible](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=150.85714285714272) [interfaces. To resolve this, we'll create](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=152.47058823529412) [an adapter that will make a SQL data](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=155.2941176470588) [entity look like an Application class.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=159.05882352941174) [We'll call this an ApplicationPerson and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=161.68421052631584) [it will have a wrapped instance of the SQL](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=164.2105263157896) [date entity, just like our previous](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=168) [example. This code snippet shows how we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=171) [expose the properties. The StartDate](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=174.5) [property is non-nullable so that it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=176.8235294117647) [matches the Application class, and then it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=179.29411764705878) [returns the StartDate from our wrapped](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=182.17647058823522) [dataPerson class. Since this is nullable,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=184.77777777777783) [we ask for the value of the StartDate. We](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=187.44444444444457) [could have an issue here if the StartDate](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=191.35) [property is ever null. This particular](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=194.14999999999995) [code will throw an exception, so we need](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=196.24999999999991) [to be aware of this. We're actually going](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=199.14285714285714) [to use this adapter in a SQLRepository in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=202.19047619047618) [our application. Let's open up our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=205.2380952380952) [existing SQLRepository and see how we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=210) [use this adapter to make our code easier to work with.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=5&mode=live&start=217)

[Demo: SQL Data Adapter](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live)

[Back in Visual Studio, we'll take a look](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=1) [at how we can use the Adapter Pattern in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=4.199999999999999) [our current applications. Here we have a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=7.8000000000000025) [project called Adapter-PeopleViewer. This](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=10.777777777777779) [is a WPF application that gets its data](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=12.555555555555557) [from our SQLRepository. When we run the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=16.111111111111114) [application, we see that our ListBox is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=19.894736842105257) [populated with data from our SQL database.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=23.947368421052616) [This particular project uses the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=28) [repository that we have in this folder,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=31.33333333333334) [PersonRepository. SQL. WithAdapter. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=35.99999999999999) [this project name is a bit of a misnomer](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=38.3) [at this point because we haven't yet added](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=40.99999999999997) [the adapter. Let's open up the repository](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=43.39999999999995) [to see how things stand now and how we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=45.84210526315791) [make use the adapter. We'll start by](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=49.526315789473735) [collapsing to definitions. Like all of our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=52.71428571428571) [repositories, the SQLRepository implements](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=56.714285714285694) [the IPersonRepository interface. For](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=59) [GetPeople and GetPerson methods, we need](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=61.66666666666666) [to return objects of type Person. This is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=65.66666666666666) [the Application class that we mentioned](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=70.58823529411765) [earlier. Let's go ahead and open this up.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=73.76470588235296) [Here, we can see that this class is simply](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=78) [four public properties. The properties are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=80.99999999999996) [marked virtual so that we can override](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=83.79999999999998) [them in a descending class. Let's look at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=87.99999999999994) [our GetPeople method. This method is using](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=92.23529411764704) [Entity Framework to access the SQL](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=95.11764705882348) [database. Let's drill into our entity data](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=97.58823529411757) [model to find the actual entity that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=100.21052631578945) [matches up with our Person class. So we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=102.78947368421048) [right-click on PeopleEntities and say Go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=105.75) [To Definition, and then we'll right-click](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=108) [on DataPerson and say Go To Definition.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=110.25) [Now we'll compare this side by side with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=113.8125) [our ApplicationPerson class. Let's go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=118.3125) [ahead and line these up so that we can see](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=120.4) [all the properties. Now we can see that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=122.40000000000003) [the FirstName and LastName properties line](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=125.10526315789473) [up just fine, but for the StartDate](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=127.6315789473684) [property, our Application class has a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=130.5789473684211) [non-nullable DataTime and the Data class](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=133.33333333333334) [has a nullable DateTime. For the Rating](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=136.13333333333335) [property, the Application class has a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=139.16666666666666) [non-nullable integer and the Data class](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=141.49999999999997) [has a nullable integer. This means that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=143.8333333333333) [have to do some sort of conversion to get](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=146.74999999999997) [these classes to work together, and that's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=149.89999999999992) [exactly what we're currently doing in our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=152.5) [SQLRepository. Let's go back to our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=156) [GetPeople method. Notice what we're doing.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=159) [First, we get the dataPeople out of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=161.86666666666667) [DataPersons data set. This will be a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=165.60000000000002) [collection of DataPerson objects. Next, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=169.3529411764706) [create an empty list of ApplicationPerson](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=172.88235294117652) [objects. This will hold the result that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=176.41176470588243) [return from the method. Next, we use a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=178.99999999999994) [foreach loop to iterate through all of our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=181.28571428571416) [dataPeople so that we can add them one at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=183.8235294117647) [a time to the People collection. But](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=187.52941176470583) [because of our incompatible interfaces, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=190.31578947368422) [need to create a new Person object as part](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=192.21052631578954) [of this process and we need to assign all](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=195.0526315789475) [of the properties from the DataPerson over](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=198.625) [to the ApplicationPerson. Notice that if](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=201.6875) [we remove the. value from the StartDate,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=204.5) [we get an error. The error says that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=208) [cannot implicitly convert a nullable](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=212.33333333333334) [DateTime to a non-nullable DateTime. When](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=214.66666666666669) [we add. Value, it will return to a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=217.4) [non-null DateTime. If the property happens](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=220.60000000000005) [to be null, then accessing the Value](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=223.00000000000009) [property will result in an exception. This](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=225.84210526315792) [same situation is true for the Rating](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=228.78947368421063) [property, but we'd rather not do this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=231.73684210526335) [conversion here. If we look down below in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=234.60000000000002) [the GetPerson method, we'll see that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=237.80000000000007) [have exactly the same type of code. We're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=240.6000000000001) [getting