## [Introduction and Prerequisites](https://app.pluralsight.com/course-player?clipId=993bed28-eab4-4f7d-b427-5b44d68906b5)

### [Version Check](https://app.pluralsight.com/course-player?clipId=993bed28-eab4-4f7d-b427-5b44d68906b5)

### [Introduction](https://app.pluralsight.com/course-player?clipId=037b5424-e89a-496d-b301-44ac08afd05a)

[[Autogenerated] So you've just been in an interview and](https://app.pluralsight.com/course-player?clipId=037b5424-e89a-496d-b301-44ac08afd05a&startTime=1.78) [someone asked you to describe a design pattern.](https://app.pluralsight.com/course-player?clipId=037b5424-e89a-496d-b301-44ac08afd05a&startTime=3.69) [Or maybe you were just describing a problem to a co worker.](https://app.pluralsight.com/course-player?clipId=037b5424-e89a-496d-b301-44ac08afd05a&startTime=6.64) [And they said, It sounds like you were reinventing the will.](https://app.pluralsight.com/course-player?clipId=037b5424-e89a-496d-b301-44ac08afd05a&startTime=9.59) [They might have even said that.](https://app.pluralsight.com/course-player?clipId=037b5424-e89a-496d-b301-44ac08afd05a&startTime=12.94) [It sounds like you're describing the decorator or a proxy pattern.](https://app.pluralsight.com/course-player?clipId=037b5424-e89a-496d-b301-44ac08afd05a&startTime=13.97) [If this sounds like a situation that you've been in, then this courses for you.](https://app.pluralsight.com/course-player?clipId=037b5424-e89a-496d-b301-44ac08afd05a&startTime=17.92) [Our focus in this courses on presenting design patterns described in the Gang](https://app.pluralsight.com/course-player?clipId=037b5424-e89a-496d-b301-44ac08afd05a&startTime=21.65) [of Four in an example driven way while using Java to do so. Hi, I'm Brian Hansen and welcome to structural design patterns using java.](https://app.pluralsight.com/course-player?clipId=037b5424-e89a-496d-b301-44ac08afd05a&startTime=26.08)

### [Why Learn Patterns?](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399)

[[Autogenerated] you might ask yourself why Design patterns air important?](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=1.74) [I first learned patterns as a means of communicating](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=5.18) [a problem to another developer.](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=8.63) [You may very well already know how to solve a particular problem,](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=10.73) [and it might follow a structure of a pattern.](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=13.84) [But it's better to have a common vocabulary that you can](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=16.21) [explain to someone of what the problem is.](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=19.27) [Patterns are an abstract topic.](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=23.09) [It isn't something that you look at the concept and then have it](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=25.18) [memorized from there some patterns or more easily applied to a](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=28.57) [particular problem set than another.](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=32.24) [Revisiting pattern materials is always a great idea,](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=35.25) [whether it be this course or a book or something else,](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=39.16) [it is amazing how your perception of a pattern will change.](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=42.42) [After gaining more and more experience with it,](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=45.39) [you may come away with a much different understanding of how](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=48.34) [the pattern works after you've applied it.](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=52.5) [Ah, lot of people have used single tens or maybe a decorator,](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=54.47) [and the thing they have used that with that design patterns,](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=58.37) [they'll find out that that's all they know, and there's much more than just Singleton's or decorators or adapters out there](https://app.pluralsight.com/course-player?clipId=7bfb8e90-6165-4070-920e-d994f8d03399&startTime=61.89)

### [Pattern Classifications](https://app.pluralsight.com/course-player?clipId=20558a99-482d-432a-beaf-f95d62a0322e)

[[Autogenerated] the Gang of four has patterns broken out](https://app.pluralsight.com/course-player?clipId=20558a99-482d-432a-beaf-f95d62a0322e&startTime=1.65) [into three groups the groups Air Creation,](https://app.pluralsight.com/course-player?clipId=20558a99-482d-432a-beaf-f95d62a0322e&startTime=3.72) [ALS, structural and behavioral.](https://app.pluralsight.com/course-player?clipId=20558a99-482d-432a-beaf-f95d62a0322e&startTime=6.7) [This course is going to focus on patterns classified](https://app.pluralsight.com/course-player?clipId=20558a99-482d-432a-beaf-f95d62a0322e&startTime=9.33) [under the structural group or category.](https://app.pluralsight.com/course-player?clipId=20558a99-482d-432a-beaf-f95d62a0322e&startTime=12.02) [The other categories have been covered in separate courses,](https://app.pluralsight.com/course-player?clipId=20558a99-482d-432a-beaf-f95d62a0322e&startTime=14.85) [structural patterns, air focused on how you use or utilize objects.](https://app.pluralsight.com/course-player?clipId=20558a99-482d-432a-beaf-f95d62a0322e&startTime=18.68) [It could be for something like performance or re](https://app.pluralsight.com/course-player?clipId=20558a99-482d-432a-beaf-f95d62a0322e&startTime=22.75) [factoring or memory utilization, just to name a few concepts.](https://app.pluralsight.com/course-player?clipId=20558a99-482d-432a-beaf-f95d62a0322e&startTime=25.2) [Let's look at what we're going to cover as faras patterns are concerned in this structural group.](https://app.pluralsight.com/course-player?clipId=20558a99-482d-432a-beaf-f95d62a0322e&startTime=29.77)

### [Which Patterns?](https://app.pluralsight.com/course-player?clipId=6bf65a33-7941-434a-9900-6fea7d87b8c7)

[[Autogenerated] we're going to start off by looking at the adapter pattern,](https://app.pluralsight.com/course-player?clipId=6bf65a33-7941-434a-9900-6fea7d87b8c7&startTime=0.5) [and then from there we're going to look at a bridge.](https://app.pluralsight.com/course-player?clipId=6bf65a33-7941-434a-9900-6fea7d87b8c7&startTime=4.6) [The composite, which shouldn't be confused with composition,](https://app.pluralsight.com/course-player?clipId=6bf65a33-7941-434a-9900-6fea7d87b8c7&startTime=7.72) [a decorator facade, flyweight and then finally,](https://app.pluralsight.com/course-player?clipId=6bf65a33-7941-434a-9900-6fea7d87b8c7&startTime=12.11) [a proxy. Let's look at how we're going to learn this material.](https://app.pluralsight.com/course-player?clipId=6bf65a33-7941-434a-9900-6fea7d87b8c7&startTime=17.89)

### [How Do We Learn Them?](https://app.pluralsight.com/course-player?clipId=38cb224f-cb47-4592-852d-c5094ecb5329)

[[Autogenerated] each pattern of this course will be in its](https://app.pluralsight.com/course-player?clipId=38cb224f-cb47-4592-852d-c5094ecb5329&startTime=1.63) [own individual module and follow a structure of having an](https://app.pluralsight.com/course-player?clipId=38cb224f-cb47-4592-852d-c5094ecb5329&startTime=3.68) [overview of what the pattern is.](https://app.pluralsight.com/course-player?clipId=38cb224f-cb47-4592-852d-c5094ecb5329&startTime=7.46) [The concepts to consider when choosing the pattern.](https://app.pluralsight.com/course-player?clipId=38cb224f-cb47-4592-852d-c5094ecb5329&startTime=9.75) [What the design implications of that pattern are a](https://app.pluralsight.com/course-player?clipId=38cb224f-cb47-4592-852d-c5094ecb5329&startTime=13.24) [live example utilized from the job.](https://app.pluralsight.com/course-player?clipId=38cb224f-cb47-4592-852d-c5094ecb5329&startTime=16.88) [A p I.](https://app.pluralsight.com/course-player?clipId=38cb224f-cb47-4592-852d-c5094ecb5329&startTime=19.39) [A demo in which we coat our own pattern,](https://app.pluralsight.com/course-player?clipId=38cb224f-cb47-4592-852d-c5094ecb5329&startTime=20.74) [the pitfalls associated with this pattern.](https://app.pluralsight.com/course-player?clipId=38cb224f-cb47-4592-852d-c5094ecb5329&startTime=24.34) [And then we'll contrast it with another pattern that maybe](https://app.pluralsight.com/course-player?clipId=38cb224f-cb47-4592-852d-c5094ecb5329&startTime=26.83) [kind of similar to what we're looking at,](https://app.pluralsight.com/course-player?clipId=38cb224f-cb47-4592-852d-c5094ecb5329&startTime=30.21) [or something that really abstracts or contrast what we're](https://app.pluralsight.com/course-player?clipId=38cb224f-cb47-4592-852d-c5094ecb5329&startTime=32.05) [doing with this particular pattern. And then we'll follow up with a brief summary.](https://app.pluralsight.com/course-player?clipId=38cb224f-cb47-4592-852d-c5094ecb5329&startTime=35.41)

### [Prerequisites](https://app.pluralsight.com/course-player?clipId=67f7cdf7-b371-41a9-b7a2-bb1140eee633)

[[Autogenerated] The prerequisites for this course are quite simple.](https://app.pluralsight.com/course-player?clipId=67f7cdf7-b371-41a9-b7a2-bb1140eee633&startTime=1.59) [I am doing all of my coding using Java seven or later,](https://app.pluralsight.com/course-player?clipId=67f7cdf7-b371-41a9-b7a2-bb1140eee633&startTime=4.3) [and I'm going to be running this from Spring STS,](https://app.pluralsight.com/course-player?clipId=67f7cdf7-b371-41a9-b7a2-bb1140eee633&startTime=8.65) [which is just a flavour of eclipse.](https://app.pluralsight.com/course-player?clipId=67f7cdf7-b371-41a9-b7a2-bb1140eee633&startTime=11.6) [Honestly, though, this should work in any I d you choose.](https://app.pluralsight.com/course-player?clipId=67f7cdf7-b371-41a9-b7a2-bb1140eee633&startTime=13.81) [Or you could even use the command line and compile if you want to go old school and do it that way.](https://app.pluralsight.com/course-player?clipId=67f7cdf7-b371-41a9-b7a2-bb1140eee633&startTime=16.92)

### [Next](https://app.pluralsight.com/course-player?clipId=b4d03392-5be9-4832-a08a-7f9823cc8edf)

[[Autogenerated] Now that we've seen what we're going to](https://app.pluralsight.com/course-player?clipId=b4d03392-5be9-4832-a08a-7f9823cc8edf&startTime=1.75) [cover and how we're going to learn it,](https://app.pluralsight.com/course-player?clipId=b4d03392-5be9-4832-a08a-7f9823cc8edf&startTime=3.16) [let's get started by diving into our first pattern.](https://app.pluralsight.com/course-player?clipId=b4d03392-5be9-4832-a08a-7f9823cc8edf&startTime=5.45) [The first pattern we're going to look at is the adapter pattern,](https://app.pluralsight.com/course-player?clipId=b4d03392-5be9-4832-a08a-7f9823cc8edf&startTime=8.71) [and it's a great one for just making some code work in a](https://app.pluralsight.com/course-player?clipId=b4d03392-5be9-4832-a08a-7f9823cc8edf&startTime=12.44) [situation or a context in which it originally didn't have a fit for or an interface to tie into.](https://app.pluralsight.com/course-player?clipId=b4d03392-5be9-4832-a08a-7f9823cc8edf&startTime=17.02)

## [Adapter Design Pattern](https://app.pluralsight.com/course-player?clipId=b0c4cab7-8525-4a29-bc73-11c10d36d489)

### [Introduction](https://app.pluralsight.com/course-player?clipId=b0c4cab7-8525-4a29-bc73-11c10d36d489)

[[Autogenerated] Hi, This is Brian Hansen,](https://app.pluralsight.com/course-player?clipId=b0c4cab7-8525-4a29-bc73-11c10d36d489&startTime=2.11) [and in this module, we're going to look at the adapter design pattern.](https://app.pluralsight.com/course-player?clipId=b0c4cab7-8525-4a29-bc73-11c10d36d489&startTime=3.78) [The adapter pattern is a great pattern for connecting new code to](https://app.pluralsight.com/course-player?clipId=b0c4cab7-8525-4a29-bc73-11c10d36d489&startTime=8.03) [legacy code without having to change the working contract that was produced from the Legacy code originally.](https://app.pluralsight.com/course-player?clipId=b0c4cab7-8525-4a29-bc73-11c10d36d489&startTime=11.47)

### [Plug Adapter](https://app.pluralsight.com/course-player?clipId=699b2c97-2de7-4698-a72c-7fd870640a6f)

[[Autogenerated] just to get it out of the way.](https://app.pluralsight.com/course-player?clipId=699b2c97-2de7-4698-a72c-7fd870640a6f&startTime=2) [It seems that everybody wants to describe the adapter](https://app.pluralsight.com/course-player?clipId=699b2c97-2de7-4698-a72c-7fd870640a6f&startTime=3.84) [pattern as a concept of a plug adapter.](https://app.pluralsight.com/course-player?clipId=699b2c97-2de7-4698-a72c-7fd870640a6f&startTime=6.62) [We have a device that needs to plug into an outlet,](https://app.pluralsight.com/course-player?clipId=699b2c97-2de7-4698-a72c-7fd870640a6f&startTime=10.04) [and we can use an adapter to make that connection.](https://app.pluralsight.com/course-player?clipId=699b2c97-2de7-4698-a72c-7fd870640a6f&startTime=12.77) [This is a fairly accurate description,](https://app.pluralsight.com/course-player?clipId=699b2c97-2de7-4698-a72c-7fd870640a6f&startTime=15.96) [but there's some twists to the adapter pattern that the](https://app.pluralsight.com/course-player?clipId=699b2c97-2de7-4698-a72c-7fd870640a6f&startTime=18.44) [typical plug example doesn't cover.](https://app.pluralsight.com/course-player?clipId=699b2c97-2de7-4698-a72c-7fd870640a6f&startTime=20.86) [And, frankly, it isn't a software example.](https://app.pluralsight.com/course-player?clipId=699b2c97-2de7-4698-a72c-7fd870640a6f&startTime=23.02) [One specific thing that I don't like about this example is that we usually](https://app.pluralsight.com/course-player?clipId=699b2c97-2de7-4698-a72c-7fd870640a6f&startTime=26.44) [only look for or need one adapter with the plug example.](https://app.pluralsight.com/course-player?clipId=699b2c97-2de7-4698-a72c-7fd870640a6f&startTime=30.08) [And with software, we could have multiple adapters.](https://app.pluralsight.com/course-player?clipId=699b2c97-2de7-4698-a72c-7fd870640a6f&startTime=35.03) [So there's one variation there that you should keep in mind that the plug adapter doesn't really demonstrate very well.](https://app.pluralsight.com/course-player?clipId=699b2c97-2de7-4698-a72c-7fd870640a6f&startTime=37.85)

### [Concepts](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625)

[[Autogenerated] We already talked about the notion of a plug adapter,](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=2.64) [but let's dive into more detail about the concepts](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=5.63) [surrounding the adapter pattern.](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=8.62) [We would choose this pattern when we're wanting to have a](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=11.24) [client talk to an existing inter vase.](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=14.01) [This is usually the case when one portion of our system is a legacy,](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=17.19) [app or module.](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=20.78) [That we don't want to or can't possibly change it effectively is](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=22.22) [translating request from the client to the code that we're adapting](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=27.43) [to basically a client to talking to a legacy app or on adapt E that](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=31.73) [we have used an adapter to talk to.](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=37.6) [Examples of this in the job.](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=41.04) [A p i.](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=42.77) [R.](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=43.54) [The collections AP I specifically the usage of the arrays to](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=44.04) [lists conversion arrays were original,](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=50.08) [or you could classify as a legacy a p I and list where the newer part](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=53.68) [of the collections AP I introduced later their methods in the](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=57.65) [collections a p I to adapt a raise to lists.](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=61.05) [Another example in the job, a p i.](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=65.2) [R.](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=67.14) [The stream classes surrounding Io.](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=67.37) [Almost all of the stream classes have adapters to work with other streams or readers](https://app.pluralsight.com/course-player?clipId=481aca1d-fcee-4b54-828f-73080b1d5625&startTime=70.14)

### [Design Considerations](https://app.pluralsight.com/course-player?clipId=e9a30070-09ca-4370-8aa6-ae86eca5bd70)

[[Autogenerated] the adapter is very client centric.](https://app.pluralsight.com/course-player?clipId=e9a30070-09ca-4370-8aa6-ae86eca5bd70&startTime=1.78) [It is typically implemented to adapt or integrate a](https://app.pluralsight.com/course-player?clipId=e9a30070-09ca-4370-8aa6-ae86eca5bd70&startTime=4.94) [new client to legacy components.](https://app.pluralsight.com/course-player?clipId=e9a30070-09ca-4370-8aa6-ae86eca5bd70&startTime=8.38) [Often times it is implemented to an interface,](https://app.pluralsight.com/course-player?clipId=e9a30070-09ca-4370-8aa6-ae86eca5bd70&startTime=11.44) [but it doesn't necessarily have to be.](https://app.pluralsight.com/course-player?clipId=e9a30070-09ca-4370-8aa6-ae86eca5bd70&startTime=14.97) [It can simply just be a new class.](https://app.pluralsight.com/course-player?clipId=e9a30070-09ca-4370-8aa6-ae86eca5bd70&startTime=17.44) [The adapt E can be the new portion of the code to it typically isn't.](https://app.pluralsight.com/course-player?clipId=e9a30070-09ca-4370-8aa6-ae86eca5bd70&startTime=20.58) [But that is one portion of this pattern that people](https://app.pluralsight.com/course-player?clipId=e9a30070-09ca-4370-8aa6-ae86eca5bd70&startTime=25.45) [often don't think about or overlook.](https://app.pluralsight.com/course-player?clipId=e9a30070-09ca-4370-8aa6-ae86eca5bd70&startTime=27.41) [Looking at the UML,](https://app.pluralsight.com/course-player?clipId=e9a30070-09ca-4370-8aa6-ae86eca5bd70&startTime=30.8) [you can see we have a client with a specific method that wants to do something.](https://app.pluralsight.com/course-player?clipId=e9a30070-09ca-4370-8aa6-ae86eca5bd70&startTime=31.97) [The legacy ap I doesn't support it or we don't want to modify](https://app.pluralsight.com/course-player?clipId=e9a30070-09ca-4370-8aa6-ae86eca5bd70&startTime=38.48) [the client toe work with it in that manner.](https://app.pluralsight.com/course-player?clipId=e9a30070-09ca-4370-8aa6-ae86eca5bd70&startTime=41.82) [So we will add an adapter that will carry out that operation for](https://app.pluralsight.com/course-player?clipId=e9a30070-09ca-4370-8aa6-ae86eca5bd70&startTime=43.89) [us and finally integrate with the client to do what we want to get completed in our legacy operation](https://app.pluralsight.com/course-player?clipId=e9a30070-09ca-4370-8aa6-ae86eca5bd70&startTime=47.46)

### [Example: Arrays.asList()](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e)

[[Autogenerated] Here's an example of the arrays as lis method that is,](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=2.24) [an adapter to convert an array of something into a list from the collections,](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=5.9) [a p I.](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=10.08) [There are a few things to note of this.](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=11.64) [First,](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=13.81) [it is an adapter because it is just adapting functionality](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=14.76) [rather than adding or decorating the class.](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=18.31) [That is a separate pattern that we will cover later](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=21.59) [called the Decorator Pattern.](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=24.21) [If you want to add more functionality to your legacy, a P I.](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=25.91) [The other thing to note is that in adapting the job AP,](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=31.9) [I makes good use of generics and returns the list as the correct](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=35.22) [object type without us having to specify it.](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=39.01) [I will say that one thing that I don't like about this example and others that](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=43.04) [I have seen is that it only shows one adapter in its use.](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=47.01) [We're just going to convert an array to a list.](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=51.31) [We're not converting other things to a list,](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=54.82) [so there's not multiple adapter types. Let's look at this example in life code](https://app.pluralsight.com/course-player?clipId=f590dcd7-cf59-4941-a711-fe73ce82bf1e&startTime=57.04)