a DataPerson out of our people](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=243.80000000000004) [entities, but then we need to convert that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=246.60000000000008) [to an ApplicationPerson by assigning all](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=249.9230769230769) [of the fields straight across. It would be](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=252.69230769230762) [much better if we could consolidate this,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=256.05882352941177) [and we'll do this with an adapter. Our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=258.529411764706) [Adapter class will wrap the DataPerson](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=261.3888888888889) [object and expose it so it looks like the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=263.7222222222224) [ApplicationPerson object. So let's create](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=267.2222222222226) [an Adapter class. We'll go to our Adapter](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=269.34999999999997) [folder and we'll right-click and we'll say](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=272.9499999999999) [Add, new Class, and we'll call this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=276.0999999999998) [ApplicationPerson. Now we do need this to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=280.82352941176464) [inherit from the Person class. So notice](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=286.17647058823513) [here that I don't have the person using](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=290.57142857142856) [statement in here yet, but I do have that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=292.8571428571428) [purple underline under the P that's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=295.4285714285713) [telling me Visual Studio wants to help. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=297.27272727272725) [if I press Control., I get an option to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=299.81818181818176) [use PersonRepository. Interface and add](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=302.6818181818181) [that using statement up at the top of our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=304.42857142857133) [class. The first thing that we'll do is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=307.6428571428568) [we'll create a private field, which will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=310.45000000000016) [be our wrapped DataPerson, and we'll call](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=312.9000000000003) [this \_dataPerson. Then we'll create a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=315.6470588235294) [constructor and this will take a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=319.52941176470574) [DataPerson as a parameter. This is how](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=323.4117647058821) [we're actually getting our DataPerson into](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=327.41176470588243) [our class. Inside our constructor, we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=330.2352941176473) [just assign that to our private field. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=333.05882352941217) [all we need to do is implement the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=336.3333333333335) [overrides for our properties. Starting](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=339.4444444444448) [with the FirstName field, we can just say](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=341.55555555555554) [override FirstName and in the getter,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=345.9999999999999) [we'll say return dataPerson. FirstName.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=349.33333333333314) [Now we're just doing a one-way adapter](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=352.2222222222222) [here, so we won't actually be using the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=356.4999999999998) [setters. Next, we'll do the LastName](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=361.38888888888846) [property. And again, we'll return the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=367.71428571428584) [dataPerson's LastName field. For the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=374.57142857142884) [StartDate, we'll add a bit more code than](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=378.625) [we saw in the earlier slide. This will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=381.125) [prevent an exception from being thrown in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=383.66666666666663) [case the wrapped StartDate is null. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=385.99999999999983) [we'll say public override StartDate,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=388.57142857142856) [remove the setter, and we'll have a little](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=391.42857142857133) [bit of extra code in our getter. First,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=395.9999999999998) [we'll check to see if the dataPerson's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=400.46153846153845) [StartDate property has a value. This will](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=403.6923076923076) [return false if it happens to be null. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=406.52173913043475) [if it does have a value, we'll go ahead](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=408.86956521739114) [and return the DataPerson. StartDate](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=411.21739130434753) [value. Now if it doesn't have a value, if](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=412.9473684210526) [we try to access StartDate. Value, we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=417.2105263157893) [get an exception. So instead, we'll just](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=420.5263157894734) [return DateTime. MinValue, just a default](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=423.66666666666674) [value so that we know it's not populated.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=426.3333333333335) [And we'll do exactly the same thing for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=429.9230769230769) [our Rating property. So we'll say public](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=433.6153846153845) [override Rating, remove the setter, and in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=437.5) [the getter we'll say if dataPerson.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=441.875) [Rating. HasValue, return the Rating.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=446.3636363636364) [Value. Otherwise, return int. MinValue.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=453.18181818181824) [Now we have our Adapter class. Let's go](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=460) [ahead and build and make sure we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=462.82352941176487) [compile. Okay, and now that we have this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=465.64705882352973) [in place, we can go back to our repository](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=468.1000000000001) [and start using it. Let's go back to our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=470.8000000000002) [GetPeople method. What we'll do is we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=473.8421052631578) [replace this call that's actually newing](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=476.42105263157873) [up a Person object. Instead, we'll use our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=478.6315789473681) [adapter. So we'll just say new](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=484.3529411764705) [ApplicationPerson and we'll bring in the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=488.94117647058806) [using statement for that, and then we'll](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=492.63157894736844) [pass in dataPerson, the object that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=494.842105263158) [actually have here that we're wrapping. So](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=497.0526315789475) [here we can see we've taken all of that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=499.4545454545455) [conversion code and moved it out of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=502.72727272727286) [way. And even better, we don't have to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=505.63636363636385) [duplicate that code. When we come down](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=508.45000000000016) [here to our GetPerson method, we actually](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=510.9000000000003) [will do the same thing. We'll new up an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=513.4444444444445) [ApplicationPerson and then we'll pass in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=517.4444444444446) [foundPerson in this case, but it's still](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=520.1111111111113) [of type DataPerson. So this way we don't](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=522.7500000000001) [have duplicated code, both of these](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=525.5500000000003) [methods are calling into the same method.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=527.6500000000004) [When we run the application, we'll see](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=529.714285714286) [that we have the same results that we had](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=531.7142857142863) [before. So with the Adapter class in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=534.5) [place, we clean up the code in the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=538) [SQLRepository and the wrapped DataPerson](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=542) [object behaves as if it were an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=544.4736842105264) [ApplicationPerson. We have a one way](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=547.7894736842109) [adapter here, we take a DataPerson object](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=550.631578947369) [and expose it as an ApplicationPerson](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=553.7777777777778) [object. A variation of the adapter pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=556.1111111111113) [is to have a two way adapter that allows](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=558.8333333333337) [conversion in both directions. This is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=562.1000000000001) [just something to keep in mind when we're thinking about the adapter pattern.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=6&mode=live&start=564.2000000000003)

[Summary](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live)

[We've added three more Gang of Four design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=1) [patterns to the list of patterns we're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=3.8235294117647065) [familiar with. We created our own](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=6.294117647058822) [implementations of these patterns. Well,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=9) [more precisely our custom implementations](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=11.5) [were based on well-known sample](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=14) [implementations, and we saw how these](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=15.764705882352944) [patterns helped us to solve specific](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=17.882352941176467) [problems. First, we looked at the Factory](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=20) [Method. This is a way to abstract the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=23.315789473684205) [creation of our objects. In our example,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=27.105263157894726) [we created a RepositoryFactory class that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=30.399999999999995) [would decide which specific repository to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=33.199999999999996) [instantiate, whether a ServiceRepository,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=36) [a CSVRepository or a SQLRepository. With](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=39.111111111111114) [the RepositoryFactory in place, our core](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=43.4375) [application code is no longer responsible](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=46.0625) [for making these decisions and it doesn't](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=48.6875) [need to worry about any specific concrete](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=52) [types. Next, we saw the Decorator Pattern.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=55.5) [This lets us add functionality to existing](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=58.47058823529413) [classes without needing to subclass them.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=61.352941176470615) [That means this pattern works even with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=63.94117647058823) [sealed classes that we're not allowed to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=67.23529411764704) [subclass. The decorator simply wraps an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=70.52941176470586) [existing object and exposes the exact same](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=73.35294117647058) [interface to the outside world. Our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=76.64705882352939) [example used a CachingRepository. Our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=79.53846153846153) [CachingRepository looked just like any](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=82.2307692307692) [other repository, which means that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=84.92307692307686) [could plug it into our application without](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=87.33333333333331) [needing to make changes to the code that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=89.66666666666661) [uses it. We wrapped an existing](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=92.33333333333324) [repository, which is responsible for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=94.33333333333331) [interacting with the data store, such as a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=95.99999999999996) [WCF Service, SQL Server or CSV file. And](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=98.66666666666659) [then we added our own functionality by](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=102.5) [implementing a client-side cache. This](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=106) [gives us an extremely easy way to add](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=108.53846153846153) [functionality to existing classes.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=112.8461538461538) [Finally, we looked at the Adapter Pattern.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=115) [This gives us the ability to let classes](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=117.3333333333333) [work together that otherwise couldn't do](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=119.99999999999993) [to incompatible interfaces. In our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=122.5) [example, we wrapped a class of one type](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=125) [and exposed it as a class of another type.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=129) [We took our SQL data entity and exposed it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=132.80000000000004) [as an Application class. This let us](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=136.4000000000001) [easily use the data entity in our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=139.16666666666666) [Repository class, even though the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=141.88888888888886) [repository was expecting the Application](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=143.8333333333333) [class. This gives us a lot to think about](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=145.8888888888889) [and hopefully we're much more comfortable](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=149.88888888888903) [with design patterns than we were when we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=152.55555555555577) [started. We've looked at 8 of the 23 Gang](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=155.66666666666666) [of Four design patterns, but there's a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=159.09523809523807) [whole world beyond the Gang of Four. Now](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=161.63157894736844) [that we have a better understanding of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=164.1578947368422) [patterns, it's time to take a look at where to go next.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m5-usefulpatterns&clip=7&mode=live&start=166.36842105263173)

[Where To Go Next](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=0&mode=live)

[Overview](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=0&mode=live)

[We've seen quite a few of the Gang of Four](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=0&mode=live&start=0) [design patterns in action, and we've](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=0&mode=live&start=3.3333333333333335) [dispelled some of the mystery that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=0&mode=live&start=5.333333333333332) [surrounds design patterns. For our final](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=0&mode=live&start=7.35) [stop, we'll review some of the topics that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=0&mode=live&start=9.449999999999998) [we saw at the beginning and take a look at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=0&mode=live&start=12.249999999999995) [them in light of our newfound](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=0&mode=live&start=15.578947368421053) [understanding. We'll spend some time](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=0&mode=live&start=17.473684210526308) [looking at further places to explore.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=0&mode=live&start=19.052631578947352) [There are myriads of patterns beyond the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=0&mode=live&start=20.999999999999996) [Gang of Four, and now that we've got a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=0&mode=live&start=23.33333333333332) [good handle on the basics of design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=0&mode=live&start=26.33333333333331) [patterns, we're ready to start taking a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=0&mode=live&start=29.142857142857135) [deeper dive. We'll start with a review of our initial definition.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=0&mode=live&start=32.142857142857125)

[A Million Implementations](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live)