### [Demo: Arrays.asList()](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366)

[[Autogenerated] So here's a small demo of the adapter pattern](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=1.54) [and use through the arrays dot as lis method.](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=4.89) [You see here we have a array of intra jurors that we're going to](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=8.74) [go ahead and pass into the raised on as less method that will](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=13.39) [then return us a list of managers,](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=17.29) [and we go ahead and print out the array events and the list of managers just to](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=20.56) [show you the different functionality that's going on there.](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=24.83) [We go ahead and run this code,](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=28.14) [and you can see it will return our java dot Laing imager address of our](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=29.78) [arrays down here and then our list of imagers here.](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=35.32) [So it's going ahead and adapted this array into our list so back behind.](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=38.31) [We don't really see what's going on,](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=44.6) [but it's converted that for us or adapted that imager](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=46.25) [array for us behind the scenes.](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=49.78) [Pretty simple example.](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=52.94) [The thing I don't like about this example,](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=54.65) [as I mentioned earlier,](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=56.62) [is this is one method or one adapter of whatever array type we're passing in,](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=57.64) [so I don't feel like it's the best example.](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=63.96) [We're gonna go ahead and create our own example that really demonstrates the effectiveness or flexibility of the adapter pattern in our code](https://app.pluralsight.com/course-player?clipId=f2814b63-d28e-4889-9a2f-98de0266c366&startTime=65.93)

### [Exercise - Create Adapter](https://app.pluralsight.com/course-player?clipId=a2653b4d-673a-40d8-9abd-7292bd587daa)

[[Autogenerated] Now that we've seen a everyday example that exists in the job](https://app.pluralsight.com/course-player?clipId=a2653b4d-673a-40d8-9abd-7292bd587daa&startTime=1.64) [a p I let's go ahead and create a little more concrete example that really](https://app.pluralsight.com/course-player?clipId=a2653b4d-673a-40d8-9abd-7292bd587daa&startTime=5.73) [shows some of the strengths of the adapter pattern.](https://app.pluralsight.com/course-player?clipId=a2653b4d-673a-40d8-9abd-7292bd587daa&startTime=9.48) [I'm gonna go ahead and walk through some code that I've already built.](https://app.pluralsight.com/course-player?clipId=a2653b4d-673a-40d8-9abd-7292bd587daa&startTime=13.24) [Just to help set up the demo that we're gonna run](https://app.pluralsight.com/course-player?clipId=a2653b4d-673a-40d8-9abd-7292bd587daa&startTime=16.27) [through of the adapter pattern, we're gonna go ahead and create an adapter,](https://app.pluralsight.com/course-player?clipId=a2653b4d-673a-40d8-9abd-7292bd587daa&startTime=19.64) [demonstrate how to not let this become a decorator,](https://app.pluralsight.com/course-player?clipId=a2653b4d-673a-40d8-9abd-7292bd587daa&startTime=24.44) [and then we're gonna add another adapter, and they're just to really solidify the concepts that we've learned.](https://app.pluralsight.com/course-player?clipId=a2653b4d-673a-40d8-9abd-7292bd587daa&startTime=27.87)

### [Demo: Adapter](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9)

[[Autogenerated] For our example,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=1.8) [we're gonna go through and build a list of employees that we](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=2.86) [obtain from two different data sources,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=6.95) [one of which would be a database and another which is held up.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=9.14) [You see, from our end users perspective,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=13.22) [we're just getting a list from somewhere and printing that list out.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=15.99) [So let's go ahead and open up our client,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=20.94) [and we get to see what example from this example](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=22.44) [what problems we're going to face.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=24.94) [I have a list of employees that is just basically built from](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=26.93) [whatever sources we can compile it from,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=30.96) [and we have an employee interface.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=33.22) [This employee interface is real simple.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=35.84) [We were looking for Get I D get first name,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=38.04) [last name and email address,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=40.55) [and then we have an employee database object which](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=43.26) [naturally implements this employee interface.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=45.87) [And it has getters.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=49.15) [Forget I d get first name, last name and email.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=50.38) [Pretty straightforward.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=53.84) [So if you look at our client, if we run this right now, it'll run just fine.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=55.44) [You can see it will print out an idea of 1234 1st name John Last](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=60.34) [name Wick and an email of Jonah quick dot com.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=64.63) [Now where the problem comes into play is when we want to do](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=67.68) [this same thing using our l DAP objects.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=70.52) [So we have an l DAP object over here,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=73.92) [and you'll notice that the naming convention for Held up for I D first name,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=76.74) [last name and email address is different.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=80.93) [CN is our i d surname would be our first name and our last](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=83.42) [name rather and given name is our first name.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=89.1) [And then Mel would equate to our email address,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=91.68) [but you'll notice we don't implement any interface at all.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=94.99) [Now you're saying I got this code right here.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=98.71) [I could go and change this Well, yes.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=101.01) [But that's not in the nature of what this pattern is built around.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=102.95) [And a lot of times we can't change this legacy code.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=107.93) [Rather, let's go ahead and implement adapter to do this.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=110.95) [Let's go back to our client.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=114.53) [And if I try to create this,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=116.34) [this will just illustrate further that we can't do that.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=118.62) [I can't create and employees held up in and sign it to an employee.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=120.82) [Rather,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=125.54) [what we're going to dio is go ahead and create a new instance of this and](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=125.94) [then use an adapter to go ahead and store that in our list.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=130.82) [So for now, I've gone ahead and created an employee,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=136.73) [held up instance and gone ahead and put in here Chewy](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=140.53) [and Solo and Han and han solo dot com.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=144.71) [And now we need to go ahead and create an adapter to add that to our list.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=148.32) [So gonna go ahead and write a little bit of code here for employees](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=152.68) [dot ad and it's gonna look for an employee here.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=157.84) [So I'm gonna say new employees e adapter from filled out.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=161.92) [And I'm gonna make this take an employee from L dap](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=171.04) [instance as its constructor and save this Now,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=176.64) [this class doesn't exist yet.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=180.42) [This is what we're gonna right.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=181.5) [We're gonna write this adapter.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=182.44) [So let's go ahead and click on this and say,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=184.01) [Create class employees adapter held out,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=186.1) [and it's already trying to be smart for us here.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=190.24) [It says, Oh, well,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=192.73) [I'm gonna go ahead and make the interface that you want to implement](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=193.51) [the employees and name everything for us correctly.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=197.66) [So let's go and click finish here.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=200.4) [And it has some stubbed out methods in here for us,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=202.94) [which is everything that we need from the employee interface.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=206.14) [But now let's go ahead and start implementing some functionality here.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=210.25) [So I want to say private employees held up.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=213.7) [We'll just call this instance and go ahead and save that.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=220.64) [We want to make our constructor that comes in and brings our instance.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=224.94) [And for us will say Public employees adapter held up](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=229.39) [and we'll go ahead and pass in here.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=239.84) [Employees held out.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=242.36) [Well, say instance, and then we can go ahead and set those two together.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=248.62) [So you say So.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=251.65) [This star instance is equal, to instance,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=252.39) [pretty straightforward what we're doing here.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=255.95) [We're going to create an instance,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=257.84) [and this is going to wrap this instance or adapt it to](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=259.24) [whatever we're trying to dio now.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=262.45) [All these getters that air stubbed out with two DUIs here we could just say](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=263.94) [return and we'll say instance dot get CN because that is what our ideas from L](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=268) [dap and our first name Weaken go in here and say in return instance dot get](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=276.09) [given name and then for our last name.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=284.25) [Return instance dot Get surname and for email will](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=289.32) [say return instance dot Get Mel.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=298.91) [Now let's go ahead and save this.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=306.12) [Now we've built our adapter.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=308.42) [This honestly, is it?](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=310.13) [We pass In a private instance,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=311.9) [we go ahead and wrap that and call the method that we want to](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=314.23) [tie into that corresponding interface now to point out the key](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=317.61) [points of this pattern and play eld up did not implement the](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=320.95) [interface that we wanted.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=324.77) [Teoh.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=325.83) [The client doesn't need to know about the gory details of what went on there,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=326.7) [and it really wasn't that gory.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=331.03) [We just created an adapter that wrapped it and went ahead and added pieces in](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=332.42) [here to map to the fields that we wanted to call basis.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=336.62) [What, based off what the fields were in the object.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=340.82) [Let's go ahead and look at our client.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=343.33) [It's added.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=344.93) [It's happy.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=345.66) [So we've added employees from eld up.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=346.39) [If we run this again,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=348.28) [we'll expect to see to two calls down below or two](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=349.21) [results from our list that gets returned.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=353.07) [And sure enough, we see I d.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=355.68) [1234 1st name John Last name Wick.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=358.11) [Email John Wick.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=361.42) [But then we also see this calmed up through all site](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=362.64) [that adapter employees adapter L dap.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=365.17) [Now you can argue that if I start adding fields in here,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=368.29) [it this now becomes a decorator pattern.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=373.13) [So if I wanted to come down here and say Public string to String and then](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=375.91) [go ahead and implement out my to string where I say,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=385.09) [Well,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=389.44) [your I D we return say I d just like the string below is doing for us](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=389.87) [and say plus instance dot get CNN and then subsequently build out the](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=399.64) [rest of our to string just like this.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=409.34) [If I run it again, you'll see that it now is starting to build it out,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=411.2) [just like the previous example did from the database.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=414.71) [Some people argue that that's turning this into a decorator and not an adapter,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=418.84) [because it really is changing the to to the to string or](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=423.1) [what would be representative that object.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=426.66) [Historically, it's really somewhat of a semantic,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=428.33) [but if I guess if you wanted to be a purist,](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=431.84) [you wouldn't add this to string method in here.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=434.79) [But I believe in making it match.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=437.31) [The output of the other object were adapting this object to make it.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=439.41) [I don't classify this as a decorator because it's returning the same interface](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=445.57) [if our to string from our other object represents this string and ours is](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=449.31) [representing something different modifying that to string or changing that to](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=453.31) [string in our adapter to make that represent the same thing still seems like a nice way of using an adapter to me.](https://app.pluralsight.com/course-player?clipId=27c538cf-a289-44b0-b5d5-be7fbdaa5df9&startTime=457.15)

### [Demo: Second Adapter](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398)

[[Autogenerated] to help solidify the concepts of an adapter in our code.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=2.04) [I wanted to go ahead and add another adapter to our project.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=5.96) [So I went ahead and inside of our employees,](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=10.99) [Client added, And an employee CSB object that we can pull information from.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=13.55) [So it's just a comma separated value string were passing in 567](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=20.02) [Sherlock Holmes and Sherlock at homes dot com.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=24.41) [Now a few things different here is that the employees see](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=27.82) [SV object has an insecure for an I.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=31.01) [D.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=33.45) [First name and last name are all lower case and email addresses.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=34.24) [Camel case.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=37.66) [I just passing a string and token ISAT based off of the values](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=39.04) [passed in really not important to what the object is doing or](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=43.24) [what the patterns really doing.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=47.05) [But I wanted to point out that naming convention has changed](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=48.65) [and the I D object type has changed as well as we're not](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=51.6) [implementing any interface in here.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=55.43) [So if I go back to my employees client and save this one to do the](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=58.44) [same thing that we did with the L Dap instance,](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=62.16) [and let's go ahead and create a new employee adapter that's](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=65.81) [going to wrap our instance of our object.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=69.69) [We'll go ahead and say,](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=73.44) [Create class and it's going to already implement the employee interface for us,](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=74.28) [which is what we want to have happen because that employees client is](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=80.73) [all expecting to just look at that basic interface.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=84.87) [I'm going to start off this object by doing the same thing by saying private](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=88.24) [employees see SV instance and then add a constructor for it.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=93.02) [Public Employees adapter See SV and pass in that instance.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=99.84) [So say employees see SV instance and then go ahead and set](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=105.76) [that instance equal to the other object.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=113.88) [This stop instance is equal to instance,](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=116.51) [now that we have this all in here, we go ahead and change a few things around,](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=121.3) [and this is gonna be very similar to what we did with the old up instance.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=124.76) [But I wanted to point out a few things we say a return instance dot get I d.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=126.96) [Now our i d.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=134.6) [From our in si SV object is an integer, not a string,](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=135.74) [and that's what it's suspecting.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=142.09) [So this is one of those cases where we can change the](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=143.08) [object type that we're returning,](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=145.36) [and I'm just gonna do real poor man's string by adding](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=147.24) [a plus quote quote on their toe.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=150.6) [Convert it to a string.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=152.7) [But you get the idea that we are building this string instance to return to our](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=154.15) [client that's expecting a string rather than an inter i D.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=160.4) [Also, we go down here to first name and last name.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=164.3) [We can see quickly that it's expecting a camel case, and we are.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=167.84) [Method was get first name, all lower case say Mazar last name.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=173.76) [I must return instance dot Get last name and go ahead](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=179.74) [and say that and then finally email.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=187.23) [I just pointed out in this that the instance we have is](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=190.64) [using get email address rather than email.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=195.32) [So naming conventions, object types,](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=198.85) [the different things that we want to adapt it to.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=201.31) [Now, if you go back to our employees client,](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=203.81) [you see that it says everything's compiling fine.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=207.24) [And finally,](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=209.98) [we'll go ahead and run it and see if this will adapt it to our object,](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=210.86) [which it did.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=213.92) [You see, we have our employees adapter.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=215.14) [See SV out there.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=217.03) [One thing to note when using the pattern.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=218.59) [Typically,](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=220.99) [we create an instance and it holds or wraps one instance](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=221.98) [every time we want to represent this.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=226.16) [So for Impl, if we want to adapt and employees from eld up to it,](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=228.6) [we go ahead and create an employee adapter.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=232.29) [If we wanna adapted employees from C S V to it,](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=235.26) [we create an instance of the employees adapter CSP,](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=237.63) [and it's a new instance every time cause it is holding a reference to the instance that we want to adapt.](https://app.pluralsight.com/course-player?clipId=143ca277-0a59-4064-8b35-c0fada9b8398&startTime=240.24)

### [Pitfalls](https://app.pluralsight.com/course-player?clipId=c11ea66d-9246-4bec-b4e1-9cd15fcfa23f)

[[Autogenerated] What are some of the pitfalls of the adapter?](https://app.pluralsight.com/course-player?clipId=c11ea66d-9246-4bec-b4e1-9cd15fcfa23f&startTime=1.04) [Well, not a lot, actually.](https://app.pluralsight.com/course-player?clipId=c11ea66d-9246-4bec-b4e1-9cd15fcfa23f&startTime=4.14) [Don't over complicate them.](https://app.pluralsight.com/course-player?clipId=c11ea66d-9246-4bec-b4e1-9cd15fcfa23f&startTime=6.94) [Typically, an adapter would provide multiple types of adapters.](https://app.pluralsight.com/course-player?clipId=c11ea66d-9246-4bec-b4e1-9cd15fcfa23f&startTime=9.05) [That doesn't mean to say that if you only have one adapter,](https://app.pluralsight.com/course-player?clipId=c11ea66d-9246-4bec-b4e1-9cd15fcfa23f&startTime=12.87) [that it isn't an example of the adapter pattern,](https://app.pluralsight.com/course-player?clipId=c11ea66d-9246-4bec-b4e1-9cd15fcfa23f&startTime=15.3) [but more to point out that you may or may not be using the pattern correctly.](https://app.pluralsight.com/course-player?clipId=c11ea66d-9246-4bec-b4e1-9cd15fcfa23f&startTime=18.07) [The adapter is also used to make things work together.](https://app.pluralsight.com/course-player?clipId=c11ea66d-9246-4bec-b4e1-9cd15fcfa23f&startTime=22.08) [If you are adding functionality to your legacy code to the adapter,](https://app.pluralsight.com/course-player?clipId=c11ea66d-9246-4bec-b4e1-9cd15fcfa23f&startTime=24.92) [then you should probably be considering the decorator or some other type of structural pattern.](https://app.pluralsight.com/course-player?clipId=c11ea66d-9246-4bec-b4e1-9cd15fcfa23f&startTime=29.2)

### [Contrast to Other Patterns](https://app.pluralsight.com/course-player?clipId=f6dccb01-bd95-492b-9b3a-26a132bed3e2)

[[Autogenerated] to contrast the adapter pattern against another one.](https://app.pluralsight.com/course-player?clipId=f6dccb01-bd95-492b-9b3a-26a132bed3e2&startTime=1.94) [Let's compare it with the bridge.](https://app.pluralsight.com/course-player?clipId=f6dccb01-bd95-492b-9b3a-26a132bed3e2&startTime=4.66) [The adapter makes things work after they were designed,](https://app.pluralsight.com/course-player?clipId=f6dccb01-bd95-492b-9b3a-26a132bed3e2&startTime=7.61) [basically dealing with legacy code.](https://app.pluralsight.com/course-player?clipId=f6dccb01-bd95-492b-9b3a-26a132bed3e2&startTime=10.9) [The adapters, almost always retrofitted to make unrelated classes work together.](https://app.pluralsight.com/course-player?clipId=f6dccb01-bd95-492b-9b3a-26a132bed3e2&startTime=13.64) [It is essentially created to provide a different interface to](https://app.pluralsight.com/course-player?clipId=f6dccb01-bd95-492b-9b3a-26a132bed3e2&startTime=19.03) [our legacy code than was originally intended.](https://app.pluralsight.com/course-player?clipId=f6dccb01-bd95-492b-9b3a-26a132bed3e2&startTime=22.32) [The bridge, on the other hand,](https://app.pluralsight.com/course-player?clipId=f6dccb01-bd95-492b-9b3a-26a132bed3e2&startTime=25.61) [was designed up friend to let abstraction and implementation very independently.](https://app.pluralsight.com/course-player?clipId=f6dccb01-bd95-492b-9b3a-26a132bed3e2&startTime=27.26) [It is built in advance so that we can provide a layer of a](https://app.pluralsight.com/course-player?clipId=f6dccb01-bd95-492b-9b3a-26a132bed3e2&startTime=34.54) [distraction and let both systems be flexible while we are](https://app.pluralsight.com/course-player?clipId=f6dccb01-bd95-492b-9b3a-26a132bed3e2&startTime=37.69) [implementing and creating them.](https://app.pluralsight.com/course-player?clipId=f6dccb01-bd95-492b-9b3a-26a132bed3e2&startTime=41.16) [Both the bridge and the adapter are meant to adapt multiple disparate systems and work in concert with one another.](https://app.pluralsight.com/course-player?clipId=f6dccb01-bd95-492b-9b3a-26a132bed3e2&startTime=43.04)

### [Summary](https://app.pluralsight.com/course-player?clipId=ab6ea391-ceaf-4a42-b981-bf074711597b)

[[Autogenerated] Let's briefly recap the things that we've](https://app.pluralsight.com/course-player?clipId=ab6ea391-ceaf-4a42-b981-bf074711597b&startTime=1.42) [learned while implementing the adapter pattern.](https://app.pluralsight.com/course-player?clipId=ab6ea391-ceaf-4a42-b981-bf074711597b&startTime=3.72) [It is a simple solution.](https://app.pluralsight.com/course-player?clipId=ab6ea391-ceaf-4a42-b981-bf074711597b&startTime=7.34) [Teoh A very descript problem.](https://app.pluralsight.com/course-player?clipId=ab6ea391-ceaf-4a42-b981-bf074711597b&startTime=9.64) [Quite easy to implement.](https://app.pluralsight.com/course-player?clipId=ab6ea391-ceaf-4a42-b981-bf074711597b&startTime=13.04) [You saw how quickly we have implemented two different](https://app.pluralsight.com/course-player?clipId=ab6ea391-ceaf-4a42-b981-bf074711597b&startTime=14.42) [adapter patterns inside of our code.](https://app.pluralsight.com/course-player?clipId=ab6ea391-ceaf-4a42-b981-bf074711597b&startTime=17.37) [It is typically used to just integrate with legacy code](https://app.pluralsight.com/course-player?clipId=ab6ea391-ceaf-4a42-b981-bf074711597b&startTime=19.84) [that we can't or don't want to change.](https://app.pluralsight.com/course-player?clipId=ab6ea391-ceaf-4a42-b981-bf074711597b&startTime=23.3) [And usually this method or pattern will contain multiple adapters.](https://app.pluralsight.com/course-player?clipId=ab6ea391-ceaf-4a42-b981-bf074711597b&startTime=26.04) [So one common problem I see with people implementing the adapter pattern is](https://app.pluralsight.com/course-player?clipId=ab6ea391-ceaf-4a42-b981-bf074711597b&startTime=32.82) [that they create one adapter and then walk away from it.](https://app.pluralsight.com/course-player?clipId=ab6ea391-ceaf-4a42-b981-bf074711597b&startTime=36.81) [Don't be shy to look at other uses that you can utilize and](https://app.pluralsight.com/course-player?clipId=ab6ea391-ceaf-4a42-b981-bf074711597b&startTime=40.45) [extend your application with multiple adapters to interface with those legacy AP eyes.](https://app.pluralsight.com/course-player?clipId=ab6ea391-ceaf-4a42-b981-bf074711597b&startTime=44.75)

## [Bridge Design Pattern](https://app.pluralsight.com/course-player?clipId=9c4d8578-dac8-480a-88dd-1d8107f16e02)

### [Introduction](https://app.pluralsight.com/course-player?clipId=9c4d8578-dac8-480a-88dd-1d8107f16e02)

[[Autogenerated] Hi.](https://app.pluralsight.com/course-player?clipId=9c4d8578-dac8-480a-88dd-1d8107f16e02&startTime=2.04) [This is Brian Hansen.](https://app.pluralsight.com/course-player?clipId=9c4d8578-dac8-480a-88dd-1d8107f16e02&startTime=2.5) [And in this module, we're going to look at the bridge design pattern.](https://app.pluralsight.com/course-player?clipId=9c4d8578-dac8-480a-88dd-1d8107f16e02&startTime=3.79) [The bridge pattern is very similar to the adapter,](https://app.pluralsight.com/course-player?clipId=9c4d8578-dac8-480a-88dd-1d8107f16e02&startTime=7.7) [with the main difference being that the bridge works with new code, whereas the adopter works with legacy code.](https://app.pluralsight.com/course-player?clipId=9c4d8578-dac8-480a-88dd-1d8107f16e02&startTime=10.35)

### [Concepts](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542)

[[Autogenerated] the concepts surrounding why you would](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=1.97) [choose the bridge pattern or that it is meant to decouple](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=3.7) [abstraction and implementation.](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=7.12) [To do this, you utilize a few techniques,](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=9.61) [namely encapsulation, composition and inheritance.](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=12.16) [A key concept with the bridge pattern and why it is more than just inheritance](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=16.34) [is that changes in the abstraction won't affect the client.](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=20.34) [What is meant by this is that the client is unaware of](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=24.34) [the abstraction on the back end.](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=26.96) [This is important because this d couples the implementation from the](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=28.88) [contract or interface that the client is using.](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=32.16) [One of the key reasons for choosing this pattern is that we](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=35.53) [know the details won't be right to begin with.](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=38.78) [This may sound a little strange at first,](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=42.07) [but the bridge allows for a level of indirection](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=43.99) [that we add into our application.](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=46.34) [If you aren't quite sure of what the end product of](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=48.94) [what you're building will be.](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=51.48) [The bridge is great for giving us flexibility](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=52.92) [without breaking things with change.](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=55.12) [Examples of this are drivers.](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=58.34) [We use drivers all the time and the bridges and the bridges in a lot of ways.](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=60.81) [Just a driver.](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=64.9) [A good example of this in the job a p i.](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=66.24) [R J D B C drivers.](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=68.45) [We have an interface that we work with and a driver that works with the underlying database.](https://app.pluralsight.com/course-player?clipId=efa72eb7-83c3-4fba-89b6-b7f278f68542&startTime=70.43)

### [Design Considerations](https://app.pluralsight.com/course-player?clipId=ebc4e548-5c6e-4b7d-b755-64570c55ce4b)

[[Autogenerated] The design of the bridge is more complicated than the adapter.](https://app.pluralsight.com/course-player?clipId=ebc4e548-5c6e-4b7d-b755-64570c55ce4b&startTime=1.24) [It will utilize interfaces and abstract classes.](https://app.pluralsight.com/course-player?clipId=ebc4e548-5c6e-4b7d-b755-64570c55ce4b&startTime=4.88) [It also places an emphasis on composition over inheritance.](https://app.pluralsight.com/course-player?clipId=ebc4e548-5c6e-4b7d-b755-64570c55ce4b&startTime=8.58) [But it is more than just composition.](https://app.pluralsight.com/course-player?clipId=ebc4e548-5c6e-4b7d-b755-64570c55ce4b&startTime=12.43) [Your application is designed to expect change from both sides.](https://app.pluralsight.com/course-player?clipId=ebc4e548-5c6e-4b7d-b755-64570c55ce4b&startTime=15.59) [Normally, the UML for this pattern would be on this slide as well,](https://app.pluralsight.com/course-player?clipId=ebc4e548-5c6e-4b7d-b755-64570c55ce4b&startTime=20.21) [but it is too large and will be on the next diagram.](https://app.pluralsight.com/course-player?clipId=ebc4e548-5c6e-4b7d-b755-64570c55ce4b&startTime=23.84) [The pieces of the diagram are an abstraction,](https://app.pluralsight.com/course-player?clipId=ebc4e548-5c6e-4b7d-b755-64570c55ce4b&startTime=28.24) [implement or refined obstruction and a concrete implementer. Let's look at that diagram now.](https://app.pluralsight.com/course-player?clipId=ebc4e548-5c6e-4b7d-b755-64570c55ce4b&startTime=31.33)

### [UML Diagram](https://app.pluralsight.com/course-player?clipId=cca59d51-3593-4153-99ba-31a1ef9bd220)

[[Autogenerated] If you aren't very familiar with UML, don't not.](https://app.pluralsight.com/course-player?clipId=cca59d51-3593-4153-99ba-31a1ef9bd220&startTime=1.88) [The names of the objects in this diagram confuse you with](https://app.pluralsight.com/course-player?clipId=cca59d51-3593-4153-99ba-31a1ef9bd220&startTime=4.45) [the types of classes that they are.](https://app.pluralsight.com/course-player?clipId=cca59d51-3593-4153-99ba-31a1ef9bd220&startTime=7.04) [The obstruction in this case is an interface.](https://app.pluralsight.com/course-player?clipId=cca59d51-3593-4153-99ba-31a1ef9bd220&startTime=9.92) [This interface could be refined into our refined abstraction,](https://app.pluralsight.com/course-player?clipId=cca59d51-3593-4153-99ba-31a1ef9bd220&startTime=13.65) [and this is just a more specific implementation of that interface.](https://app.pluralsight.com/course-player?clipId=cca59d51-3593-4153-99ba-31a1ef9bd220&startTime=18.14) [From here we have our implementer, which is the hierarchy of our abstract.](https://app.pluralsight.com/course-player?clipId=cca59d51-3593-4153-99ba-31a1ef9bd220&startTime=22.81) [Classes are abstract.](https://app.pluralsight.com/course-player?clipId=cca59d51-3593-4153-99ba-31a1ef9bd220&startTime=27.21) [Classes will then be defined into a more concrete implementation,](https://app.pluralsight.com/course-player?clipId=cca59d51-3593-4153-99ba-31a1ef9bd220&startTime=29.61) [which will utilise composition of our various pieces of our bridge](https://app.pluralsight.com/course-player?clipId=cca59d51-3593-4153-99ba-31a1ef9bd220&startTime=34.14) [pattern to define those concrete implementations.](https://app.pluralsight.com/course-player?clipId=cca59d51-3593-4153-99ba-31a1ef9bd220&startTime=38.99) [There are a few more moving parts in this pattern,](https://app.pluralsight.com/course-player?clipId=cca59d51-3593-4153-99ba-31a1ef9bd220&startTime=43.34) [and we will look at more detail when we create our own pattern. But first, let's look at an example of this pattern in our everyday usage.](https://app.pluralsight.com/course-player?clipId=cca59d51-3593-4153-99ba-31a1ef9bd220&startTime=45.15)

### [Example: JDBC](https://app.pluralsight.com/course-player?clipId=c237cc8b-0b7d-4f30-82f9-86bb8ca73645)

[[Autogenerated] J.](https://app.pluralsight.com/course-player?clipId=c237cc8b-0b7d-4f30-82f9-86bb8ca73645&startTime=1.39) [D.](https://app.pluralsight.com/course-player?clipId=c237cc8b-0b7d-4f30-82f9-86bb8ca73645&startTime=1.57) [B C.](https://app.pluralsight.com/course-player?clipId=c237cc8b-0b7d-4f30-82f9-86bb8ca73645&startTime=1.68) [Is an A P I for executing sequel statements.](https://app.pluralsight.com/course-player?clipId=c237cc8b-0b7d-4f30-82f9-86bb8ca73645&startTime=2.07) [Classes that implement the interface R J D B C drivers and](https://app.pluralsight.com/course-player?clipId=c237cc8b-0b7d-4f30-82f9-86bb8ca73645&startTime=5.24) [applications that rely on these drivers are abstractions that can work](https://app.pluralsight.com/course-player?clipId=c237cc8b-0b7d-4f30-82f9-86bb8ca73645&startTime=9.38) [with any database for which a J BBC driver exists.](https://app.pluralsight.com/course-player?clipId=c237cc8b-0b7d-4f30-82f9-86bb8ca73645&startTime=13.39) [The JBC Architecture de couples in abstraction from its](https://app.pluralsight.com/course-player?clipId=c237cc8b-0b7d-4f30-82f9-86bb8ca73645&startTime=17.21) [implementation so that the to convey very independently,](https://app.pluralsight.com/course-player?clipId=c237cc8b-0b7d-4f30-82f9-86bb8ca73645&startTime=20.81) [thus being an excellent example of a bridge pattern. Let's see this code in a live demo.](https://app.pluralsight.com/course-player?clipId=c237cc8b-0b7d-4f30-82f9-86bb8ca73645&startTime=24.65)

### [Demo: JDBC](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f)

[[Autogenerated] in this demo,](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=1.22) [we're gonna go through and use the JBC AP I to go ahead and](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=1.95) [create a database table in a Derby database.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=5.77) [So this examples pretty straightforward.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=10.92) [In fact,](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=13.44) [there's a more detailed example of this in the creation all design patterns](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=14.02) [course under the single 10 that shows how to wrap all of this.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=17.97) [So when they we only get one instance of that](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=21.25) [connection each time we want to utilize it.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=24.66) [But in this example, we gonna go ahead and register our driver,](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=27.24) [and then we're going to build our U R L,](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=30.12) [which actually builds our database for us.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=32.76) [If you're familiar with Derby at all, it doesn't matter if you're not,](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=34.71) [then we can use that driver manager to get our connection.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=37.96) [Now.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=41.34) [The interesting thing about this is that our](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=41.65) [abstraction is that in this is the client.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=43.36) [The client is abstracted away from the underlying details of what's going on,](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=45.98) [and the driver that we're using is also enabling us to use a](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=50.95) [different database with the same code or different code.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=56.64) [With that same database.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=60.7) [There's that bridge that goes between the two using the](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=61.65) [driver and the A P I that we have.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=64.35) [So from there we can create our statement and then execute Our](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=67.04) [statement will so tell us that we've created a table.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=71.48) [So let's go ahead and run this and I go ahead and execute this.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=73.77) [You see that our table was created pretty straightforward example,](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=78.47) [but it's a good example of the J.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=82.07) [D B C, a P I, and how it is a bridge to an underlying database.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=84.06) [We could swap out our database with my SQL or sequel server Oracle.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=88.92) [Any of those and her client could stay the same.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=94.62) [Or our client can change without our underlying database](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=97.51) [having to worry about the details or whatever other](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=101.19) [configurations we need to weaken. Just utilize our driver to make that bridge between the two.](https://app.pluralsight.com/course-player?clipId=b73dc793-3871-45ca-a876-673517ea810f&startTime=104.9)

### [Exercise - Create Adapter](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66)

[[Autogenerated] Now that we've seen a live demo of the bridge and use,](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=1.14) [let's go ahead and create our own gonna start off by looking at](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=5.17) [some code that deals with color and shape and then how to turn](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=8.3) [that into a color and shape bridge.](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=12.21) [I'm not a big fan of this example because it's not a real life example,](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=14.2) [in my opinion.](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=20.01) [But it does show and illustrate the exact problem we're trying to](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=21.14) [solve with the bridge in a very clear description.](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=25.81) [If we dive right into other problems,](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=29.25) [they're a little too complex where you kind of get](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=32.11) [lost in the details of what it is.](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=34.19) [So we're gonna go walk through the color and shape example and](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=35.72) [then implement that in some real world code.](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=39.27) [Once we've created our bridge,](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=42.33) [we're going to go ahead and implement another bridge just to help solidify that.](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=44.05) [So we're gonna look at color and shape done](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=48.74) [incorrectly color and shape using a bridge,](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=50.82) [create our own bridge and then cement those details in by adding another bridge onto that](https://app.pluralsight.com/course-player?clipId=cf6657b7-3101-4afa-ab07-5c1c5b713f66&startTime=53.24)

### [Demo: Shape Without a Bridge](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532)

[[Autogenerated] here is an example that illustrates the problem that](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=1.34) [we're trying to solve with the bridge pattern.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=4.47) [So it's a simple, simple application.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=8.14) [We have some shapes, a circle that we're gonna create.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=10.49) [That's an instance of a blue circle,](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=13.96) [a square that is an instance of a red square.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=15.67) [And then we're going to say apply color to this.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=18.33) [Now, the problem with this is that it can't grow with us.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=21.3) [It it has orthogonal problems.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=24.35) [And so as we get in here, we can see we've got a shape class that is abstract,](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=26.37) [and this is what people think of when they're referring to all.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=31.27) [I'm gonna use inheritance to solve this problem.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=33.76) [Will Inheritance doesn't really solve this problem.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=35.66) [Have a shape, have a circle that extends it.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=37.95) [I have a square that extends that,](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=40.61) [and then we can start implementing our colored instances.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=42.77) [So we have our Red square.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=45.94) [We have our red circle.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=47.94) [We have a blue circle on a blue square.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=49.7) [The problem is, is in this Kotal run just fine.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=52.65) [When we go to run our application,](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=55.72) [it'll run and it'll it'll apply our colors to us.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=58.73) [You see, we have our blue color in our red color.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=62.07) [But what happens when we want to say at a green square?](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=64.07) [Oh, well, now we got to go through and create a new class and say,](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=68.74) [Well,](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=74.2) [we want a green square and it's super class is going to be these](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=74.5) [square and we'll go ahead and click Finish and it will go through](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=80.85) [and generate a method Forests will say, Oh,](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=86.25) [well,](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=89.59) [let's a player Colors will do system dot out dot print Lynn and say](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=89.71) [that we're going to be applying the green color.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=95.02) [Okay, this isn't that hard, cause this is a very simple example.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=100.5) [That's what I really don't like about this example is such a simple solution.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=103.59) [But you see that for every color I want to add,](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=106.7) [I have to go add a green square and have to do the same](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=109.39) [thing that have to add a green circle.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=112.4) [And now we have yellow.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=114.36) [We're gonna add a yellow square in a yellow circle,](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=115.49) [and then we run into the bigger problem of what](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=117.54) [happens when we add another shape.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=119.73) [Oh, so let's say we add rectangle.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=122) [Well, now I got to go through an ad, a rectangle that's red,](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=124) [blue, green, yellow and it just keeps expanding and expanding from there.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=127.74) [So just to show that this works, find the code Will will run just fine with us.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=133.24) [Once we do a Green square run just fine for us,](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=137.39) [it was new Green Square and then weaken.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=141.3) [Apply.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=149.4) [That's we say, green square dot apply color,](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=149.89) [and I know it'll run just fine, you know,](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=155.54) [to run just fine.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=157.84) [As we can see, all of our colors are blue color,](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=160.17) [red clover and green color, but it can't expand with us.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=162.45) [It can't grow with us. So let's look at a different example about how we can solve this.](https://app.pluralsight.com/course-player?clipId=4209a8ad-0072-4882-8f25-e9032944e532&startTime=165.77)

### [Demo: Shape With a Bridge](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0)

[[Autogenerated] So here's a demo of that exact same shape problem.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=1.24) [Using the bridge pattern you can see right off the bat that one](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=4.59) [major change here is our client has changed.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=9.17) [We now have colors extracted into their own interface and class](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=11.36) [hierarchy and shapes air still implemented the same way.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=15.41) [But now we've utilized composition.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=18.96) [Let's talk about how that all works,](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=21.48) [so our shape object is still in abstract class.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=23.32) [It still has an abstract void method for applying color,](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=26.93) [but now we take a color in the constructor to utilize through composition.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=30.47) [Color is its own interface now,](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=36.24) [and we have the apply color method defined in the interface.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=39.35) [So shape has apply.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=44.14) [Color and color has the color that it's going to apply.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=45.24) [It looks a little redundant there, but it's not now.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=49.12) [As we create colors, we can look at our blue color.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=51.73) [We say that we're applying the blue color and we look at](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=54.74) [one of our shapes such as our square.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=57.52) [We can see that it is utilizing that composition to](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=59.89) [go ahead and apply the color.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=63.81) [So let's run this.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=67.18) [Make sure that it works.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=68.79) [I want to do run as Java application,](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=72.04) [and you can see that we apply our blue color in our red color.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=75.69) [But now let's show by adding another color or a shape to this.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=78.83) [How it's not the issue of a North Ogle problem like we had before.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=84.21) [So let's go ahead and add another color Here will say New Class and](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=89.7) [we want to do green and our interface is color.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=95.94) [We'll go ahead and click finish and now it has our color for us here.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=104.14) [So we'll say system dot out up print Lynn just for our basic example.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=108.9) [And we're going to apply the green color.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=115.24) [So we're playing our green color and save this.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=120.64) [Everything works.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=127.01) [Here we go back to our sample, and now if I want a green circle,](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=127.67) [we already have.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=134.42) [Our are shaping our square here.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=135.34) [Let's go ahead and create a new circle.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=138.1) [Let's say shape and we'll dio a green circle equals new](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=139.54) [circle and I could just pass in green.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=148.37) [Now we have to create an instance of our green here](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=151.6) [that hasn't been defined yet, which is easy enough to do.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=153.73) [It will say color green equals new green and save that now](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=156.04) [in come down here and just to execute it.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=165.14) [Make sure that runs right, will say green circle thought,](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=167.93) [apply color and run in.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=173.58) [Now you can see that we have our blue, red and green colors being applied.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=177.93) [But notice one thing we did not do in here.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=184) [We did not change our circle object at all.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=186.47) [It was abstracted out from the changes of the colors on the back end.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=191.43) [Same thing.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=196.81) [If I want to do a an instance of a green square now,](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=197.42) [I can also say shape Green Square equals new square.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=202.14) [I can now pass in that same green color instance to](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=212.18) [it and apply that color down here.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=217.24) [Green square, a play color and save it.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=219.64) [Now, if we run this, it'll also work as well.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=230.29) [So we were able to now add changes at colors.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=232.58) [We could add another shape to to really illustrate it.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=236.3) [But you get the idea.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=239.25) [The bridge is the way we're utilizing that composition and](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=240.5) [abstracting out the properties on this.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=244.01) [Now,](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=246.29) [why I don't like this example is because typically and I'm not](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=246.41) [saying that there's not ever an instance,](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=250.59) [but typically we don't have a hierarchy of colors,](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=252.22) [colors, arm or oven attributes.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=255.5) [But I do believe that this illustrates the problem very well](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=257.94) [of what the bridge is trying to solve, that I have something over on one side,](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=261.56) [this shape and something over on this other side.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=266.5) [That's this color.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=269.02) [And I want those two to be independent of one another of changes,](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=269.98) [and you saw that we were able to add a shape or at a color without having to](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=273.34) [go through and changed the other half of our application.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=276.95) [So we're getting changes from both sides that can](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=280.54) [act independently of one another.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=283.47) [And that's why I really like the bridge pattern when we're](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=285.65) [dealing with something that we're not quite aware of what our end details are going to be.](https://app.pluralsight.com/course-player?clipId=01152293-1c60-4d6a-9c97-df5e6f1f76d0&startTime=288.34)