[Here's the definition of design patterns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=1) [that we started with: Each pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=3.11764705882353) [describes a problem that occurs over and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=5.235294117647058) [over again in our environment and then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=7.699999999999999) [describes the core of the solution to that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=10.149999999999997) [problem in such a way that you can use the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=12.949999999999994) [solution a million times over without ever](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=16.799999999999997) [doing it the same way twice. One](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=19.599999999999987) [particularly important aspect of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=22.444444444444443) [definition is that we can implement a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=24.666666666666657) [pattern a million different ways. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=27.777777777777757) [pattern itself does not specify a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=30.666666666666668) [particular implementation. We saw this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=34.66666666666666) [with the observer pattern. We look at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=37.05882352941176) [three different implementations and that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=39.52941176470587) [was without even trying very hard. We can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=41.294117647058805) [implement the observer pattern with a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=44.333333333333314) [standard event handler, just like we did](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=46.66666666666663) [with our initial button Click events. We](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=49.4375) [can implement the observer pattern with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=52.5) [the EventAggregator object from the Prism](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=55.125) [library as we saw with our StockGenerator](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=58.28571428571428) [and StockReceiver example. And we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=62.28571428571426) [implement the observer pattern by using](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=65.10526315789473) [the IObservable of T and IObserver of T](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=67.31578947368418) [interfaces that we get with. NET 4. 0. And](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=70.26315789473678) [we could build our own implementation of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=73.57894736842103) [the observer pattern as well. It all](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=76.15789473684205) [depends upon what the needs are. Each](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=79.125) [implementation has its own advantages and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=83.0625) [disadvantages. And because we have a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=86.4375) [million implementations available to us,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=89.00000000000003) [exactly defining a design pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=91.00000000000006) [implementation can get a bit nebulous.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=93) [This brings us back to the common question](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=98) [that we saw earlier, is, insert](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=101.29411764705878) [programming implementation here, an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=103.76470588235287) [example of the, insert pattern name here.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=105.47368421052632) [For example, someone might ask is event](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=108.78947368421052) [bubbling in WPF an example of the chain of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=112.10526315789473) [responsibility pattern, or, is it an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=116.5) [example of the observer pattern. Since](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=119.5) [design patterns do not specify an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=122.5) [implementation, how do we answer the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=125.5) [question? The most common answer that I](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=128.5) [give is maybe, unless the design pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=131.33333333333331) [is blindingly obvious in the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=134.05555555555551) [implementation, it usually requires a bit](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=136) [more thought. A couple of questions we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=138.66666666666674) [ask include does it try to solve the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=142.2222222222224) [problem the pattern describes, and does](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=146) [the implementation follow the core of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=149) [solution? These questions really get down](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=152.5) [to the spirit of the pattern. So let's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=154.50000000000006) [walk through this with the WPF event](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=156.90000000000015) [bubbling question. First, a quick](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=159) [description of what event bubbling is. In](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=163.421052631579) [WPF, there is a hierarchal tree of UI](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=166.7368421052633) [elements. This is very similar to the DOM](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=170.52631578947393) [of an HTML page. Our simple application](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=173.86363636363635) [here has a window as the root element.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=176.7272727272727) [Inside the window is a button. And inside](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=180) [the button is an image and a text block.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=183.76470588235293) [Event bubbling means that the lower-most](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=188) [object gets the first shot at handling an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=190.40000000000003) [event. If that object doesn't handle the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=193.60000000000008) [event, then it bubbles up to the parent.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=196.14285714285717) [If that object does not handle the event,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=199) [it bubbles up to its parent, and so forth.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=202.29411764705878) [Let's say that we hover the mouse over the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=206) [image of this example. First, the image](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=209.00000000000009) [gets a chance to handle the MouseOver](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=211.33333333333348) [event. If it handles the event, then the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=213.77777777777777) [event is marked as handled and everything](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=216.88888888888886) [stops. If the image does not handle the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=219.61111111111106) [event, it bubbles up to the button. If the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=222.50000000000003) [button handles the event, then the event](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=225.61538461538464) [is marked as handled. Otherwise, if the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=227.7692307692309) [button does not handle the event, it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=230.00000000000003) [bubbles up to the window. Is this starting](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=232.33333333333343) [to sound familiar? Hopefully you recognize](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=235.4) [this as the chain of responsibility. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=238.20000000000002) [event is our message that gets passed](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=241.3684210526316) [along the chain. Each member has a chance](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=243.94736842105272) [to handle it. Otherwise, it's passed to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=246.89473684210543) [the next member of the chain. Based on](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=250.39999999999998) [this, it's pretty easy to say that WPF](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=254.7) [event bubbling is an example of the chain](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=257.50000000000006) [of responsibility pattern. But what about](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=260.30000000000024) [the observer pattern? We saw in previous](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=262.7777777777778) [examples that an event handler is an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=265.888888888889) [implementation of the observer pattern,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=269) [but are we really looking at event](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=271.8571428571428) [handlers here? There are definitely event](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=275.85714285714266) [handlers involved in this process, but](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=278.5) [when we're talking about event bubbling,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=280.75) [we're usually talking about the process of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=283) [passing the event from one object to its](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=285.625) [parent. The actual event handling part is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=288.625) [secondary to the process. So I would have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=291.10000000000014) [a tendency to say that event bubbling is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=293.9000000000003) [not an example of the observer pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=296.70000000000005) [with a caveat that the observer is in an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=299.1500000000002) [important part of the event handling](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=302.3000000000004) [process. Part of the fun of design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=304.27272727272725) [patterns is that we may not all agree on](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=306.49999999999994) [the answers to these types of questions.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=309.36363636363626) [What is good about this though is that it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=311.50000000000006) [keeps us thinking about the intent of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=314.20000000000016) [pattern and the spirit behind them. When](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=316.7619047619048) [we take time to analyze them, then we usually leave with a better understanding.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=1&mode=live&start=319.4285714285717)

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[We've been looking at the Gang of Four](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=0) [patterns that were published way back in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=3.5) [1994. Are they still relevant to us today,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=6.5625) [especially when we consider our modern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=10.5) [development languages and tools? We saw](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=13.5) [how. NET has built-in implementations for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=16.264705882352942) [these patterns. For the observer pattern,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=18.558823529411768) [we have event handlers and the IObservable](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=20.852941176470594) [of T interface coming straight from the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=24) [framework class library. And we also have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=27.5) [the EventAggregator that comes out of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=30.75) [Microsoft Patterns and Practices Team. For](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=33.8125) [the iterator pattern, we have the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=36.36842105263158) [IEnumerable of T interface, and this is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=38.578947368421076) [built into almost every collection in.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=41.15789473684215) [NET. In addition, we have the foreach](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=43.44444444444444) [statement that makes it simple to iterate](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=46.55555555555554) [over a collection. We've been using these](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=49.66666666666664) [implementations without worrying about](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=52.53846153846155) [design patterns in the past. Do we really](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=54.076923076923094) [need to start worrying about them now? And](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=57.5) [the answer is yes. The Gang of Four](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=61.333333333333336) [patterns are still relevant to us because](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=64.00000000000001) [we have the same problems today as we did](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=66.33333333333331) [in 1994. Let's take a look at the problems](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=69.88235294117646) [that we saw initially. We may want to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=74.11764705882351) [receive a notification when a process](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=77.26315789473682) [completes, such as when an asynchronous](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=79.15789473684205) [call is finished, or, we may want to be](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=81.05263157894728) [notified if the state of a particular](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=84.40000000000003) [property changes. This is the problem](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=87.20000000000007) [addressed by the observer pattern. We saw](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=89.14285714285717) [how we could use the observer to setup a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=91.14285714285721) [publish/ subscribe relationship. We may](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=93.71428571428584) [have a complex API that we want to share](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=95.80000000000001) [with other developers, but we want to make](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=99.85000000000004) [it easier to work with so they don't need](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=103.38888888888889) [to understand the ugly details of the API.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=106.88888888888886) [The facade pattern addresses this. We may](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=110) [want to add functionality to an existing](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=112.94736842105262) [object, even if we don't have the source](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=115.89473684210523) [code for that object or were unable to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=119.28571428571429) [subclass it, such as with a sealed class](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=122.71428571428574) [in C#. We could use the decorator pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=126.14285714285718) [here just like we added caching](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=129.1176470588235) [functionality to our existing repository](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=131.235294117647) [objects. We may want to have a state](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=133) [machine that behaves in different ways](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=136.78947368421063) [based on its current mode. The state](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=139.6315789473686) [pattern addresses this. We didn't](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=142.70588235294116) [specifically look at the state pattern,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=144.47058823529406) [but if you're curious to see a state](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=146.58823529411754) [machine, you can look at the IL that's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=149.27272727272725) [generated by the compiler when you use the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=151.81818181818176) [await keyword in. NET 4. 5. We may want to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=154.36363636363626) [loop through the elements of a collection](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=158.13043478260875) [or sequence so that we can display them or](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=160.8695652173914) [perform an action on them, and this is an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=164.4) [example of the iterator pattern. These are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=168.00000000000006) [all problems that exist today and they can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=170.66666666666669) [still be addressed by the Gang of Four](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=173.33333333333343) [Patterns to give us some well-described](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=176.00000000000017) [solutions. Let's review some of the other](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=178.58823529411765) [benefits that we get from design patterns.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=182.29411764705884) [Design patterns are well-described](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=186) [solutions. Someone way smarter than we are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=187.75) [has already thought about this problem and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=190.8125) [has come up with a solution. There are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=193.7) [very few times when we want to reinvent](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=196.49999999999994) [the wheel. Let's start with someone else's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=199.2999999999999) [working solution. Design patterns provide](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=203.07692307692307) [a shared vocabulary. Other professionals](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=206.15384615384613) [such as doctors, lawyers, and accountants](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=209) [all have their own specialized vocabulary.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=212) [Design patterns give software developers](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=215) [that same specialized language. The shared](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=218.3333333333333) [vocabulary allows us to use the concise](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=221.85714285714283) [language that design patterns offer. Now,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=224.85714285714275) [if I say I'm using the observer in an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=227.3684210526316) [application, you will know immediately](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=230.6842105263159) [what I'm talking about without needing the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=232.52631578947384) [full description of the implementation](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=235.66666666666663) [details. Design patterns also encourage us](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=238.44444444444434) [to stay in design mode longer. When we're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=241.35294117647058) [talking about observers and iterators,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=245.1176470588235) [we're talking at a higher level and we can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=247.35) [spend more time at the whiteboard figuring](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=250.49999999999994) [out how our solutions fit together. Once](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=252.9499999999999) [we've got that overview of what we need,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=255.39999999999998) [we can sit down and start working on the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=258.2000000000001) [implementations. And as mentioned earlier,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=261.46666666666664) [if we start using design patterns in our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=263.79999999999984) [everyday conversations, it will encourage](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=267.53333333333296) [developers around us to investigate and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=269.7142857142858) [start learning about patterns themselves.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=272.28571428571445) [This helps us propagate the idea of using](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=275) [the design patterns language throughout our industry.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=2&mode=live&start=283)

[Beyond The Gang of Four](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live)