### [Demo: Movie Printer Bridge](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999)

[[Autogenerated] this bridge pattern demo is a little bit larger than](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=2.54) [some of the other patterns that we have gone through.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=5.13) [So I'm gonna go ahead and pre code some things to show you](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=7.56) [what we need to to create the pattern but not bore you with](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=11.57) [the details of watching me type.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=14.69) [So you see inside of here I have a movie object that's](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=16.39) [already created and it's populated, and it's a simple Poggio.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=18.92) [There's nothing about it doesn't inherit from anything or implement anything.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=22.16) [Just has a classification runtime title in the year and here.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=25.5) [Basic movie attributes.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=29.73) [There's another object in here called detail,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=31.39) [and that detail is just simply a name value pair.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=33.61) [We have a label and a value associated with it that we just](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=35.84) [used to pass information between the bridge pieces that](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=39.66) [were that were going to build.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=43.28) [Now, inside of the demo.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=44.94) [There's some code that I have commented out,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=47.46) [and this is to just help us illustrate what we're going to be building.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=49.57) [So let's start off by creating our interface, which is new interface.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=53.41) [Four matter now, this four matter is,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=61.12) [representative represents the same thing as we were doing](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=64.88) [with the color and our previous demos.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=68.26) [So this has a very simple method inside of here.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=71.8) [We have string format,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=74.07) [and it takes a string for the header and a list of the](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=77.71) [detail objects that we just covered.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=82.17) [So we got her details and then that saved this and import our job,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=86.78) [You till list.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=91.49) [And now we have our four matter cloth interface.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=93.44) [This this interface, like I said,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=96.1) [is very similar to what we had with the color in her face.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=97.42) [Now we're gonna go ahead and create our printer class,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=100.44) [which is an abstract class.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=104.74) [So we want to go ahead and right click and say new class.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=106) [And this is the printer and it is abstract because any of](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=110.04) [our specific printers air going to extend this or implement](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=115.65) [the various aspects of this, they're gonna be our concrete implementations.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=119.75) [So now we have a couple of methods we need in here,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=124.29) [and I'm gonna type these ones out because this really](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=126.63) [is the heart of the bridge pattern.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=128.64) [The rest of stuff I'm going to just copy and paste in,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=131.72) [but we're going to have a method inside of here that is](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=134.34) [our print methods so se string print,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=136.22) [And this is going to take the four matter instance in.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=140.06) [Now, remember, this is our composition.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=142.96) [So we have our instance of our four matter,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=147.04) [and this returns four matter for matter dot format and](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=149.63) [it's gonna pass in our get header.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=162.73) [And this method isn't defined yet and are get details.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=166.64) [You could quickly see how you could add stuff for getting a footer or](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=171.61) [those various aspects inside of here for matter.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=175.67) [Now, let's go ahead and create those too abstract methods inside of here.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=181.34) [So I wanted to abstract protected list detail get details and this is what](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=184.74) [we're going to call and the implementation class to go ahead and build](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=197.92) [what it is we want to put inside of this body.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=201.57) [And then we need one more for the get headers.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=205.34) [We're gonna do abstract protected string Get header.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=206.97) [Now we have all the pieces in place for our bridge.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=217.64) [We have our four matter, which is represented.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=220.14) [Our color shape is the 1/2 for bridge that we're](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=222.41) [gonna acquire through composition.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=224.23) [And then we have our printer that's actually going to do](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=226.22) [the work and combine those two together,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=228.16) [but just like how he had with their colors,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=230) [where we had a red square, a blue circle.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=231.75) [Now we can have printers and for matters,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=235.37) [stand independently of one another so we could have a Web printer or,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=237.63) [natch, HTML printer as well as a print printer,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=241.01) [a more concrete strings.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=244.82) [Whatever we want to do,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=247.58) [we can build upon those to do whatever we want and have these](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=248.4) [to change independently of one another.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=251.63) [Now that we have those pieces put in place,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=253.79) [let's build our print for matter and our movie printer.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=256.39) [So we're gonna come over here and create a new class.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=262.63) [We want to start off with the movie printer,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=266.44) [and it is going to extend printer Click Finish,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=271.34) [and you can see it's put our to are.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=278.48) [Two instances are two methods in here already from our](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=280.92) [abstract class that we inherited from printer.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=283.54) [So let's go ahead and store a movie of an instance of the movie in here.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=286.43) [So I want to say private movie movie and we're going to pass this instance.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=291.14) [It is through composition.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=298.6) [We're going to pass this in and say public movie printer and](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=300.64) [take that instance of our movie in here.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=305.68) [I'm typing this out on purpose because this is a key point.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=308.25) [This is where the composition comes into place.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=310.62) [So there stop movie equals movie.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=313.14) [Now the details of getting the details and getting the header.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=318.84) [I'm gonna go ahead and pace those in from some sample code that I have earlier.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=322.49) [Let's grab the details there and go into our movie printer](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=327.25) [and replace these details here with that,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=332.64) [and you can pause it and look and see what I'm doing.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=335.34) [All I'm doing is just adding details,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=337.63) [objects and and creating those name value pairs is we go and then I'm](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=339.95) [gonna do the same thing with Header and the headers.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=344.72) [Really straightforward.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=346.73) [I could have just type that, but it will work just fine.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=347.64) [It's a movie printer and replace our header.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=354.6) [Say that and now we have our movie printer built.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=360.54) [Now we need to do the same thing with our four matter.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=364.84) [On the other side's.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=366.73) [We have 1/2 of our bridge done.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=367.38) [Let's do the other half of the bridge now, which is our print for matter.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=369.53) [They're gonna come over here and right click and say](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=374.24) [new class and do print four matter, and it's going to implement the four matter,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=377.52) [not extend.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=387.21) [The super class can implement the interface.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=387.84) [That's the four matter interface.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=390.14) [Quick finish.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=397.84) [And now there's a basic method in here and that is just building our format.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=399.54) [And all this is going to do is go through and basically print to our screen,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=404.52) [just like our system out print Lynn was applying before to our screen.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=409.78) [This is gonna build the string for us that we're going to return to our client.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=413.36) [So already have that done in here is well, which is just a basic string builder.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=417.27) [And you can see what we've got going on here.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=421.84) [Paste this out.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=426.54) [I go through,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=427.87) [create an instance of a string builder and start a pending the header and the](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=429.08) [body details to what I cycle through each one of the details,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=433.35) [build up to the string and then return that builder dot to string](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=435.95) [to the claim calling code were actually done.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=440.24) [That is the bridge pattern.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=444) [Now let's go back to our demo and start uncommon Amazing CR print](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=445.15) [four matter and our movie printer noticed that movie printer takes](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=452.03) [an instance of the movie and to store it.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=456.48) [And then we can take and call movie,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=461.02) [printer dot print and pass in our print four matter.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=463.42) [So let's look at our movie printer,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=466.37) [and we can see it has our It extends our printer method.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=469.14) [And if you look our printer class, if you look in our printer class,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=474.3) [there is our print method that takes an instance of the four matter notice.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=477.12) [It doesn't know anything about the four matter that's being passed](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=481.47) [into it just the contract through the interface.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=485.2) [Now, if we come back over here, we can see that movie printed up.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=487.89) [Print is going to return, are printed material, and we will be able Teoh.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=490.65) [Print that out to our screen.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=495.24) [Let's go ahead and run this now and you'll see that it goes through and](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=497.69) [prints out action title John Wick and Year 2014 runtime.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=507.63) [Two hours and 15 minutes,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=512.39) [you'll notice that this knows nothing about the movie printer object itself,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=514.39) [and the movie printer object knows nothing of the print.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=519.7) [Four matter.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=521.76) [All of that stuff can change independently.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=522.28) [Now this is a maybe a little bit more complex from something that you](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=524.64) [could just cycle through and grab those values out.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=528.88) [But think about that in terms of grabbing a Web printer.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=530.85) [So I want Teoh.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=535.25) [We're gonna you know, in a business sense,](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=536.79) [I I want to print a catalogue which this is the example that we just did.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=539.09) [But I also want to make these objects available to our website.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=542.5) [So I want to create and html print four matter instead of](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=545.7) [just the print for matter that we have.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=549.48) [That's actually what we're going to do in this next demo just to help solidify these concepts.](https://app.pluralsight.com/course-player?clipId=e46c43a7-0c1a-4395-bd1d-421ecb700999&startTime=551.43)

### [Demo: Movie Printer HTML Bridge](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11)

[[Autogenerated] Now that we've seen a demo of the](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=0.64) [bridge pattern and how it worked,](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=1.87) [let's go ahead and implement another instance of our](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=3.48) [four matter to do an HTML four matter.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=7.32) [You see,](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=9.74) [I've stubbed out what we want for the methods down here](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=10.21) [to call inside of our demo class.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=12.45) [Let's go ahead and right, click on bridge and say New and we want to do a class.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=14.64) [It's an HTML four matter,](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=22.28) [and it's going to implement the four matter interface Click finish,](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=25.54) [and you'll see that it just goes ahead and,](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=32.04) [like it did with our print for matter,](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=34.49) [create a basic method signature for us knowing.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=37.57) [Save this, Let's open up.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=41.93) [I have already created the body for this previously because it's just](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=44.55) [mundane code for me to type out and paste this in here,](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=49.09) [and you can see that it's very much like our print for matter.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=53.33) [I've gone ahead and created an instance of a string builder and then Donna](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=57.17) [build out a pan and you can see that I've added on here the headers and](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=61.28) [different columns and then got into the body of it.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=65.79) [And we you know, the sky's the limit with what you want to do here.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=68.58) [But what I want to point out is all I had to do to add another](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=71.54) [formatting type is create one instance of this class,](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=75.04) [and now I can utilize it anywhere.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=78.06) [Go ahead and say this.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=80.78) [If I go back to my bridge demo,](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=81.9) [I now have my HTML four matter and notice that I didn't have](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=84.4) [to create a new instance of movie printer.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=89.82) [I'm using the same movie printer that we had before and just passing in the](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=92.09) [different four matter and getting that material back.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=96.39) [So now I can save this and run this and you'll see down below.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=99.98) [Here that we have are printed format as well as our](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=105.02) [HTML format being printed out.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=108.97) [So all I had to do to add another formatting type was go](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=111.47) [ahead and create an instance of the HTML four matter and](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=115.54) [passed that end to my movie printer, and I'm done now.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=120.08) [I'll let you go ahead on your own and create a different type of printer.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=124.98) [Maybe we have another media object of book,](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=128.91) [so you would just create an instance of the movie and change that you](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=131.04) [know to utilizes a book and then create a book printer and go through](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=134.79) [and build those details that you want to.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=138.96) [Maybe you'd have page count.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=140.66) [Maybe you would have the Dewey decimal number or](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=142.08) [whatever other features you want.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=145.58) [I ESPN number those types of things that you would](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=147.08) [build into those that details object.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=149.15) [You don't have to use those that detail object The way](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=151.14) [that I did hear this little class,](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=153.68) [it was just a convenience way for me to pass things](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=155.39) [through generically and and share that information from](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=157.66) [those objects from one to another.](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=161.38) [You can utilize that every want,](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=162.7) [but all you have to do to create the other half The bridge,](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=164.54) [like I said, was created a different type of object from movie,](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=166.82) [maybe book and then a book printer and our print for matter](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=170.02) [and our HTML four matter would already work. You could just grab those values and pass him in, and you're good to go](https://app.pluralsight.com/course-player?clipId=75392ae0-e51f-40b0-bd12-c47d906c0d11&startTime=174.15)

### [Pitfalls](https://app.pluralsight.com/course-player?clipId=4a34e350-cdda-460b-9257-29c4c0d639c6)

[[Autogenerated] what are some of the pitfalls of a bridge?](https://app.pluralsight.com/course-player?clipId=4a34e350-cdda-460b-9257-29c4c0d639c6&startTime=2.14) [It does increase complexity.](https://app.pluralsight.com/course-player?clipId=4a34e350-cdda-460b-9257-29c4c0d639c6&startTime=4.32) [Also, as we saw with the color and shape example,](https://app.pluralsight.com/course-player?clipId=4a34e350-cdda-460b-9257-29c4c0d639c6&startTime=6.41) [you need to look at the code and see what makes sense to abstract out.](https://app.pluralsight.com/course-player?clipId=4a34e350-cdda-460b-9257-29c4c0d639c6&startTime=9.24) [It can be conceptually difficult to plan.](https://app.pluralsight.com/course-player?clipId=4a34e350-cdda-460b-9257-29c4c0d639c6&startTime=13.79) [Your code needs to be fairly thought out,](https://app.pluralsight.com/course-player?clipId=4a34e350-cdda-460b-9257-29c4c0d639c6&startTime=16.44) [and it might not lend itself into an agile codas.](https://app.pluralsight.com/course-player?clipId=4a34e350-cdda-460b-9257-29c4c0d639c6&startTime=18.68) [You go scenario.](https://app.pluralsight.com/course-player?clipId=4a34e350-cdda-460b-9257-29c4c0d639c6&startTime=21.78) [It is definitely more than just good.](https://app.pluralsight.com/course-player?clipId=4a34e350-cdda-460b-9257-29c4c0d639c6&startTime=23.78) [Oh, principles.](https://app.pluralsight.com/course-player?clipId=4a34e350-cdda-460b-9257-29c4c0d639c6&startTime=25.61) [One comment that has often made about design patterns is that I use](https://app.pluralsight.com/course-player?clipId=4a34e350-cdda-460b-9257-29c4c0d639c6&startTime=26.93) [sound oo principles and I don't need to know patterns.](https://app.pluralsight.com/course-player?clipId=4a34e350-cdda-460b-9257-29c4c0d639c6&startTime=31.46) [Well, this is more than just inheritance and abstraction,](https://app.pluralsight.com/course-player?clipId=4a34e350-cdda-460b-9257-29c4c0d639c6&startTime=34.58) [and overall, it could just be a little confusing as to what goes where in your code.](https://app.pluralsight.com/course-player?clipId=4a34e350-cdda-460b-9257-29c4c0d639c6&startTime=38.44)

### [Contrast to Other Patterns](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f)

[[Autogenerated] to contrast the bridge pattern with another one.](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=0.99) [Let's go ahead and look at the adapter pattern.](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=4.01) [The bridge pattern is designed upfront.](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=7.04) [It's something we consciously go into our application with the](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=10.04) [mindset that we want to dio the abstraction and the implementation](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=12.98) [convey areas we saw with the demo that we did.](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=17.51) [We have our printer object in R four matter object,](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=20.93) [and we can change either side of those without breaking the other.](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=23.38) [It is definitely built in advance, just like it's designed up front.](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=28.01) [This is something we consciously build up front as well,](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=31.59) [and it is a little bit more complex.](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=35.24) [It adds a layer of complexity, which isn't necessarily a bad thing,](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=37.15) [but it is mawr complex than what we might just do out of the gate on our own.](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=41.15) [The adapter, on the other hand, works after the code is designed.](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=47.14) [It is intended for legacy applications.](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=50.7) [So it's something that we we try to tie in legacy code with a new application,](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=53.9) [and in doing so, it's typically retrofitted in.](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=60.74) [It's something that were working with,](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=63.8) [and we try and piece into our application later and really the ultimate](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=65.6) [design or point that we're trying to do with an adapter is just get a](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=70.96) [different interface for existing or legacy code.](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=74.77) [We're just trying to make this tie into something else](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=78.65) [that already exists and nothing more, nothing less.](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=81.38) [We're not trying to add any more functionality.](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=84.04) [Where with the bridge.](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=85.86) [We're trying to break that functionality apart so that we can make those change independently of one another.](https://app.pluralsight.com/course-player?clipId=9f183e38-51b0-40a7-ae66-b76a8c70b92f&startTime=86.69)

### [Summary](https://app.pluralsight.com/course-player?clipId=8f595bf4-5ea7-45b8-81bd-3934cfa9c7ed)

[[Autogenerated] to wrap up the bridge.](https://app.pluralsight.com/course-player?clipId=8f595bf4-5ea7-45b8-81bd-3934cfa9c7ed&startTime=1.08) [Let's just quickly recap what we've covered.](https://app.pluralsight.com/course-player?clipId=8f595bf4-5ea7-45b8-81bd-3934cfa9c7ed&startTime=2.72) [The bridge is designed for uncertainty.](https://app.pluralsight.com/course-player?clipId=8f595bf4-5ea7-45b8-81bd-3934cfa9c7ed&startTime=5.54) [It can be complex and often times adds a layer of complexity to](https://app.pluralsight.com/course-player?clipId=8f595bf4-5ea7-45b8-81bd-3934cfa9c7ed&startTime=9.24) [our application that we weren't planning on.](https://app.pluralsight.com/course-player?clipId=8f595bf4-5ea7-45b8-81bd-3934cfa9c7ed&startTime=13.46) [It provides a level of flexibility,](https://app.pluralsight.com/course-player?clipId=8f595bf4-5ea7-45b8-81bd-3934cfa9c7ed&startTime=16.04) [so we will take that complex city because it gives us flexibility.](https://app.pluralsight.com/course-player?clipId=8f595bf4-5ea7-45b8-81bd-3934cfa9c7ed&startTime=18.5) [So it helps us in designing for the uncertainty of what we might](https://app.pluralsight.com/course-player?clipId=8f595bf4-5ea7-45b8-81bd-3934cfa9c7ed&startTime=22.08) [do inside of our application and then to last,](https://app.pluralsight.com/course-player?clipId=8f595bf4-5ea7-45b8-81bd-3934cfa9c7ed&startTime=26.25) [they just point out it is much more than composition.](https://app.pluralsight.com/course-player?clipId=8f595bf4-5ea7-45b8-81bd-3934cfa9c7ed&startTime=30.13) [We do utilize composition.](https://app.pluralsight.com/course-player?clipId=8f595bf4-5ea7-45b8-81bd-3934cfa9c7ed&startTime=33) [We also utilize inheritance through abstractions and interfaces Inside](https://app.pluralsight.com/course-player?clipId=8f595bf4-5ea7-45b8-81bd-3934cfa9c7ed&startTime=34.69) [of our coats were really taking a lot of the principles of good oh design and wrapping them into this one pattern.](https://app.pluralsight.com/course-player?clipId=8f595bf4-5ea7-45b8-81bd-3934cfa9c7ed&startTime=39.08)

## [Composite Pattern](https://app.pluralsight.com/course-player?clipId=2800c8b8-ee0d-4396-94db-4a318d86d0ee)

### [Introduction](https://app.pluralsight.com/course-player?clipId=2800c8b8-ee0d-4396-94db-4a318d86d0ee)

[[Autogenerated] Hi, This is Brian Hansen,](https://app.pluralsight.com/course-player?clipId=2800c8b8-ee0d-4396-94db-4a318d86d0ee&startTime=1.44) [and in this module, we're going to look at the composite design pattern.](https://app.pluralsight.com/course-player?clipId=2800c8b8-ee0d-4396-94db-4a318d86d0ee&startTime=2.98) [The composite pattern is a hierarchical, tight pattern that deals with tree structures of information.](https://app.pluralsight.com/course-player?clipId=2800c8b8-ee0d-4396-94db-4a318d86d0ee&startTime=7.38)

### [Concepts](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff)

[[Autogenerated] the concept surrounding why you would choose the composite](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=2.64) [pattern are that it is meant to treat components the same,](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=5.53) [whether it is part of your structure or the whole structure itself.](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=9.44) [This is done by configuring your objects into tree structures.](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=14.33) [Once your data is built this way,](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=19.34) [you can treat individual objects the same as a composite](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=21.98) [object and treating objects the same.](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=25.65) [We can apply operations or functions on both the individual and the](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=28.58) [composite and expect them to work the same way.](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=33.44) [Examples of this in the job a P I.](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=37.34) [R.](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=40.09) [Java,](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=40.66) [a WT component Almost everything from the Java Ada beauty](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=41.1) [library is built this way as well as JSF widgets.](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=44.97) [Now JSF isn't part of the core AP I,](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=50.39) [but almost everything in Java server faces is built around the same structure.](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=53.56) [Another useful example is rest ful Web services.](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=59.54) [In fact,](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=64.87) [the way we structure gets are almost always built with](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=65.22) [the composite structure in mind.](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=69.42) [So if you've never used a rest full service, don't worry about it.](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=71.89) [But there is a couple, of course, is out here on portal sites,](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=74.85) [specifically one on wrestle services using Jersey that talks about how we](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=77.87) [navigate and re cursed down through the directory structure. Using this composite model](https://app.pluralsight.com/course-player?clipId=77b1d19d-4fe3-4f79-9171-a5577349cfff&startTime=83.84)