[The Gang of Four describes 23 design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=1) [patterns. We looked at just eight of these](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=3.7999999999999994) [today and we just scratched the surface of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=7.000000000000002) [the patterns we did look at. There's a lot](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=9.85714285714286) [more to learn about these patterns, but](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=12.428571428571438) [the Gang of Four was just the beginning of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=14.428571428571443) [the popularity of software design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=18.294117647058815) [patterns, there are many more. There are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=20.647058823529395) [hundreds, if not thousands of design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=23.666666666666664) [patterns. Some of these are cataloged in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=25.666666666666657) [books, some are described in articles and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=27.999999999999982) [white papers, and some are explained in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=30.84615384615384) [blog articles. There's really no central](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=34.07692307692306) [source and whether a design pattern gains](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=36.41176470588235) [traction is really determined by the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=38.88235294117646) [developer community at large. Here are a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=41) [few patterns that you have probably heard](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=44.73333333333332) [of. There's the repository pattern that's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=48.46666666666664) [designed to act as a layer of abstraction](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=50.764705882352935) [between the core application and the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=53.58823529411763) [underlying data store. We saw several](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=55.82352941176471) [repository implementations in our samples](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=58.29411764705884) [to get data from a WCF Service, a CSV file](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=60.352941176470615) [or a SQL Server. And there are variations](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=65.33333333333334) [on patterns as well. The repository has a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=69.7777777777778) [couple of common sub-patterns that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=73.64705882352939) [describe how the data access is broken](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=75.70588235294113) [down. The CRUD approach uses methods for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=78.58823529411757) [Create, Read, Update, and Delete](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=82.49999999999997) [operations. The CQRS approach has a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=85.41666666666661) [division between the methods that read the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=87.84210526315788) [data, query, and those that update the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=90.4210526315789) [data, command. You've probably heard of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=93) [inversion of control and dependency](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=97.5) [injection. These patterns are concerned](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=101.25) [with how dependencies of an object are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=103.11111111111109) [managed, and there are a number of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=105.05555555555549) [patterns that support these concepts, such](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=107) [as constructor injection, property](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=110) [injection, and the service locator. And](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=112) [you've probably heard about several of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=115.14285714285714) [presentation patterns including model,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=119.14285714285712) [view, viewmodel, model view controller,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=121.4285714285714) [and model view presenter. Each of these](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=124) [address a similar problem, which is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=127.5) [separating the presentation logic from the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=130.35294117647058) [application logic, but they each approach](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=132.47058823529406) [the problem a little bit differently. MVVM](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=134.58823529411754) [is good for client applications. It became](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=137.578947368421) [popular with WPF and XAML, but it is also](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=141.2631578947367) [moved into the client-side JavaScript](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=146) [world in a number of libraries. MVC is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=148.27272727272734) [good for web applications where we have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=151.85714285714283) [some processing on the server that emits a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=154.85714285714275) [view to the browser. These are very](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=158.28571428571408) [limited descriptions of course, but these](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=160.83333333333331) [show that we're familiar with the names of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=162.49999999999994) [several design patterns, even if we don't](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=164.72222222222211) [consciously think about them as patterns.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=168.50000000000006) [Since there is no central source for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=172) [design patterns, it can be difficult to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=175.0625) [find patterns. One thing that I do is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=178.125) [follow articles and websites of developers](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=181.11764705882348) [who talk about patterns regularly. I've](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=183.23529411764696) [gathered a few of my favorites here.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=185.42105263157896) [Robert C. Martin is an excellent resource](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=188.36842105263167) [for all things having to do with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=191.3157894736844) [object-oriented software. He often talks](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=194.23529411764704) [about different design patterns and how](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=196.29411764705878) [they fit naturally in with our code.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=198.76470588235287) [Martin Fowler is another excellent](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=201.77777777777783) [resource. Whenever I want more information](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=204.0000000000001) [on a particular pattern, I look to see if](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=206.66666666666686) [he's written something about it. He](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=210.00000000000006) [usually has an opinion of the pattern and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=212.0000000000001) [thoughts on how it can be used](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=214.66666666666686) [effectively. Dino Esposito is coauthor on](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=217.8235294117647) [a book about architecting enterprise](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=220.6470588235294) [applications. This covers a ton of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=223) [patterns that relate to large layered](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=225.40000000000003) [systems and this is just one of the many](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=227.80000000000007) [books that he's authored. And I would be](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=231.46666666666667) [remise not to mention Joshua Kerievsky. He](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=235.20000000000002) [wrote a book called Refactoring to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=238.375) [Patterns that deals with incorporating](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=240.625) [design patterns into our existing code.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=242.5) [The majority of the patterns mentioned are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=244.8235294117647) [Gang of Four patterns, but he also](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=247.70588235294113) [includes patterns beyond the Gang of Four.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=250.58823529411757) [So when studying design patterns, whether](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=253.33333333333331) [we're wanting to take a deeper dive into a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=255.66666666666663) [pattern that we know or are looking for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=258.95454545454544) [new patterns, it's often much easier to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=261.49999999999994) [search for a person rather than a pattern.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=263.72727272727263) [This list gives us a few excellent](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=267.13333333333344) [resources to start with. A good next stop](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=270.86666666666696) [for learning more about design patterns is](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=274.33333333333326) [the Design Pattern Library course that's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=276.66666666666646) [offered by Pluralsight. It covers a number](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=278.66666666666634) [of Gang of Four patterns plus some others](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=281.21052631578937) [outside the Gang of Four. It provides a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=284.15789473684185) [more detailed look at each of these](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=289) [patterns, including some of the patterns we've looked at today.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=3&mode=live&start=296)

[A Warning](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live)

[Before we wrap up our exploration of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=1) [design patterns, we should take a look at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=3.4500000000000006) [a few of the dangers. These can be](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=6.249999999999998) [especially hazardous when we're just](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=9.5) [learning about design patterns. When we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=12) [first learn about a particular pattern, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=14.625) [want to start using it right away. It](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=16.8125) [sounds like a really useful pattern so we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=19.454545454545453) [start looking for places in our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=23.09090909090908) [application where we can shove it in.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=25.8181818181818) [Next, we may have a tendency to get overly](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=29) [attached to a particular pattern. We found](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=32.214285714285715) [a pattern that works well for us in a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=34.599999999999994) [number of different applications, now it's](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=37.29999999999997) [our favorite pattern and we try to use it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=39.09999999999995) [in every application we write. Third,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=43.15789473684211) [design patterns tend to go through fads.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=46.31578947368422) [It seems like everyone is talking about a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=50) [particular pattern. If we're not careful,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=52.39999999999998) [we can get swept up in the hype and think](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=54.19999999999996) [that we need to use this pattern in every](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=57.5) [application we build. So how do we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=60.875) [overcome these dangers? I recommend an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=63.599999999999994) [article written by Rocky Lhotka called On](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=66.00000000000001) [the Use and Misuse of Patterns. This is an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=68.80000000000005) [article that everyone should read. And by](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=72.72727272727272) [the way, the last letter in the shortened](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=75.875) [URL is a capital letter O. What kind of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=79.375) [advice can we find in this article? The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=82.87500000000001) [first item is to only use a pattern if you](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=85.20833333333339) [have the problem it solves and the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=88.1250000000001) [positive consequences outweigh the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=91.80000000000001) [negative consequences. This sounds](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=94.60000000000002) [blindingly obvious, but I can't tell you](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=96.73684210526315) [how many times I've seen a developer want](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=99.31578947368418) [to implement a pattern even though he did](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=102.26315789473678) [not have the problem that the pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=105.14285714285717) [solves. In those situations, we do not get](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=107.6428571428572) [any of the benefits of the pattern, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=110.80000000000004) [only get the negative consequences, and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=114.00000000000009) [that makes our applications worse, not](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=116.52631578947368) [better. The last piece of advice is to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=119.6842105263158) [strive for pattern mastery where you are](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=123.89473684210527) [solving problems with natural solutions,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=127.58823529411765) [not looking for ways to apply any specific](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=130.23529411764707) [pattern. This is something that comes with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=134.47058823529414) [experience and takes some effort. We can](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=137.18181818181824) [treat design patterns as tools in our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=139.5) [toolbox. When we get a new tool, we want](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=141.25) [might to try it out and use it in every](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=143.5) [single one of our projects and we look for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=146.60000000000002) [places where we can use that tool. But if](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=150.20000000000007) [we're really comfortable with all of our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=153.60000000000002) [tools and we know the strengths and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=155.7000000000001) [weaknesses of each one, it becomes natural](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=157.80000000000018) [to simply reach into the toolbox and pull](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=159.90000000000003) [out the screwdriver that you need for a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=162.30000000000013) [particular problem. That's the mindset](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=164.70000000000022) [that we're striving for with design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=167.18181818181813) [patterns. Rocky's article has a lot of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=170.45454545454533) [other great advice. There are seven points](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=173.25) [just like these. If we want to be serious](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=175.875) [about design patterns, these are things that we really need to keep in mind.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=4&mode=live&start=183)

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[Our primary goal when we set out was to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=1) [get comfortable with design patterns and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=3.8421052631578956) [to realize that they're applicable to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=5.736842105263159) [everyday developers, not just architects](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=8.333333333333334) [and designers. Here's the steps that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=11.666666666666664) [took along the way. Let's look at some](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=14.590909090909092) [more specifics and see how close we were](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=17.136363636363633) [to achieving our goal. We started by](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=19.681818181818166) [looking at the definition of design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=22.76923076923076) [patterns. This comes from Christopher](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=25.53846153846152) [Alexander and we should have a good](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=27.5) [understanding of it by now. Each pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=30.125) [describes a problem that occurs over and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=32.77777777777777) [over again in our environment and then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=35.49999999999997) [describes the core of the solution to that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=38.22222222222217) [problem in such a way that you can use the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=40.90909090909092) [solution a million times over without ever](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=44.09090909090912) [doing it the same way twice. The emphasis](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=46.411764705882355) [here is on the core of the solution.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=49.705882352941195) [Design patterns do not give us a specific](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=53) [implementation, just a pattern to follow](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=56.29411764705884) [in our code. Design patterns come in many](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=58.76470588235297) [forms, but they're generally contained in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=61.99999999999999) [catalogs with other patterns. Each pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=64.39999999999999) [description consists of at least four](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=66.8235294117647) [parts, the pattern name, the problem that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=69.29411764705878) [pattern addresses, the core of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=72.17647058823522) [solution, and the consequences. And we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=75.28571428571428) [cannot forget the consequences. Each](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=78.7142857142857) [pattern has both benefits and drawbacks.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=81.27272727272727) [We need to be aware of both of these so](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=82.90909090909086) [that we can make good decisions about](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=85.63636363636353) [using a particular pattern. We met the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=88.66666666666666) [Gang of Four who wrote the book Design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=93.41176470588235) [Patterns, Elements of Reusable](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=97.17647058823528) [Object-Oriented Software. This is one of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=99.05882352941174) [the most important works on design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=101.14285714285717) [patterns and was vital to making them an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=102.85714285714292) [excepted part of our industry. And we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=105.14285714285725) [talked about why we should care about](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=107.53846153846155) [design patterns. They are well-described](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=110.23076923076925) [solutions that give us a concise shared](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=112.26315789473684) [vocabulary, and they allow us to stay in](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=115.21052631578945) [design mode longer. From here, we moved](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=118.57894736842101) [onto some patterns that we already use. We](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=122.69230769230768) [saw that when we use event handlers, we're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=127.3125) [using an implementation of the observer](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=129.8125) [pattern. This is just a publish/subscribe](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=131.6875) [relationship that makes sure our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=134.99999999999997) [subscribers are notified when appropriate.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=137.99999999999994) [We also saw that when we import a service](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=141) [reference for a SOAP Service in Visual](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=143.7000000000001) [Studio, it generates an implementation of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=145.80000000000018) [that proxy pattern. This gives us a local](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=147.77777777777777) [proxy class that we can interact with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=150.88888888888886) [exactly as if we were interacting with the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=153.61111111111106) [Service class on the other side of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=157.0625) [network. We saw that when we use a foreach](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=160.5625) [loop, we're using an implementation of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=163.82352941176464) [iterator pattern. We spent quite a bit of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=166.2941176470587) [time on the iterator just because it plays](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=169.28571428571428) [such an important role in. NET](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=172.33333333333331) [collections. Any class that implements the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=174.6190476190476) [IEnumerable interface has an iterator. We](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=177.5) [also created our own classes that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=180.3) [implemented IEnumerable so that we could](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=182.10000000000008) [see what it takes to create our own](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=183.90000000000015) [implementation of an iterator. We saw that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=186.5) [when we use a try/catch block, we're using](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=190) [an implementation of the chain of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=194) [responsibility pattern. This describes a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=196.26315789473688) [way for a message to get passed along](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=197.84210526315798) [until an object is able to handle it. We](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=200.36842105263173) [saw that when we use a foreach loop, we're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=203.66666666666666) [not just using an implementation of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=207.09523809523807) [iterator, we're also using an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=209.83333333333331) [implementation of the facade pattern. The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=211.9166666666666) [foreach statement conceals the underlying](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=214.46666666666667) [API of dealing directly with the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=216.8) [enumerator, methods, and properties and it](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=219.60000000000002) [gives us an easy to use syntax for](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=222.20000000000002) [iterating through a collection. The facade](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=225.40000000000006) [pattern allows us to hide complexity](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=228.0769230769231) [behind a much simpler interface. Then we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=231.30769230769238) [took a look at some other useful patterns](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=234.70588235294116) [that we don't necessarily use every day.