### [Design Considerations](https://app.pluralsight.com/course-player?clipId=b788452f-df38-46cd-91fa-a42000fd1311)

[[Autogenerated] the design of the composite is that it is tree structured.](https://app.pluralsight.com/course-player?clipId=b788452f-df38-46cd-91fa-a42000fd1311&startTime=1.69) [The root of the tree starts with a component.](https://app.pluralsight.com/course-player?clipId=b788452f-df38-46cd-91fa-a42000fd1311&startTime=5.79) [Components are one of two things either a leaf or a composite of objects.](https://app.pluralsight.com/course-player?clipId=b788452f-df38-46cd-91fa-a42000fd1311&startTime=9.84) [The difference is that a leaf just has operations and a](https://app.pluralsight.com/course-player?clipId=b788452f-df38-46cd-91fa-a42000fd1311&startTime=17.09) [composite has all of the same operations available,](https://app.pluralsight.com/course-player?clipId=b788452f-df38-46cd-91fa-a42000fd1311&startTime=20.1) [but also knows about its child components.](https://app.pluralsight.com/course-player?clipId=b788452f-df38-46cd-91fa-a42000fd1311&startTime=23.04) [The pieces of the UML diagram are a component, a leaf and a composite. Let's look at that UML diagram now.](https://app.pluralsight.com/course-player?clipId=b788452f-df38-46cd-91fa-a42000fd1311&startTime=26.59)

### [UML Diagram](https://app.pluralsight.com/course-player?clipId=c5714e66-59fa-4aea-ac49-e1d95612d5f0)

[[Autogenerated] This is the UML diagram for the composite pattern.](https://app.pluralsight.com/course-player?clipId=c5714e66-59fa-4aea-ac49-e1d95612d5f0&startTime=1.49) [The component class is the abstraction for all components,](https://app.pluralsight.com/course-player?clipId=c5714e66-59fa-4aea-ac49-e1d95612d5f0&startTime=4.84) [including composite ones.](https://app.pluralsight.com/course-player?clipId=c5714e66-59fa-4aea-ac49-e1d95612d5f0&startTime=9.17) [It declares the interface for objects in the composition.](https://app.pluralsight.com/course-player?clipId=c5714e66-59fa-4aea-ac49-e1d95612d5f0&startTime=11.39) [The component can also define methods for accessing the parent,](https://app.pluralsight.com/course-player?clipId=c5714e66-59fa-4aea-ac49-e1d95612d5f0&startTime=15.51) [but it isn't necessary to still use this pattern correctly.](https://app.pluralsight.com/course-player?clipId=c5714e66-59fa-4aea-ac49-e1d95612d5f0&startTime=19.06) [The leaf represents the leaf objects or nodes, in the composition.](https://app.pluralsight.com/course-player?clipId=c5714e66-59fa-4aea-ac49-e1d95612d5f0&startTime=22.92) [It should be noted that it also implements all of the components methods.](https://app.pluralsight.com/course-player?clipId=c5714e66-59fa-4aea-ac49-e1d95612d5f0&startTime=27.91) [The composite, though,](https://app.pluralsight.com/course-player?clipId=c5714e66-59fa-4aea-ac49-e1d95612d5f0&startTime=32.79) [represents a composite component or a component that has Children and](https://app.pluralsight.com/course-player?clipId=c5714e66-59fa-4aea-ac49-e1d95612d5f0&startTime=34) [implements methods to manipulate those Children.](https://app.pluralsight.com/course-player?clipId=c5714e66-59fa-4aea-ac49-e1d95612d5f0&startTime=39.41) [It also implements all of the components methods as well,](https://app.pluralsight.com/course-player?clipId=c5714e66-59fa-4aea-ac49-e1d95612d5f0&startTime=42.15) [but typically delegates the functionality to its Children.](https://app.pluralsight.com/course-player?clipId=c5714e66-59fa-4aea-ac49-e1d95612d5f0&startTime=45.28) [So a leaf and a composite have thesafeside functions in sight of them.](https://app.pluralsight.com/course-player?clipId=c5714e66-59fa-4aea-ac49-e1d95612d5f0&startTime=49.38) [A composite just knows about what's Children, which Children it has and what it could do with those Children.](https://app.pluralsight.com/course-player?clipId=c5714e66-59fa-4aea-ac49-e1d95612d5f0&startTime=55)

### [Example: Map](https://app.pluralsight.com/course-player?clipId=13eecf65-dd7c-40fc-8056-d248478873a2)

[[Autogenerated] the map and other collections are an](https://app.pluralsight.com/course-player?clipId=13eecf65-dd7c-40fc-8056-d248478873a2&startTime=1.72) [interesting implementation of the composite pattern.](https://app.pluralsight.com/course-player?clipId=13eecf65-dd7c-40fc-8056-d248478873a2&startTime=4.15) [Much of the collections AP I have the option to add all or in this case,](https://app.pluralsight.com/course-player?clipId=13eecf65-dd7c-40fc-8056-d248478873a2&startTime=7.52) [staying with the naming convention of a map.](https://app.pluralsight.com/course-player?clipId=13eecf65-dd7c-40fc-8056-d248478873a2&startTime=12.5) [Put all of the attributes of one map into another.](https://app.pluralsight.com/course-player?clipId=13eecf65-dd7c-40fc-8056-d248478873a2&startTime=14.45) [The key distinction here is that one element of a map is](https://app.pluralsight.com/course-player?clipId=13eecf65-dd7c-40fc-8056-d248478873a2&startTime=18.26) [treated just the same as the entire map itself. Let's look at this in a live coating example now.](https://app.pluralsight.com/course-player?clipId=13eecf65-dd7c-40fc-8056-d248478873a2&startTime=21.64)

### [Demo: Map](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9)

[[Autogenerated] here is theme app.](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=1.64) [Example that we were just previously describing in this example we're](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=2.97) [going through and building a list of person attributes and a list of group](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=6.87) [attributes and then combining them all in one to represent our security](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=12.89) [attributes using the put all method,](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=18.84) [which treats each map as a composite of the previous ones.](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=22.06) [What treats the individual object the same way?](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=26.83) [And if we run this application,](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=29.64) [you can see that it has eventually combined all of](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=31.64) [our rolls into one security map.](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=34.92) [Now I've done this.](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=40.63) [This is actual code that I have pulled from an application that I've](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=41.45) [written recently for a client that was representing their person group and](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=44.8) [final security roles inside their application.](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=51.69) [And although says this is a much simplified version of that,](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=54.64) [this is exactly the same type of thing that we did and a very good](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=58.04) [example of how the composite pattern can be used in other things rather](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=61.99) [than just map hierarchy structures of men. Ewing Systems, which is typically where you see the composite pattern being used](https://app.pluralsight.com/course-player?clipId=a689e6de-d79a-4291-9a54-64d25b4208b9&startTime=68.44)

### [Exercise - Create Composite](https://app.pluralsight.com/course-player?clipId=dce7edcc-df85-4976-b9b9-80743e932717)

[[Autogenerated] Now that we've seen in everyday](https://app.pluralsight.com/course-player?clipId=dce7edcc-df85-4976-b9b9-80743e932717&startTime=1.24) [example of the composite pattern, let's go ahead and create our own.](https://app.pluralsight.com/course-player?clipId=dce7edcc-df85-4976-b9b9-80743e932717&startTime=2.35) [We're going to start off by creating a menu,](https://app.pluralsight.com/course-player?clipId=dce7edcc-df85-4976-b9b9-80743e932717&startTime=6.94) [menu item and menu component to represent our composite](https://app.pluralsight.com/course-player?clipId=dce7edcc-df85-4976-b9b9-80743e932717&startTime=9.29) [leaf and component of the UML diagram.](https://app.pluralsight.com/course-player?clipId=dce7edcc-df85-4976-b9b9-80743e932717&startTime=13.19) [There were going to create our composite pattern itself.](https://app.pluralsight.com/course-player?clipId=dce7edcc-df85-4976-b9b9-80743e932717&startTime=16.8) [We're finally going to wrap up with showing how you do the features not](https://app.pluralsight.com/course-player?clipId=dce7edcc-df85-4976-b9b9-80743e932717&startTime=20.64) [supported in all levels of the hierarchy because you don't have to implement](https://app.pluralsight.com/course-player?clipId=dce7edcc-df85-4976-b9b9-80743e932717&startTime=26.06) [all of the methods to use the composite as we discussed in the design criteria for implementing the composite pattern.](https://app.pluralsight.com/course-player?clipId=dce7edcc-df85-4976-b9b9-80743e932717&startTime=31.15)

### [Demo: Composite Menu](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225)

[[Autogenerated] to show this example.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=1.74) [I have created a couple of stubbed out classes just](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=3.05) [to help us get things rolling.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=6.86) [And first, let's start with the main method and say this main method.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=8.79) [I just have a basic menu structure that we're building that has a main menu,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=12.63) [and there's a safety menu item that is its own menu underneath that](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=16.42) [in a claims menu and then a personal claims menu and all that](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=20.93) [builds into a much larger composite menu.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=25.33) [So we have a menu with sub menus and nose have individual items underneath them.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=28.37) [So to facilitate this, I've started off with a menu component class.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=33.92) [The menu component class is pretty simple,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=39.01) [has a name and the URL and a ray list of menu components,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=41.2) [and you just see the basic features we have in here a](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=47.15) [getter for the name I get for the girl,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=49.41) [and I've put an abstract to string method in here.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=52.01) [We're gonna add a little bit more meat to this here in a minute,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=55.14) [but that's the basic of this class right now.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=57.97) [The menu object, which is the composite of our UML diagram,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=60.53) [goes through and this will have stuff referring to the](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=68.12) [Children and how you can add and remove things to it as](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=71.8) [well as it has a name in the U.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=75.69) [R L.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=77.59) [A cell.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=77.85) [So if you think about a fly out menu or a drop down menu](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=78.24) [that has a hierarchical structure, that's what we're building here.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=81.05) [The other piece that will do this is we're going to also add a two string method](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=86.01) [to print out this menu structure just for display purposes,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=91.52) [but also see about which pieces should know about the Children,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=94.48) [which shouldn't end there.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=98.41) [The last piece that we're going to implement is the menu item menu items.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=99.67) [Not gonna change a whole bunch from this.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=103.82) [It just has a name in the URL.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=105.49) [But we're going to also add some to string method stuff in here to just](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=107.54) [help round out the object and show all the pieces.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=112.44) [They work together.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=115.36) [So let's get started with the menu component.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=116.73) [As we go through this, you'll see these red squiggle ease underneath our objects.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=119.32) [Here.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=123.74) [Go away are red access, so start with the menu component.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=123.97) [Now the menu component itself is quite simple,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=127.33) [but it is the root or the start of our hierarchy.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=130.56) [So what we want to do is add functionality to this that's going](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=134.23) [to be consumed by the Children of this object.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=136.67) [Go through and I have some sample code already put in here.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=140.93) [I'm gonna add this print method that I've already pre made and](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=143.99) [just paste this in the bottom of this object.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=149.74) [Now,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=152.21) [the print method here goes through and creates an instance of a string builder,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=152.38) [which, by the way,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=156.41) [is another design pattern that you can look at in the creation.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=157.45) [All section of my other course talks about what the](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=160.46) [builder pattern is and how it works.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=163.49) [But, ah, the builder pattern here.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=165.84) [We're gonna go through and get the name of this ST of this](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=168.03) [menu item and upend the colon to it.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=173.36) [And then the your l and return that object out so we can just see the menu](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=176.52) [hierarchy get built as we go Here we have our menu here.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=181.1) [Now let's go ahead and move onto the menu class.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=185.97) [We have our menu component.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=189.15) [Let's move on to the menu class itself.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=190.06) [Now we need to do two things here.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=192.85) [We want to add stuff to navigate the Children.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=194.82) [So on Adam even move method as well as we want to build out the two](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=199.51) [string in here Now the add and remove is quite simple.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=205.68) [Since we are implementing an array list for our menu components,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=209.21) [we're just going to put some functionality to navigate those.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=213.82) [I like to do something a little bit different here.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=217.84) [As we add things and remove them.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=220.39) [I like to return the actual object that we're dealing with.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=223.34) [You don't always have to do this, but it's not any more costly for you to do it,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=227.27) [and I find that it makes it easier to make changes.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=232.74) [Did you go down the road?](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=237.97) [If you want to know which object was removed or which object was added,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=238.84) [you just returned their reference to it.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=242.23) [And so I've got a add method in here that's going to just take those menu](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=244.59) [components from our parent class and add them to it.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=249.37) [And then it returns that object at the end,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=253.83) [and then I have the remove method that does pretty much the same thing now,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=255.69) [for right now, I have the At Override commented out,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=259.52) [and I'll explain that later.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=263.51) [It's because of you don't have to implement these](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=265.28) [features for this to be a usable class,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=268.88) [but we'll talk about why I've got those commented out here later.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=272.15) [Now I still have a compilation Aaron here,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=275.44) [and that's because I don't have the two string implemented yet](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=278.77) [that is required from our menu component class.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=281.59) [So we have this to string method here.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=284.6) [Our menu object is looking for its Let's go ahead and](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=286.89) [put a two string in there as well, and this one is fairly complex.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=290.37) [We're gonna walk through what happens here,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=295.32) [so it's open up the menu, object here and paste it in.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=298.74) [Now the two string and hair has a couple of things going on,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=304.54) [just like in the menu component.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=308.12) [We have a stream builder.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=310.18) [We also inside of our to string here have a string builder,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=313.24) [but we call the print method from menu component.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=316.96) [So this print method here is referring to the one inside of our menu component,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=320.12) [and then we iterated through all of our Children.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=326.44) [Now that is one of the features of this pattern.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=329.12) [As a composite, we know about our Children now.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=332.31) [Each child objects structure can be handled the same way as its own leaf.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=336.88) [And so we just hand off it.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=342.29) [Do what it needs to and a pen that back,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=344.28) [and you'll notice we're doing exactly that.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=346.6) [When we get our next menu component, we go ahead and just a pen,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=348.94) [that menu component to string to us and return it back.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=353.28) [So we re cursed down through the entire tree structure and then walk back up.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=356.74) [And that's what this method is effectively doing here.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=361.09) [So we use this builder pattern and then navigate through our](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=364.24) [tree structure and finally return out.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=367.61) [Now let's look at our menu item to see what we have left to do here.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=371.04) [This one's really simple.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=375.14) [The only thing we haven't done here is override the two strings.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=376.35) [We're gonna grab that and paste that in and save that now](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=379.26) [our application is full functioning.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=385.29) [Now let's recap the pieces that we did.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=387.75) [We went ahead and added our print method inside of here.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=389.88) [We went through an added are add and remove for our](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=393.83) [child or are composite structure.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=397.51) [Here's we know about our Children and navigated down recursive Lee through](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=399.94) [our to string method by calling the menu component dot to string and having](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=405.14) [it walked down through anything and it's Children.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=410.04) [And then our menu item.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=413.68) [We added,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=415.8) [A two string is out of this and this is just calling the print](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=416.24) [function up in the tree structure of our menu component,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=418.43) [and the last thing we're going to do now is run our menu demo.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=423.07) [Now you can see from our menu demo.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=426.63) [We have our main menu getting build our safety menus,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=429.24) [claims some menu, all of that stuff.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=432.8) [We run this,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=434.96) [we'll see that it prints out our main menu safety menu claims and personal](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=438.24) [claims menu as we go through and build our structure.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=443.59) [We just called thes system out print Lynn on our main menu,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=446.41) [and it navigated through all the structures we went through here.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=451.16) [Now, if you want to take this example of step further,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=454.46) [you could change that to string method to go ahead and](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=457.91) [print out the entire path down to it,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=462.54) [so slash main slash safety slash claims or slash main slash](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=466.2) [claims slash personal claims to go through that entire tree](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=470.64) [structure of our objects.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=474.79) [But very simple.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=476.91) [You can see that we are treating the Children the same as the object itself,](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=478.11) [and we get a very complex problems solved quite simplistically.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=483.59) [And as far as our clients concerned, they just Adam and treat him just the same and it handles it pretty elegantly.](https://app.pluralsight.com/course-player?clipId=a7709e4b-657a-47e3-8ac9-e6f5b2761225&startTime=489.82)

### [Demo: Unsupported Operations Exception](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d)

[[Autogenerated] now we're not done here just yet.](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=1.94) [This pattern actually works exactly how it's intended.](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=4.26) [And as I mentioned earlier in our design section,](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=7.24) [you can implement this this way and it's perfectly legitimate.](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=10.42) [It will work just fine.](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=13.74) [But remember in our menu class, we had these at Overrides commented out,](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=15.13) [and I said that we would talk about them later.](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=20.64) [Well,](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=23.24) [that is because we can add in features to our menu component and](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=23.44) [paste those throughout our hierarchical structure.](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=30.64) [But we don't have to to use this pattern.](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=34.54) [Let me explain what I mean by this.](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=36.96) [So inside of our menu component,](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=39) [we can go ahead and add these two methods in here,](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=41.54) [and these two methods are what establish our contract for any](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=48.64) [other type of menu options that we have.](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=53.69) [So right now we only have two menu options.](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=55.89) [We have a menu and a menu item.](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=58.1) [What if we had a complex menu item or a graphical menu item?](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=60.21) [You see, as we start adding different types of menu item here,](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=65.3) [there are some features that we may want to implement by establishing this](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=69.1) [contract in our parent class and notice I did not make abstract because we're](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=72.5) [overriding it as we go through our child objects.](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=77.32) [We can now implement these features where we want,](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=80.13) [but we can throw a nun supported operation exception other](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=83.37) [points in our hierarchal structure if we want to,](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=87.06) [we don't have to, but it is a feature, and it does round out this pattern nicely.](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=90.1) [And this example,](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=95.34) [it really isn't going to gain us a whole lot because we](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=96.55) [aren't doing multiple menu item types.](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=99.5) [But if you wanted to implement another one and not](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=101.48) [necessarily implement the remove feature,](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=103.87) [you could and then that feature would throw an unsupported feature exception.](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=106.47) [And I'm supported Operation Exception feature not implemented this level](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=111.44) [so you can establish that contract a little better.](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=115.23) [Let's just run this again to make sure that everything works all right, which it does, and it works as we expect it to](https://app.pluralsight.com/course-player?clipId=778f189f-f478-4fab-b46a-1c40d88d7e1d&startTime=118.14)

### [Pitfalls](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b)

[[Autogenerated] what are some of the pitfalls of a composite pattern?](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b&startTime=1.94) [It can overly simplify a system.](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b&startTime=5.14) [This may seem like a strange drawback at first,](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b&startTime=8.24) [but in building the hierarchy the way that we want to do it,](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b&startTime=11.07) [it could make it difficult to restrict what we want to add to it.](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b&startTime=13.74) [Everything eventually has treated the same,](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b&startTime=18.24) [and that is the intent of the pattern.](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b&startTime=20.4) [But you end up relying on runtime checks to see if objects being](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b&startTime=22.3) [added can in fact be added instead of compile time.](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b&startTime=25.84) [Safety implementation can also be costly of dealing](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b&startTime=29.11) [with a very large composite or, if implemented,](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b&startTime=33.11) [correct, incorrectly.](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b&startTime=35.93) [This doesn't have to always be the case.](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b&startTime=37.74) [But if child objects air held in a collection and each](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b&startTime=39.76) [object itself contains a collection, it's size.](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b&startTime=43.18) [Congrats fairly quickly.](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b&startTime=45.9) [Typically, composites aren't that big, though, and I don't find this being a real practical issue.](https://app.pluralsight.com/course-player?clipId=7dc40e1a-0bf2-4b69-8145-afdcb606228b&startTime=48.34)

### [Contrast to Other Patterns](https://app.pluralsight.com/course-player?clipId=f0d1229f-8156-4b40-84fa-eebc094b3958)

[[Autogenerated] to contrast the composite pattern.](https://app.pluralsight.com/course-player?clipId=f0d1229f-8156-4b40-84fa-eebc094b3958&startTime=2.22) [Let's compare it with the decorator.](https://app.pluralsight.com/course-player?clipId=f0d1229f-8156-4b40-84fa-eebc094b3958&startTime=4.25) [The composite is a tree structure.](https://app.pluralsight.com/course-player?clipId=f0d1229f-8156-4b40-84fa-eebc094b3958&startTime=7.14) [Its intent to make a leaf and a composite have the same interface to the client.](https://app.pluralsight.com/course-player?clipId=f0d1229f-8156-4b40-84fa-eebc094b3958&startTime=10.34) [It provides a unity between objects.](https://app.pluralsight.com/course-player?clipId=f0d1229f-8156-4b40-84fa-eebc094b3958&startTime=17.39) [The decorator, on the other hand, contains another entity.](https://app.pluralsight.com/course-player?clipId=f0d1229f-8156-4b40-84fa-eebc094b3958&startTime=21.39) [Now this may sound like a composite,](https://app.pluralsight.com/course-player?clipId=f0d1229f-8156-4b40-84fa-eebc094b3958&startTime=25.71) [but it really just composition composition is just](https://app.pluralsight.com/course-player?clipId=f0d1229f-8156-4b40-84fa-eebc094b3958&startTime=27.84) [an object containing another one.](https://app.pluralsight.com/course-player?clipId=f0d1229f-8156-4b40-84fa-eebc094b3958&startTime=33) [It differs in that the decorator modifies the behaviour of the contained entity.](https://app.pluralsight.com/course-player?clipId=f0d1229f-8156-4b40-84fa-eebc094b3958&startTime=35.59) [This is usually adding functionality to an entity](https://app.pluralsight.com/course-player?clipId=f0d1229f-8156-4b40-84fa-eebc094b3958&startTime=42.74) [that it didn't originally have. It decorates the underlying object but doesn't necessarily change it.](https://app.pluralsight.com/course-player?clipId=f0d1229f-8156-4b40-84fa-eebc094b3958&startTime=45.81)

### [Summary](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae)

[[Autogenerated] let's do a quick recap of the composite pattern.](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=1.41) [The composite pattern generalizes a hierarchical structure.](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=5.44) [As we saw on our examples.](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=9.49) [We built a menu structure that had menu items such](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=11.06) [as leafs and other composites,](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=14.22) [and it helped us navigate that structure in an easier fashion.](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=16.22) [It can simplify things too much.](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=21.24) [As we learned in the Pitfalls section, you can make things too overly simplistic,](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=23.48) [which can later make it harder to restrict what's getting added to a menu.](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=28.37) [And you can sometimes have to rely on runtime checks.](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=33.54) [It definitely makes things easier for the client.](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=37.75) [In our example, we looked at the client, didn't it?](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=40.13) [Didn't care if we had a menu, a sub menu, a menu item.](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=44.66) [It just handled it all gracefully the same way.](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=48.8) [Likewise, with our our collections example,](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=51.63) [we went through and could add individual items or an entire collection,](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=55.54) [and it gracefully handled both as well.](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=60.38) [The last thing that we should talk about is the composite](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=63.86) [does not equal composition difference.](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=68.15) [The composite pattern is dealing with that hierarchical structure where](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=71.24) [composition is just one object containing another,](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=76.34) [and I bring this up because the next pattern that we're](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=79.31) [going to look at is the decorator pattern,](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=81.69) [and the decorator pattern utilizes composition, but it is not a composite structure.](https://app.pluralsight.com/course-player?clipId=b15b7c72-0704-4193-acf1-2709fc1344ae&startTime=84.1)

## [Decorator Pattern](https://app.pluralsight.com/course-player?clipId=52f15858-5ebd-4746-9439-64446ce35234)

### [Introduction](https://app.pluralsight.com/course-player?clipId=52f15858-5ebd-4746-9439-64446ce35234)

[[Autogenerated] Hi, This is Brian Hansen,](https://app.pluralsight.com/course-player?clipId=52f15858-5ebd-4746-9439-64446ce35234&startTime=0.99) [and in this module, we're going to look at the decorator pattern.](https://app.pluralsight.com/course-player?clipId=52f15858-5ebd-4746-9439-64446ce35234&startTime=2.72) [The decorator pattern is a hierarchical type pattern that](https://app.pluralsight.com/course-player?clipId=52f15858-5ebd-4746-9439-64446ce35234&startTime=6.71) [builds functionality at each level while using composition from similar data types.](https://app.pluralsight.com/course-player?clipId=52f15858-5ebd-4746-9439-64446ce35234&startTime=9.84)

### [Concepts](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f)

[[Autogenerated] the concepts surrounding why you would choose the](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=2.09) [decorator pattern are when you want to wrap another object.](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=4.37) [To add functionality to it,](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=8.3) [you can add behavior to an object without affecting other](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=10.82) [parts of the hair key if you don't want to.](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=14.03) [It is more than just simple inheritance,](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=17.44) [though you are controlling which pieces complement your object,](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=19.75) [not necessarily trying to override it.](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=23.52) [Like with inheritance.](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=25.83) [The decorator also follows the single responsibility principle,](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=28.14) [which states that every class should have responsibility over a single](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=32.61) [part of the functionality provided by the software.](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=36.64) [And that responsibility should be entirely encapsulated by the class.](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=39.73) [Basically, this means that it should do one thing and do it well.](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=45.04) [You can compose behavior dynamically by using one of the](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=49.94) [sub classes that decorate your object.](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=53.31) [This candidly makes it feel a little bit like a creation all pattern,](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=56.24) [but it is adding behavior through creations,](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=61.38) [so it is in fact still a structural design pattern.](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=63.83) [Examples of this in the a p i.](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=68.24) [R.](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=71.03) [The Java Io input stream classes, and these are a great example,](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=71.73) [often confusing to people as to why it does things the way that it does But](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=76.06) [hopefully this tutorial and walking through an example of it will clear up](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=80.68) [why they built it the way that they did the job.](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=84.87) [You till collections AP.](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=88.09) [I also has a checklist method,](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=89.3) [but it's not really clear is to why that is a decorator.](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=92.04) [Patterns were not going to use that for our example.](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=95.52) [And also, I should note that almost all you I components in the A, B, T and swing AP eyes are implemented following a decorator pattern.](https://app.pluralsight.com/course-player?clipId=a26ec45e-f680-4772-99aa-8a90344d275f&startTime=98.24)

### [Design Considerations](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28)

[[Autogenerated] the design of the decorator is that it is inheritance based.](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=2.08) [Often the confusing,](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=6.44) [confusing part of a decorator is that it is more than just inheritance.](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=8.1) [It utilizes composition and inheritance.](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=12.04) [To achieve this, there is a common component,](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=15) [but functionality is added in the sub components.](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=18.68) [It is also an alternative to sub classing because it adheres to the](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=22.74) [single responsibility principle that we talked about in the concept](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=26.6) [section where this class will just do one thing.](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=30.18) [Typically, when you're subclass,](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=34.84) [it is to completely rewrite or extend the parent class.](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=36.41) [The last piece is that the constructor requires an](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=42.24) [instance of the component from the hierarchy,](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=45.7) [which enables it to build upon that and use composition rather than inheritance,](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=48.54) [to override which individual fields that it wants to.](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=55.37) [The pieces of the you are of the UML diagram are a component](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=59.31) [concrete component decorator and a concrete decorator.](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=64) [Let's go ahead and look at that example now to see what the UML diagram looks like](https://app.pluralsight.com/course-player?clipId=034bbef3-f1df-4877-96e1-d4293141ca28&startTime=67.72)

### [UML Diagram](https://app.pluralsight.com/course-player?clipId=11edc59b-39ae-4e6a-aadb-54c8122727a3)

[[Autogenerated] here is the UML diagram for this decorator pattern.](https://app.pluralsight.com/course-player?clipId=11edc59b-39ae-4e6a-aadb-54c8122727a3&startTime=2.64) [The component class is typically an interface,](https://app.pluralsight.com/course-player?clipId=11edc59b-39ae-4e6a-aadb-54c8122727a3&startTime=6.39) [although it can be an abstract class that has a concrete instance](https://app.pluralsight.com/course-player?clipId=11edc59b-39ae-4e6a-aadb-54c8122727a3&startTime=10.3) [represented here in the concrete component.](https://app.pluralsight.com/course-player?clipId=11edc59b-39ae-4e6a-aadb-54c8122727a3&startTime=15.29) [In the of this diagram,](https://app.pluralsight.com/course-player?clipId=11edc59b-39ae-4e6a-aadb-54c8122727a3&startTime=18.31) [the concrete component is what we're going to eventually decorate,](https://app.pluralsight.com/course-player?clipId=11edc59b-39ae-4e6a-aadb-54c8122727a3&startTime=20.49) [and the decorator is Thebe,](https://app.pluralsight.com/course-player?clipId=11edc59b-39ae-4e6a-aadb-54c8122727a3&startTime=25.04) [base decorator or rapper that we will extend and](https://app.pluralsight.com/course-player?clipId=11edc59b-39ae-4e6a-aadb-54c8122727a3&startTime=27.44) [create other decorators from now.](https://app.pluralsight.com/course-player?clipId=11edc59b-39ae-4e6a-aadb-54c8122727a3&startTime=30.27) [It should be of note that both the concrete component and](https://app.pluralsight.com/course-player?clipId=11edc59b-39ae-4e6a-aadb-54c8122727a3&startTime=32.63) [the decorator extend the components so that they could be](https://app.pluralsight.com/course-player?clipId=11edc59b-39ae-4e6a-aadb-54c8122727a3&startTime=36.33) [treated the same from here.](https://app.pluralsight.com/course-player?clipId=11edc59b-39ae-4e6a-aadb-54c8122727a3&startTime=39.26) [We can then create multiple concrete decorators to decorate our object and provide functionality as we develop.](https://app.pluralsight.com/course-player?clipId=11edc59b-39ae-4e6a-aadb-54c8122727a3&startTime=42.12)

### [Example: File](https://app.pluralsight.com/course-player?clipId=75413652-8004-4e16-aaec-e25dfc06f470)

[[Autogenerated] here is an everyday example,](https://app.pluralsight.com/course-player?clipId=75413652-8004-4e16-aaec-e25dfc06f470&startTime=2.24) [using the input stream class from java dot io that utilizes](https://app.pluralsight.com/course-player?clipId=75413652-8004-4e16-aaec-e25dfc06f470&startTime=3.91) [decorators to build out its functionality.](https://app.pluralsight.com/course-player?clipId=75413652-8004-4e16-aaec-e25dfc06f470&startTime=9.23) [In this example,](https://app.pluralsight.com/course-player?clipId=75413652-8004-4e16-aaec-e25dfc06f470&startTime=12.12) [we're gonna go ahead and create an instance of a file and write that](https://app.pluralsight.com/course-player?clipId=75413652-8004-4e16-aaec-e25dfc06f470&startTime=12.97) [file out to the output stream using an output stream,](https://app.pluralsight.com/course-player?clipId=75413652-8004-4e16-aaec-e25dfc06f470&startTime=15.9) [which is a base decorator,](https://app.pluralsight.com/course-player?clipId=75413652-8004-4e16-aaec-e25dfc06f470&startTime=20.08) [we can add on to its functionality using a file output](https://app.pluralsight.com/course-player?clipId=75413652-8004-4e16-aaec-e25dfc06f470&startTime=21.81) [stream and a data output stream.](https://app.pluralsight.com/course-player?clipId=75413652-8004-4e16-aaec-e25dfc06f470&startTime=25.06) [As you can see here, these three are all chained together,](https://app.pluralsight.com/course-player?clipId=75413652-8004-4e16-aaec-e25dfc06f470&startTime=27.5) [building or necessarily, in this case,](https://app.pluralsight.com/course-player?clipId=75413652-8004-4e16-aaec-e25dfc06f470&startTime=31.49) [decorating functionality from one stream to the next and a](https://app.pluralsight.com/course-player?clipId=75413652-8004-4e16-aaec-e25dfc06f470&startTime=33.91) [pending its functionality on Let's go her head and look at a live example of this code.](https://app.pluralsight.com/course-player?clipId=75413652-8004-4e16-aaec-e25dfc06f470&startTime=38.2)

### [Demo: File](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd)

[[Autogenerated] as we mentioned earlier in this example,](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=2.84) [we're going to create an instance of a file and](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=4.7) [write that out to the output stream.](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=8.52) [Here we've created a instance of a file output stream](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=10.84) [and assign that to an output stream.](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=14.73) [In this example, our output stream would be our base decorator,](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=16.36) [and our file output stream would be one of the](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=21.04) [instances of a concrete decorator.](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=23.55) [We then turn around and passed that file output stream into a data output](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=25.84) [stream so that we can write physical data out to the system.](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=29.94) [Pretty straightforward.](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=33.53) [But you haven't used the job I o classes or even if you have there,](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=34.6) [oftentimes confusing because people don't understand why the](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=38.74) [output streams air built the way that they are.](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=42.33) [Well,](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=44.23) [it's so that we can daisy chain that functionality on two](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=44.43) [different streams without having to have a specific instance](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=47.95) [of each class to build that out.](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=51.23) [Let's go ahead and run this and see what it does.](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=54.64) [I want to say run as job application,](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=58.54) [and if we go over to our file structure here,](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=62.64) [we'll see an output text, and once it reloads from being written,](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=66.04) [you can see that it has implemented text in there,](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=73.06) [and that may be a little bit small for you,](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=75.18) [but that's just the text output from it.](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=76.96) [The examples.](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=80.49) [Pretty straightforward.](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=81.43) [But we get all of our daisy chaining of our decorators built out](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=82.89) [here that ends up writing into our file system.](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=87.87) [And it's a good example of a decorator.](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=91.5) [Because the output stream alone can't write files,](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=93.56) [the file output stream can write to it.](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=96.41) [Well, the file output stream doesn't know about writing out data,](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=97.94) [so the data output stream goes through the file output stream,](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=101.04) [which goes through the output stream.](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=103.77) [You see that kind of reverse hierarchy that's being built there using that structural pattern a great example of a decorator pattern.](https://app.pluralsight.com/course-player?clipId=6ab97c4e-9ddf-46ec-9f5d-5115b29c9ccd&startTime=105.56)

### [Exercise - Create Decorator](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa)

[[Autogenerated] Now that we've seen an example of a decorator pattern,](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa&startTime=1.14) [let's go ahead and build our own for our decorator.](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa&startTime=4.25) [We're going to build a hierarchy that builds a sandwich.](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa&startTime=7.33) [Now I'm taking this example from our builder example that we used in the](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa&startTime=10.8) [creation all section of this course that implemented the different build](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa&startTime=16.03) [options for building out a lunch order.](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa&startTime=20.93) [And this is a real world example that I had used with that builder.](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa&startTime=23.89) [Well,](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa&startTime=27.78) [I like the functionality of that application that I went](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa&startTime=28.06) [ahead and used it for this decorator.](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa&startTime=30.9) [We're going to implement a few pieces, specifically a component,](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa&startTime=32.67) [a concrete component, then a decorator and a concrete decorator.](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa&startTime=38.59) [With these parts,](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa&startTime=43.53) [we will have everything that we've needed to create our](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa&startTime=44.51) [decorator pattern and condemn a wood.](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa&startTime=47.38) [Then, to cement those concepts, we will implement another decorator,](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa&startTime=50.03) [and Leslie will discuss that this is not a creation pattern and kind of show. The differences between this and the builder pattern](https://app.pluralsight.com/course-player?clipId=839c5023-1acf-4e05-bcc4-7edae54f1caa&startTime=54.73)

### [Demo: Decorator Implementation](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f)

[[Autogenerated] all right to start off with our decorator pattern,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=2.84) [I've gone ahead and created some classes just a fill in some of the blanks and](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=5.53) [not make so such mundane coding throughout this example,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=10.79) [I've started off by creating an interface which is just our sandwich interface.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=14.67) [We want to build a sandwich, so we're going to go ahead and start with that now,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=19.08) [the interface doesn't have anything currently in it.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=24.17) [We're going to go ahead and add a method signature called Public String make.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=26.58) [I'm gonna just drop this in here now, This is just for us to make a sandwich.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=34.6) [We're gonna build out our sandwich.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=39.91) [Now,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=41.84) [you see already that the placeholders I have automatically throw some](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=42.08) [red Xs because it they haven't implemented those yet.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=45.41) [So now we're starting at the at the root of our hierarchy.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=48.79) [If you remember rul UML diagram.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=51.89) [Now we're going to go down and make a concrete instance of our sandwich.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=54.5) [So here, in our simple sandwich,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=60.14) [we want to go ahead and just implement a basic](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=61.94) [implementation of that make method.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=65.6) [Now, I'm gonna go ahead and grab this,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=68.74) [which is just some basic code that says we're going to](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=70.72) [return and instance of our sandwich, which basically will be our ingredients.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=74.08) [We could say Basic sandwich or we could return bread here doesn't really matter.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=78.55) [Um, this is going to be the basic implementation of what we want for a sandwich.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=86.03) [If he ran it right now, all we would get back when we made our sandwiches bread.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=90.59) [So there's nothing on it yet.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=94.59) [You see how this functionality will build upon that.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=96.14) [Now let's go ahead and look at the right half of Ruml](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=99.94) [tree and look at our sandwich decorator.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=103.28) [Now our sandwich decorator is our abstract class,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=106.04) [and this the base of our decorators.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=108.96) [Currently, there's nothing in here.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=112.54) [But one thing I want to point out is that it does](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=113.87) [implement the sandwich interface,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=116.23) [and that is because decorators should be treated as objects because](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=119.24) [we're creating these decorators so that we don't have to keep](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=123) [creating various implementations of that sandwich so we wouldn't have](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=126.35) [to have a simple sandwich with meat.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=131.08) [A simple sandwich with cheese, a simple sandwich with dressing,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=134.41) [a simple sandwich with whatever thes decorators helped build this help.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=138.06) [So now let's go ahead and add some basic pieces to this.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=143.14) [I'm gonna go ahead and grab my notes over here and](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=148.33) [then talk through what we're adding.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=151.74) [So, insider decorator, we're going to add a protected instance of our sandwich,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=154.07) [which is what all the sub decorators air going to extend and build upon.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=161.21) [Then we add a constructor that, through composition,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=166.97) [takes in an instance of that sandwich.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=170.9) [Now this is a key point that implementation of a](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=173.3) [sandwich can be the concrete class.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=176.18) [Or it could be an instance of another decorator,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=178.54) [and that's what we're going to see.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=181.69) [As we build upon this example,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=183.09) [we're going to start off with sandwich and then at a decorator in another](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=184.97) [decorator in another decorator to it as we build our sandwich.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=188.14) [And lastly, in this snippet of code,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=191.97) [we are implementing the required interface of sandwich with our make methods.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=195.44) [So right now in this basic class,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=200.95) [this space implementation were just saying custom sandwich dot Make.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=203.33) [Now let's move on to the meat decorator,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=209.22) [the meat decorators, air first concrete decorator of all of our classes.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=212.84) [So we started off with our base component,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=218.3) [which is sandwich, and that's just our our base interface are top of Ruml tree.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=220.04) [Then we have the left side of Ruml tree,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=224.97) [which is our simple sandwich, and then the right side,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=226.61) [which is our abstract class.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=229.2) [But we currently don't have any decorators that are building anything on it.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=230.8) [Now the meat decorator comes into play.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=233.91) [So inside this meat decorator,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=236.84) [we're gonna go ahead and implement many of the same features](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=238.51) [that we did in the sandwich decorator.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=241.45) [But add some stuff to it,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=242.76) [and I'm gonna grab my snippet of code from over here and](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=244.92) [paste this in and we can walk through.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=249.27) [It would be very similar to the sandwich decorator,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=251.51) [except you're going to see that we add a method down here called Add meat.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=254.58) [As we build the sandwich, we can add functionality to it and say,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=260.29) [Oh, no, this is essentially a meat sandwich.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=264.51) [You could do another thing if you wanted tofu or or](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=267.84) [vegetarian or whatever you wanted to dio.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=271.08) [You could go through and make different decorators to build this out.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=273.24) [You can see in our sandwich example here that we don't have to](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=276.81) [create new instances of simple sandwich every time we want to](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=280.9) [change up what type of class we have.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=286.11) [This is the same thing that the Iot packages air doing in](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=289.21) [using input stream inside of the job.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=293.27) [I o a p i.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=296.19) [Now, as we go in here into our decorator, let's save this.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=297.84) [We can see that as we build these out.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=303.84) [We're calling upon whatever implementation came into the sandwich,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=306.2) [not necessarily a decorator versus a concrete object.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=310.96) [So now we have our com custom sandwich that we call Make On](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=315.51) [and go ahead and add something to it.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=318.7) [Let's add one more just to submit this concept in,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=320.57) [go ahead and create a new class and it is going to be the dressing decorator.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=324.61) [And it has a super class of have of sandwich decorator.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=334.7) [And let's click finish now inside of here.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=345.72) [It's gonna be very similar to the meat decorator.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=347.92) [In fact, I'm gonna go ahead and just grab some of this stuff already,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=351.81) [cause I haven't done and paste it in here Now.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=355.16) [Inside of this,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=362.65) [you can see that we have the constructor that calls super passing in](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=363.33) [the instance that we have utilizing composition,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=370.42) [but we're also utilizing inheritance were using inheritance to](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=373.79) [extend the decorator but we're using composition to pass the](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=377.37) [instance in that we're working with.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=380.89) [The nice thing about this is we're actually adding our](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=382.54) [functionality through composition.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=384.67) [Then the next thing that we're doing is as we're making our sandwich.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=387.34) [We are a pending on that functionality and overriding the](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=390.54) [features that we want to through that composition.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=394.07) [So now that we have our decorator sandwich done here,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=397.54) [let's go ahead and look at the demo,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=401.77) [and this is where you see what's going on inside of our sandwich.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=403.89) [We have a dressing decorator that takes a meat](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=408.64) [decorator that takes a simple sandwich.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=411.76) [The simple sandwich isn't is our actual based sandwich,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=414.46) [but the two decorators can take either the sandwich or the decorator in.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=418.21) [Now.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=423.94) [If we go and run this run as Java application,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=424.21) [you can see that we have bread plus turkey and mustard,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=431.44) [just like we have expected it dio.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=435.07) [Now,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=437.94) [one thing that's confusing about this is this starts to](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=438.29) [feel a lot like a creation all pattern,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=441.52) [because we are passing all of these features in in constructors and it](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=444.09) [looks like we're building these out on constructors.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=449.65) [But note that what we're doing is we're adding functionality to this](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=451.84) [simple sandwich that didn't exist there before.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=455.53) [We're just doing that through constructors and using](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=458.64) [composition in those decorators.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=462.05) [So although it feels like a creation all pattern,](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=465.13) [it's actually a structural pattern because we're modifying the](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=467.99) [structure of that simple sandwich by utilizing a decorator, and we get a lot of power in that hierarchy of that decorator.](https://app.pluralsight.com/course-player?clipId=a1aec7ba-47a3-4c23-b9c7-2dc3ca53542f&startTime=470.61)