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=237.5294117647058) [The Factory method pattern helps us create](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=240) [the right objects in the right place. In](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=242.50000000000003) [our example, we created a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=245.4) [RepositoryFactory. This was responsible](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=247.40000000000003) [for determining whether it should](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=249.00000000000006) [instantiate a ServiceRepository, a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=251) [CSVRepository or a SQLRepository. And if](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=255) [our repositories need to change in the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=259.6363636363636) [future to use a subclass for example, then](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=261.8636363636363) [we just need to change the Factory method.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=264.4090909090908) [The rest of our application continues to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=267.5) [work unchanged. The decorator pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=271) [allows us to add functionality to another](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=273.3125) [class without needing to subclass it. In](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=276.375) [our example, we created a decorator object](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=279.4117647058824) [that added client-side caching to a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=282.294117647059) [repository and since this wraps an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=284.76470588235327) [existing repository, it will work with any](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=287.38461538461536) [of our repositories. And since it exposes](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=290.6153846153845) [itself to the outside world as a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=293.4000000000001) [repository, it can be used anywhere in our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=295.85000000000025) [application that we would use a regular](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=298.65000000000043) [repository. The adapter pattern helps us](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=302.60000000000014) [resolve incompatible interfaces. In our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=306.2000000000003) [example, we took two classes with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=308.9411764705883) [incompatible interfaces, an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=311.76470588235316) [ApplicationPerson class and a SQL data](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=313.1764705882356) [entity Person class. With an adapter, we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=316) [could use the data Person object in a spot](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=318.66666666666686) [of our code that expected an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=322.0952380952385) [ApplicationPerson object. In our last](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=325.3333333333333) [section, we reviewed some of the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=328.94736842105266) [definitions and benefits that we looked at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=330.842105263158) [earlier, but this time with a better](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=333.0526315789475) [understanding of what design patterns are,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=335.6470588235295) [design patterns can have a million](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=338.11764705882376) [different implementations. So when we ask](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=340.588235294118) [the question is WPF event bubbling an](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=342.94444444444457) [example of the observer pattern, we need](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=345.66666666666697) [to realize that this is not a black and](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=348.2608695652174) [white question. We need to take a look at](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=350.60869565217376) [the problem that the pattern is trying to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=352.95652173913015) [solve. Do we have that problem in this](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=355.8461538461538) [scenario? We also need to think about the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=359.53846153846143) [core of the solution. Does our technology](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=362.45000000000016) [reflect the spirit of that solution? The](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=364.9000000000003) [answers to these questions are a bit](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=367.3333333333333) [subjective, but they can be instigators of](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=369.6666666666665) [some very interesting conversations with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=371.9999999999997) [other developers. Then we asked if the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=373.82352941176475) [Gang of Four patterns are still relevant,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=376.7058823529414) [they are from way back in 1994, should we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=379.588235294118) [still care? Well it turns out that we have](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=382.909090909091) [the same type of problems today that we](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=386.18181818181836) [had back then. Our tools and languages](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=389.41176470588243) [have changed, but the problems have not.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=392.70588235294144) [Then we reviewed the benefits of learning](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=396) [design patterns. They are well-described](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=398.79999999999984) [solutions from people way smarter than us.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=400.7999999999997) [They allow us to speak with a concise](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=403.33333333333326) [shared vocabulary and they allow us to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=405.9999999999998) [stay in design mode longer. These are all](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=408.333333333333) [things that improve the development](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=412.4999999999999) [process. We took a quick look at some](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=415.41666666666646) [patterns beyond those cataloged by the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=417.75) [Gang of Four. There are hundreds, if not](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=419.25) [thousands of patterns out there to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=421.50000000000006) [explore, and now that we have a good](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=423.3000000000001) [understanding of patterns, we realize that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=425.7000000000002) [these are not specific implementations,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=428.5) [just the core of the solution. We're free](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=431) [to come up with our own implementation if](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=434.8571428571429) [our application needs it. We ended with a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=438.28571428571445) [warning. It's very easy for us to get](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=441.4000000000001) [wrapped up in the concept of design](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=444.2000000000003) [patterns. We could end up trying to use a](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=446.65000000000043) [pattern just because we like the pattern](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=449.2857142857142) [and not because it actually solves the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=451.28571428571416) [problem we have. We need to understand our](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=453.42105263157896) [tools and learn where it's appropriate to](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=456.78947368421063) [use each one. Once we become intimately](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=459.73684210526335) [familiar with our tools, we no longer](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=462.33333333333326) [think about it consciously, we simply](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=464.66666666666646) [reach into the toolbox and pull out the](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=466.66666666666634) [right tool for the job. So that wraps up](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=470.7916666666668) [our Design Patterns On-Ramp. We've seen](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=474.6578947368421) [the basics and are now comfortable with](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=476.3947368421052) [the concepts behind them. We've seen that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=478.42105263157885) [design patterns are not mysterious,](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=481.3529411764707) [they're just tools and they're tools that](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=483.70588235294144) [we already use every day. And now you're](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=487) [ready for a deeper dive into the wonderful](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=489.9473684210525) [world of patterns. Enjoy your journey on the design pattern superhighway.](https://app.pluralsight.com/player?course=design-patterns-on-ramp&author=jeremy-clark&name=design-patterns-on-ramp-m6-wheretonext&clip=5&mode=live&start=492.894736842105)