### [Pitfalls](https://app.pluralsight.com/course-player?clipId=b76e20cd-7acc-4850-bd0f-83d8e8d0f40c)

[[Autogenerated] What are some of the pitfalls of a decorator?](https://app.pluralsight.com/course-player?clipId=b76e20cd-7acc-4850-bd0f-83d8e8d0f40c&startTime=1.34) [You end up building a new class for every feature that you want to decorate,](https://app.pluralsight.com/course-player?clipId=b76e20cd-7acc-4850-bd0f-83d8e8d0f40c&startTime=4.14) [realized that the decorator enables us to not need to extend the concrete](https://app.pluralsight.com/course-player?clipId=b76e20cd-7acc-4850-bd0f-83d8e8d0f40c&startTime=9.14) [object but rather implement a new decorator itself.](https://app.pluralsight.com/course-player?clipId=b76e20cd-7acc-4850-bd0f-83d8e8d0f40c&startTime=12.93) [The side effect of this, though,](https://app.pluralsight.com/course-player?clipId=b76e20cd-7acc-4850-bd0f-83d8e8d0f40c&startTime=16.74) [is that you end up with a lot of little specialized objects.](https://app.pluralsight.com/course-player?clipId=b76e20cd-7acc-4850-bd0f-83d8e8d0f40c&startTime=18.24) [Decorators can also be confused with simple inheritance.](https://app.pluralsight.com/course-player?clipId=b76e20cd-7acc-4850-bd0f-83d8e8d0f40c&startTime=22.94) [In Java, you only have single inheritance,](https://app.pluralsight.com/course-player?clipId=b76e20cd-7acc-4850-bd0f-83d8e8d0f40c&startTime=26.99) [and some features shouldn't be part of the hierarchy.](https://app.pluralsight.com/course-player?clipId=b76e20cd-7acc-4850-bd0f-83d8e8d0f40c&startTime=29.44) [Decorators give us a unique way to add functionality](https://app.pluralsight.com/course-player?clipId=b76e20cd-7acc-4850-bd0f-83d8e8d0f40c&startTime=32.34) [without creating concrete objects.](https://app.pluralsight.com/course-player?clipId=b76e20cd-7acc-4850-bd0f-83d8e8d0f40c&startTime=35.9) [For every feature that we want to implement,](https://app.pluralsight.com/course-player?clipId=b76e20cd-7acc-4850-bd0f-83d8e8d0f40c&startTime=37.82) [we rather create a decorator and don't mess up that hierarchy of our concrete objects.](https://app.pluralsight.com/course-player?clipId=b76e20cd-7acc-4850-bd0f-83d8e8d0f40c&startTime=40.21)

### [Contrast to Other Patterns](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff)

[[Autogenerated] to contrast the decorator.](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff&startTime=2.01) [Let's go ahead and look at the composite.](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff&startTime=4.19) [And if you just finished the composite module, I'll be honest with you.](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff&startTime=7.05) [This is the exact same comparison that we made earlier.](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff&startTime=10.69) [The composite is a tree structure,](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff&startTime=15.21) [and its intent is to make a leaf and composite have the same interface.](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff&startTime=18.06) [The client.](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff&startTime=22.48) [It provides a unity between objects.](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff&startTime=23.68) [The decorator, on the other hand, contains another entity.](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff&startTime=26.82) [Now this may sound a lot like a composite, but it is really composition.](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff&startTime=32.19) [As you saw in some of the life examples that we did,](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff&startTime=37.02) [we utilize both inheritance and composition.](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff&startTime=40.05) [Composition just contains another entity in It differs in that it](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff&startTime=44.8) [modifies this behavior of that contained entity.](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff&startTime=48.06) [So we want to use decorators to modify that behavior of the contain entity.](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff&startTime=50.87) [This is usually adding functionality to nitty that it didn't originally have,](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff&startTime=56.3) [and we just want to decorate the underlying object, but not necessarily change that concrete class](https://app.pluralsight.com/course-player?clipId=26d6b8ea-28e4-4c0a-86c3-2c50554cbbff&startTime=60.57)

### [Summary](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be)

[[Autogenerated] Let's recap what we learned with the decorator pattern.](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=1.59) [The original objects stays the same,](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=5.1) [so we don't have to creep creating concrete objects](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=7.76) [to add functionality to them.](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=11.04) [We can utilize the decorator to do that.](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=12.59) [It's an interesting and unique way to add](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=15.13) [functionality to those concrete objects.](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=17.98) [It's often time confused with inheritance,](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=21.98) [and you can see that because you use inheritance in the decorator.](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=24.64) [But we don't have to change our base object.](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=29.39) [So that's where the confusion of inheritance sets in.](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=32.06) [It can honestly be a little bit more complex for clients.](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=35.74) [Ah,](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=39.19) [lot of the other classes that we've looked at and patterns and](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=39.48) [methods and approaches to solving these things.](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=42.96) [You'll see that it gets simpler for the clients.](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=45.24) [I feel that the decorator exposes a lot of that functionality to the client](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=47.83) [and sometimes makes it a little more confusing for them.](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=52.37) [Still a great pattern, though. If you don't want to modify that base object](https://app.pluralsight.com/course-player?clipId=466912d7-7146-4618-9692-1fde679397be&startTime=55.64)

## [Facade Pattern](https://app.pluralsight.com/course-player?clipId=cd0ace40-4e8e-470c-9687-dad34fcdd1fe)

### [Introduction](https://app.pluralsight.com/course-player?clipId=cd0ace40-4e8e-470c-9687-dad34fcdd1fe)

[[Autogenerated] Hi, This is Brian Hansen,](https://app.pluralsight.com/course-player?clipId=cd0ace40-4e8e-470c-9687-dad34fcdd1fe&startTime=1.93) [and in this module, we're going to look at the facade pattern.](https://app.pluralsight.com/course-player?clipId=cd0ace40-4e8e-470c-9687-dad34fcdd1fe&startTime=3.62) [The facade pattern provides a simplified interface to a](https://app.pluralsight.com/course-player?clipId=cd0ace40-4e8e-470c-9687-dad34fcdd1fe&startTime=7.09) [complex or difficult to use system that is often the result of a poorly designed A P I.](https://app.pluralsight.com/course-player?clipId=cd0ace40-4e8e-470c-9687-dad34fcdd1fe&startTime=10.27)

### [Concepts](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e)

[[Autogenerated] First off,](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=1.94) [it should be noted that the facade pattern is pronounced facade and not FIC aid.](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=2.78) [This is a common mispronunciation.](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=8.87) [When discussing this pattern when going to a job interview,](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=10.8) [make sure you call it the right name,](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=14.18) [the concepts surrounding why you would choose the facade pattern or](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=16.71) [one thing you want to make an A P I easier to use.](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=19.93) [Oftentimes you encounter a poorly designed A P I and can wrap a](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=22.94) [facade around it to hide the details from the client.](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=26.78) [It also helps to reduce dependencies on outside code.](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=30.22) [The main point that I usually look for is that it will](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=34.5) [simplify the interface or client usage.](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=37.05) [We typically want to wrap complex code with an interface using](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=40.16) [this facade to make it simpler for the end user.](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=45.28) [It should also be thought of as a re factoring pattern.](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=48.73) [You would usually want to implement a facade to wrap a](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=52.33) [poorly or complex written a p I.](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=55.29) [Examples of this in the job a p i.](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=58.93) [R java dot net dot u R l.](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=61.04) [There is a lot of functionality built behind the Ural class,](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=64.13) [and it provides a simple interface to the end user.](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=67.43) [There actually aren't a lot of good examples of the facade in the J via Java,](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=71.07) [a P I.](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=75.76) [And that is probably a good thing because is usually the](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=76.2) [result of a poorly designed or complex AP I.](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=78.99) [But another good example of the facade pattern is the Java](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=82.76) [server faces a P I specifically the faces context Now faces](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=87.3) [is part of the J two ee pattern, so we're not gonna talk much more about that.](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=92.92) [But suffice it to say that Faces has a fairly complex A p I,](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=97.14) [and interacting with the context can be quite difficult. So this is a great example of the facade pattern as well.](https://app.pluralsight.com/course-player?clipId=ac2cf84f-e466-48b9-a76a-aca2b4cc915e&startTime=102.19)

### [Design Considerations](https://app.pluralsight.com/course-player?clipId=b16a89bf-af24-4641-bdb0-de6059d9beab)

[[Autogenerated] the design of the facade is actually quite simple.](https://app.pluralsight.com/course-player?clipId=b16a89bf-af24-4641-bdb0-de6059d9beab&startTime=2.14) [It is a class that utilizes, typically just composition in its design.](https://app.pluralsight.com/course-player?clipId=b16a89bf-af24-4641-bdb0-de6059d9beab&startTime=5.19) [You shouldn't have a need for inheritance,](https://app.pluralsight.com/course-player?clipId=b16a89bf-af24-4641-bdb0-de6059d9beab&startTime=10.53) [and if you feel like you need to,](https://app.pluralsight.com/course-player?clipId=b16a89bf-af24-4641-bdb0-de6059d9beab&startTime=12.93) [then you probably ought to be looking at a different design pattern.](https://app.pluralsight.com/course-player?clipId=b16a89bf-af24-4641-bdb0-de6059d9beab&startTime=14.72) [The facade also encompasses the entire life cycle of](https://app.pluralsight.com/course-player?clipId=b16a89bf-af24-4641-bdb0-de6059d9beab&startTime=18.64) [whatever object you're dealing with,](https://app.pluralsight.com/course-player?clipId=b16a89bf-af24-4641-bdb0-de6059d9beab&startTime=21.99) [but it doesn't necessarily have to in order to be](https://app.pluralsight.com/course-player?clipId=b16a89bf-af24-4641-bdb0-de6059d9beab&startTime=24.04) [considered a correct usage of this pattern.](https://app.pluralsight.com/course-player?clipId=b16a89bf-af24-4641-bdb0-de6059d9beab&startTime=26.31) [The UML pieces associate with this UML diagram are simply a class and the](https://app.pluralsight.com/course-player?clipId=b16a89bf-af24-4641-bdb0-de6059d9beab&startTime=29.55) [packages or classes that the facade is making easier to use. Let's look at that UML diagram now.](https://app.pluralsight.com/course-player?clipId=b16a89bf-af24-4641-bdb0-de6059d9beab&startTime=34.59)

### [UML Diagram](https://app.pluralsight.com/course-player?clipId=640665f1-8eb4-42ce-8f27-081d56871146)

[[Autogenerated] There really isn't a standard UML diagram for](https://app.pluralsight.com/course-player?clipId=640665f1-8eb4-42ce-8f27-081d56871146&startTime=1.82) [the facade pattern because the facade typically wraps whatever](https://app.pluralsight.com/course-player?clipId=640665f1-8eb4-42ce-8f27-081d56871146&startTime=4.25) [other AP I you're working with.](https://app.pluralsight.com/course-player?clipId=640665f1-8eb4-42ce-8f27-081d56871146&startTime=8.69) [Simply stated, though, the facade contains other classes,](https://app.pluralsight.com/course-player?clipId=640665f1-8eb4-42ce-8f27-081d56871146&startTime=11.73) [and this is the basis for this diagram.](https://app.pluralsight.com/course-player?clipId=640665f1-8eb4-42ce-8f27-081d56871146&startTime=15.02) [We have a facade class that does something or some operation,](https://app.pluralsight.com/course-player?clipId=640665f1-8eb4-42ce-8f27-081d56871146&startTime=17.04) [and it contains, usually through composition,](https://app.pluralsight.com/course-player?clipId=640665f1-8eb4-42ce-8f27-081d56871146&startTime=21.72) [multiple other packages or AP eyes that is providing a simpler interface for the end user.](https://app.pluralsight.com/course-player?clipId=640665f1-8eb4-42ce-8f27-081d56871146&startTime=24.69)

### [Example: URL](https://app.pluralsight.com/course-player?clipId=a790e363-b52a-4c02-b3ac-06504cdc1529)

[[Autogenerated] Let's look at an everyday example](https://app.pluralsight.com/course-player?clipId=a790e363-b52a-4c02-b3ac-06504cdc1529&startTime=0.59) [of the facade pattern in action.](https://app.pluralsight.com/course-player?clipId=a790e363-b52a-4c02-b3ac-06504cdc1529&startTime=2.31) [The euro class is an interesting example of this pattern.](https://app.pluralsight.com/course-player?clipId=a790e363-b52a-4c02-b3ac-06504cdc1529&startTime=5.15) [It face value.](https://app.pluralsight.com/course-player?clipId=a790e363-b52a-4c02-b3ac-06504cdc1529&startTime=8.05) [It seems like a simple class that doesn't do much when in](https://app.pluralsight.com/course-player?clipId=a790e363-b52a-4c02-b3ac-06504cdc1529&startTime=9.3) [fact it handles all of the connections for opening a UL and](https://app.pluralsight.com/course-player?clipId=a790e363-b52a-4c02-b3ac-06504cdc1529&startTime=12.08) [opening a stream to its content.](https://app.pluralsight.com/course-player?clipId=a790e363-b52a-4c02-b3ac-06504cdc1529&startTime=15.86) [You can see here that all we have to do to open up a](https://app.pluralsight.com/course-player?clipId=a790e363-b52a-4c02-b3ac-06504cdc1529&startTime=18.31) [stream is calling open stream method,](https://app.pluralsight.com/course-player?clipId=a790e363-b52a-4c02-b3ac-06504cdc1529&startTime=21.05) [and it handles all of the connections and connection](https://app.pluralsight.com/course-player?clipId=a790e363-b52a-4c02-b3ac-06504cdc1529&startTime=23.68) [information behind the scenes.](https://app.pluralsight.com/course-player?clipId=a790e363-b52a-4c02-b3ac-06504cdc1529&startTime=26.7) [It should also be of note that wrapping the input stream with a](https://app.pluralsight.com/course-player?clipId=a790e363-b52a-4c02-b3ac-06504cdc1529&startTime=29.1) [buffered reader is an example of a decorator. Let's go ahead and look at this code in a live sample now.](https://app.pluralsight.com/course-player?clipId=a790e363-b52a-4c02-b3ac-06504cdc1529&startTime=31.75)

### [Demo: URL](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c)

[[Autogenerated] Here's the U R L code that we were just talking about.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=2.24) [You could see in this example.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=5.7) [We go ahead and grab an instance of the u.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=7.1) [R L.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=9.22) [And it's pointing to plural site slash author slash Brian Desh Hanson.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=9.91) [This is my author page on plural site dot com,](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=14.99) [and I'm gonna go ahead and open up a stream and wrap that](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=18.29) [with an input stream in a buffered reader.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=22.65) [This is where we're talking about.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=24.43) [There's a decorator inside of here,](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=25.56) [so we're showing a facade the nice clean usage of the U.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=27.58) [R L class, and then also you get a great example of a decorator inaction.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=31.89) [Gonna go ahead and grab this content and put into an input line](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=36.45) [and just dump out what this page returns.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=39.93) [Let's go ahead and run this code.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=42.78) [Now we just say,](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=44.1) [right click run as a job application and it will dump out all this text of what?](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=47.29) [The pages behind the scene, and it's really not too interesting.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=56.85) [It's just a bunch of HTML.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=60.03) [But it was a good example of it going out and grabbing that you are l](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=61.24) [just using a basic git and dumping this content out.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=64.58) [Now a great example.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=69.04) [The U.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=70.65) [R L classes doing a lot of stuff here,](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=70.91) [opening and closing connection to making sure we've](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=73.24) [got things formatted the right way,](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=75.41) [handling streams on the back and all sorts of](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=77.56) [different things that are going on here.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=80.67) [But it just has a nice little facade that wraps that all up for us, A great example of this pattern.](https://app.pluralsight.com/course-player?clipId=00055101-5130-4fef-8570-d57e7e63846c&startTime=82.55)

### [Exercise - JDBC](https://app.pluralsight.com/course-player?clipId=69c6854e-6a4b-4e62-a961-f5324abdf307)

[[Autogenerated] Now that we've seen an example of the facade in action,](https://app.pluralsight.com/course-player?clipId=69c6854e-6a4b-4e62-a961-f5324abdf307&startTime=0.41) [we're going to go ahead and build our own.](https://app.pluralsight.com/course-player?clipId=69c6854e-6a4b-4e62-a961-f5324abdf307&startTime=3.19) [That simplifies Working with the JBC, a p I.](https://app.pluralsight.com/course-player?clipId=69c6854e-6a4b-4e62-a961-f5324abdf307&startTime=5.54) [We're in a start was showing the complex client without using.](https://app.pluralsight.com/course-player?clipId=69c6854e-6a4b-4e62-a961-f5324abdf307&startTime=9.39) [If Assad that utilizes G A B C, a p I,](https://app.pluralsight.com/course-player?clipId=69c6854e-6a4b-4e62-a961-f5324abdf307&startTime=13.03) [then we will implement the facade that will just have a client,](https://app.pluralsight.com/course-player?clipId=69c6854e-6a4b-4e62-a961-f5324abdf307&startTime=16.21) [the facade in between and then our access to R J B C A P I,](https://app.pluralsight.com/course-player?clipId=69c6854e-6a4b-4e62-a961-f5324abdf307&startTime=19.33) [and lastly will show the simplified client code in a demo that wraps up all the pieces as we put them together.](https://app.pluralsight.com/course-player?clipId=69c6854e-6a4b-4e62-a961-f5324abdf307&startTime=23.7)

### [Demo: JDBC Without a Facade](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c)

[[Autogenerated] Here's an example of some code using thes e](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=2.24) [b c a p I without a facade wrapping it,](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=5.55) [you get an idea really quick of how busy this coat is or how much](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=8.13) [stuff is going on your client has to know about.](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=11.66) [There's just a lot of loose ends that you have to deal with.](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=14.38) [You can start off by saying that I used an instance of the](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=17.89) [singleton that we created in the Singleton module of the](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=21.23) [creation all patterns course right here.](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=24.7) [And then we go down in our code and grab a connection that a statement.](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=28.21) [We execute that statement, close it.](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=33.63) [Then we insert a record into the table that we just created.](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=36.47) [Go ahead and close that.](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=42.19) [Then we create another statement,](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=43.08) [come down here and execute a result set to see if we](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=44.99) [grabbed a record from this table.](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=48.66) [You just see there's a lot of stuff going on here in a lot of little loose ends.](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=50.85) [If you've dealt with JBC very long,](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=54.59) [at some point you've had connections that were left open or various](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=56.59) [memory leaks because you forgot to close off.](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=60.98) [Resource is when you were done using them Let's go ahead and run this](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=63.15) [code now and we could see their tables created.](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=66.31) [We have one record that we created,](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=73.41) [and then we retrieve that record from the database.](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=75.95) [But let's see what a facade pattern conduce for us for cleaning up this client A P I.](https://app.pluralsight.com/course-player?clipId=ae7515f9-4e79-4f85-a2e5-688c4dc1c70c&startTime=78.48)

### [Demo: JDBC Facade](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf)

[[Autogenerated] looking at our JBC demo,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=2.04) [we can see that there are three distinct areas were](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=3.59) [working with inside the JTB CSI classes.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=6.22) [We have it where we're creating a table where we're inserting records and](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=9.44) [then we're selecting records back from the database.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=14.01) [So let's go ahead and create a facade for this.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=16.94) [I'm gonna say new class and we're gonna call this the jdb.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=20.49) [See facade click Finish Now inside of here we want toe outline](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=25.07) [are three instances that we're dealing with.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=32.28) [There are three areas that we're working with,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=34.98) [so we're gonna have a public and create table.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=36.78) [I'm gonna type this out because this really is the crux of this pattern,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=42.95) [and then we're going to have a public and insert into table,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=48.84) [and then we're also going to have a public,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=59.23) [and I'm gonna return a list of address objects and we](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=63.04) [haven't created the address object yet.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=68.55) [I want to get addresses now.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=70.84) [This is really the main pieces of the facade that we're gonna be dealing with.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=77.42) [So let's go ahead and fill this in now.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=82.8) [And I've got this already done for,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=84.64) [so I'm gonna just copy and paste some things in here.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=85.95) [But first, let's get an instance of our DB single 10.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=87.8) [I would just say instance equal to know.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=93.13) [And this is the same singleton pattern that we used in the Singleton demo.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=95.69) [And let's create a constructor here, just a no or constructor.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=99.94) [So we'll say public JBC facade and then inside of here,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=103.82) [which is to say instance,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=113.22) [is equal to Devi singleton dot get instance now for our create table.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=115.7) [Basically,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=123.68) [what we're going to do is we're going to go ahead and copy the](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=124.16) [same code that we had of this JBC demo over here,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=127.65) [but I have clean some things up a little bit,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=130.56) [So I'm gonna go through and open up my demo notes here and paste this in,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=132.71) [and I'll walk through what I'm doing here.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=137.45) [So what I'm going to do is inside of our create table.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=139.74) [I'm going to get an instance of and grab my imports really quick.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=144.04) [I'm going, Teoh, take our database instance,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=149.94) [grab a connection to it, create a statement,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=153.23) [execute that statement and then close my resource is out and return a count](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=155.44) [of how many tables or records or statements we executed.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=160.31) [Notice that I'm hiding all of this stuff from my client.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=163.95) [My client doesn't have to know about getting the database connection.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=166.94) [It doesn't have to know about our Singleton even doesn't know.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=170.04) [I need to know about what the secret was.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=172.3) [It was executed.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=174.19) [Now,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=175.43) [if we wanted to change this and make it where we](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=175.69) [could make a dynamic for any table,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=177.7) [we could definitely pass a string into our arguments here.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=179.82) [Something like this that would say sequel and past that in for our](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=183.55) [client to use to create tables in a generic fashion.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=189.24) [But you get the idea of what this methods gonna dio.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=194.5) [We're gonna do the same thing with the insert into table.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=197.35) [Let me grab this code that I had written here copy and paste it in.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=200.17) [And the same thing It's hiding the connection,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=210.14) [the statement opening and closing.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=213.46) [I am just putting out stack traces.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=216.38) [If you wanted,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=218.15) [you could throw an exception back to the client or return something different.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=218.75) [But we get a good idea of what we're doing here now](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=222.2) [for our retrieval for our address.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=225.87) [And this is one thing that I don't like about J.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=228.3) [D B C.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=230.46) [has nothing to do with this design pattern.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=231.1) [But it does have a concept of object during a programming is why I bring it up.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=233.16) [The retrieval of an object You want to actually deal with objects.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=237.12) [So let's go ahead and actually get create an address object.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=242.86) [And for sake of this demo, I'm just going to create a class within this class.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=247.64) [A little inner class will say class address and put an open and close on here.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=251.76) [And Wolf, go ahead and throw some records.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=261.14) [And here I've already got the class created going to](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=264.14) [just do an idea street name and a city,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=266.81) [and we'll just right click and sage generate getters and](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=273.04) [centers source generate getters and centers,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=276.43) [yet we want to select all of those hit.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=281.34) [Okay, Now make sure you're doing this,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=284.25) [that you are putting everything in the right order here.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=288.13) [So we have are objects all in the right brackets.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=293.25) [What I mean by that is that we now have our in her class](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=300.06) [down here below our main class declaration.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=305.55) [If you haven't dealt with in a class as much and it could be an extra class,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=308.15) [it's not a big issue,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=310.63) [but you get the idea for this type of retrieval I like to use in](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=311.82) [her classes often to pass back information.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=315.08) [Now that we've got this object in place, we can do our select statement.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=318.74) [So I'm gonna go ahead and grab this code that I've already get got](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=322.89) [written for it and copy and paste that in here and now we can get](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=326.12) [an idea of what we've got going on.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=333.55) [I'm gonna import the results sets you can see very much like](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=335.12) [the insert record and the create table.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=338.91) [We are going to go ahead and grab a connection in a statement.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=341.66) [But then we also have our results set.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=345.35) [We're gonna execute this query,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=347.28) [loop through it and dump out what we have going on here.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=348.98) [And I need to do one of the thing to the client here.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=353.24) [I want to upend on the record for the client to utilize.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=356.29) [So I purposely left this out for us to work together on If I want to](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=360.6) [go ahead and say address address equals new address and then I can](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=366) [say address set i d rs dot Get string one and we could do the same](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=376.39) [thing for the other fields.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=387.62) [So he can say Set said ST,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=390.04) [and change that to get string to save that and then the same thing for the city.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=398.64) [So the set City se rs don't get String three Now when we're all done with that,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=412.49) [we want to go ahead and add that to her address is Objects will say addresses](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=419.33) [dot ad and add in our address and return that to the client.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=423.07) [Now let's take a look at how much simpler our client is,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=433.08) [and I've gone ahead and wrote the client code for us already.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=436.6) [So we've got our JBC demo that we already use and then our facade jbc](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=439.74) [demo and let me put these two side by side and we can see here that are](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=443.54) [facade cleans up our client code a lot.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=456.84) [So our facade demo is very simple, simply an instance of the facade.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=460.92) [And then I've got some debug code in here,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=467.43) [but we're creating the table,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=469.62) [inserting the table and producing a result set from our get addresses](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=471.22) [that loops through its Our client doesn't need to know about any of](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=478.14) [the connection information are singleton or any of the other stuff](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=481.1) [that's got that we've got going on.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=483.72) [Let's run this and see how it works.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=485.59) [You see run as Java application and we can see that we had](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=487.94) [our table creator in our record inserted,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=493.52) [and I did go ahead and print this out twice.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=495.47) [That was simply because we had our four loop here that was printing it out,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=498.35) [and we also had inside of our facade that was putting it out.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=501.97) [In our select statement, she saw a couple of concepts there.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=505.36) [We utilized our singleton, which was nice to take advantage of that.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=509.07) [But we also got to see how this is.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=513.19) [This facade is hiding all of this complex code,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=516.15) [all these connections,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=519.01) [statements and although type of information from our client,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=520) [which results in our client being much simpler and only](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=523.69) [focusing on what it needs to now.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=527.1) [As I mentioned,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=529.2) [we could take the table and the answered in the table](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=530.7) [statements and change that takes mystery and so would work](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=534.71) [for any object and our insert table.](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=537.29) [We could make it take the address object in there,](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=538.99) [but this shows thesis implicit E that our client now experiences using the facade pattern](https://app.pluralsight.com/course-player?clipId=58c1a94b-fc5b-489e-9446-e924d9bdb9cf&startTime=541.08)

### [Pitfalls](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3)

[[Autogenerated] what are some of the pitfalls of the facade?](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=1.24) [It's typically used to clean up code that was potentially](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=3.6) [designed incorrectly or poorly to begin with.](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=6.98) [If you're using it, a new A P I or interface,](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=10.5) [you really should look at the design of your A P I and see if](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=13.13) [another pattern will help solve the problems that you're](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=15.83) [trying to solve with the facade.](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=18.57) [It typically shouldn't utilise inheritance,](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=21.34) [so the facade deals with a flat problem or structure,](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=24.19) [and it is a It is the single 10 of structural patterns.](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=28.14) [And what A.](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=32.96) [What I mean by that is that it often is misused or overused because it's](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=33.47) [such an easy pattern implement You saw through our example.](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=38.42) [We just put a basic class in and masks some of those things that](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=41.28) [were going on behind the object behind it.](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=44.9) [It's an interesting pattern in the sense of object oriented programming,](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=47.84) [because it's just dealing with making a simpler interface to that client.](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=51.1) [But you can see how people often over use it or misuse it to just hide some of](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=56.24) [those ugly things that they've designed into their code.](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=60.87) [And if you're doing that up front,](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=63.8) [you probably need to think about the design of what you're trying to do inside your application](https://app.pluralsight.com/course-player?clipId=2421a861-ccd7-4cfe-9ad5-37e9409547a3&startTime=65.22)

### [Contrast to Other Patterns](https://app.pluralsight.com/course-player?clipId=9b5cfe0d-3431-4399-991b-fca2acf99f7b)

[[Autogenerated] to contrast the facade pattern.](https://app.pluralsight.com/course-player?clipId=9b5cfe0d-3431-4399-991b-fca2acf99f7b&startTime=0.6) [Let's compare it to the adapter pattern.](https://app.pluralsight.com/course-player?clipId=9b5cfe0d-3431-4399-991b-fca2acf99f7b&startTime=2.82) [The facade patterns simplifies an interface,](https://app.pluralsight.com/course-player?clipId=9b5cfe0d-3431-4399-991b-fca2acf99f7b&startTime=6.33) [and it works with, typically just composite.](https://app.pluralsight.com/course-player?clipId=9b5cfe0d-3431-4399-991b-fca2acf99f7b&startTime=9.7) [It provides a cleaner a P I,](https://app.pluralsight.com/course-player?clipId=9b5cfe0d-3431-4399-991b-fca2acf99f7b&startTime=13.83) [to something that was designed incorrectly or complex Lee to begin with.](https://app.pluralsight.com/course-player?clipId=9b5cfe0d-3431-4399-991b-fca2acf99f7b&startTime=16.3) [The adapter, on the other hand,](https://app.pluralsight.com/course-player?clipId=9b5cfe0d-3431-4399-991b-fca2acf99f7b&startTime=21.79) [is also a re factoring pattern very similar to the facade,](https://app.pluralsight.com/course-player?clipId=9b5cfe0d-3431-4399-991b-fca2acf99f7b&startTime=24.19) [but it modifies behavior and typically is used toe add behavior to an object.](https://app.pluralsight.com/course-player?clipId=9b5cfe0d-3431-4399-991b-fca2acf99f7b&startTime=28.34) [So with the facade, we're just trying to clean up its usage.](https://app.pluralsight.com/course-player?clipId=9b5cfe0d-3431-4399-991b-fca2acf99f7b&startTime=33.11) [Where the adapter is adding behavior to the object that we're working with.](https://app.pluralsight.com/course-player?clipId=9b5cfe0d-3431-4399-991b-fca2acf99f7b&startTime=36.68) [It also provides a different interface to code.](https://app.pluralsight.com/course-player?clipId=9b5cfe0d-3431-4399-991b-fca2acf99f7b&startTime=41.3) [So the adapter is trying to maybe bring an A P I or an interface up](https://app.pluralsight.com/course-player?clipId=9b5cfe0d-3431-4399-991b-fca2acf99f7b&startTime=44.77) [to something more current in your application, where the facades just trying to make it easier to work with](https://app.pluralsight.com/course-player?clipId=9b5cfe0d-3431-4399-991b-fca2acf99f7b&startTime=49.89)

### [Summary](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388)

[[Autogenerated] So let's briefly recap what we learned with the facade pattern.](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=0.65) [It simplifies the client interface, and that's really the Onley.](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=4.34) [And main goal of this pattern is to make things easier](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=7.98) [and hide some ugly nuances of an A P I.](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=11.39) [It's a very easy pattern to implement.](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=15.45) [As I mentioned in the pitfalls,](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=17.4) [It kind of is the singleton of the structural patterns,](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=19.1) [because people can see how it will help and see how to utilize it so](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=22.78) [they get a little carried away with it sometimes.](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=26.73) [But it is a simple one to add to your code and something that you](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=28.73) [should consider in trying to re factor things.](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=31.87) [And it's definitely a re factoring pattern.](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=36.34) [This isn't something you should design in upfront.](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=39.73) [It's something that you want to use down the road after you realize that.](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=41.96) [You know this code is ugly and we're passing all this](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=46.36) [stuff down to our client to utilize.](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=49.32) [Let's go ahead and put a layer here so that we can reduce](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=51.71) [those dependencies that the client is necessarily looking at](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=54.25) [is you'll notice in our JBC demo, our client had to know about connections,](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=58.22) [statements, results, sets and all that type of stuff,](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=62.83) [and after we put our facade in filling and he didn't know about was our facade,](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=65.3) [it didn't need to know about any of the exception or exception handling](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=68.94) [or connections that were going on behind the scenes.](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=72.38) [So it's a nice way to clean up that stuff and reduce those dependencies inside of our application.](https://app.pluralsight.com/course-player?clipId=052a7e1b-953c-4f61-bc2e-5aa3055cd388&startTime=74.37)

## [Flyweight Pattern](https://app.pluralsight.com/course-player?clipId=65297029-061a-4c33-9c0a-b1efb3542d94)

### [Introduction](https://app.pluralsight.com/course-player?clipId=65297029-061a-4c33-9c0a-b1efb3542d94)

[[Autogenerated] Hi, This is Brian Hansen.](https://app.pluralsight.com/course-player?clipId=65297029-061a-4c33-9c0a-b1efb3542d94&startTime=1.2) [And in this module, we're going to look at the flyway pattern.](https://app.pluralsight.com/course-player?clipId=65297029-061a-4c33-9c0a-b1efb3542d94&startTime=3.26) [The flyway pattern is a pattern that minimizes memory used by sharing data with similarly type objects.](https://app.pluralsight.com/course-player?clipId=65297029-061a-4c33-9c0a-b1efb3542d94&startTime=6.64)

### [Concepts](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180)

[[Autogenerated] the concepts surrounding why you would choose the flyweight](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=2.89) [pattern or when you need to make a more efficient use of memory.](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=5.47) [A flyway is definitely an optimization pattern.](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=9.74) [This is typically an issue when you have a large number of similar objects,](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=13.8) [and this is especially the case for objects that are](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=18.35) [stateless or immutable in nature.](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=20.45) [Immutable objects are objects that their state can't be changed after creation.](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=23.72) [This is possible when most of the objects state can be in tricks.](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=29) [Extrinsic, extrinsic properties are ones that are not essential or inherent.](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=32.49) [Examples of this in the job.](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=38.94) [A p i.](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=40.28) [R java dot Laing dot string strings are immutable objects and are loaded from a](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=41.01) [string literal pool that is basically the flyweight factory.](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=47.17) [Cashing is generally a hint also that you are,](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=51.42) [or could he be using a flyweight as well?](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=54.92) [There are quite a few other examples in the job,](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=58.2) [a P I, specifically java dot linda in Urge ER and the value of method,](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=60.44) [which is another great example of a flyweight.](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=66.09) [In fact, all of the primitive objects with rappers such as Boolean bite,](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=68.81) [character,](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=74.31) [short and long have a value of method that is similar to the inner jurors, one that is a flyweight in action](https://app.pluralsight.com/course-player?clipId=c4d422dd-9e18-4b07-a01c-3c7a08ada180&startTime=75.11)

### [Design Considerations](https://app.pluralsight.com/course-player?clipId=97e97ec0-6b18-4e81-b3bd-7a6e389ae4f5)

[[Autogenerated] the design of the flyweight is a little more](https://app.pluralsight.com/course-player?clipId=97e97ec0-6b18-4e81-b3bd-7a6e389ae4f5&startTime=2.55) [complicated than some of the other patterns we've looked at.](https://app.pluralsight.com/course-player?clipId=97e97ec0-6b18-4e81-b3bd-7a6e389ae4f5&startTime=4.64) [It is a pattern of patterns.](https://app.pluralsight.com/course-player?clipId=97e97ec0-6b18-4e81-b3bd-7a6e389ae4f5&startTime=8.14) [It utilizes other patterns inside of it, so to speak.](https://app.pluralsight.com/course-player?clipId=97e97ec0-6b18-4e81-b3bd-7a6e389ae4f5&startTime=11.52) [It uses a factory pattern to retrieve flyway objects after they've been created.](https://app.pluralsight.com/course-player?clipId=97e97ec0-6b18-4e81-b3bd-7a6e389ae4f5&startTime=15.41) [The flyweight also often encompasses both the creation and structure](https://app.pluralsight.com/course-player?clipId=97e97ec0-6b18-4e81-b3bd-7a6e389ae4f5&startTime=22.34) [of the object as far as the patterns concerned.](https://app.pluralsight.com/course-player?clipId=97e97ec0-6b18-4e81-b3bd-7a6e389ae4f5&startTime=27.94) [So it has a creation all pattern inside of this structural pattern.](https://app.pluralsight.com/course-player?clipId=97e97ec0-6b18-4e81-b3bd-7a6e389ae4f5&startTime=30.35) [It can and often does, manage the entire life cycle of the object.](https://app.pluralsight.com/course-player?clipId=97e97ec0-6b18-4e81-b3bd-7a6e389ae4f5&startTime=35.2) [If you are unfamiliar with the factory pattern,](https://app.pluralsight.com/course-player?clipId=97e97ec0-6b18-4e81-b3bd-7a6e389ae4f5&startTime=39.28) [you can watch the factory pattern module in the creation patterns course.](https://app.pluralsight.com/course-player?clipId=97e97ec0-6b18-4e81-b3bd-7a6e389ae4f5&startTime=41.65) [The pieces of the UML diagram are a client factory](https://app.pluralsight.com/course-player?clipId=97e97ec0-6b18-4e81-b3bd-7a6e389ae4f5&startTime=47.09) [flyweight and concrete flyweight. Let's look at that UML diagram now.](https://app.pluralsight.com/course-player?clipId=97e97ec0-6b18-4e81-b3bd-7a6e389ae4f5&startTime=51.74)

### [UML Diagram](https://app.pluralsight.com/course-player?clipId=b6a3c2fc-72b6-44fe-97c3-bd2a252e5c36)

[[Autogenerated] the UML for the flyway starts with a client](https://app.pluralsight.com/course-player?clipId=b6a3c2fc-72b6-44fe-97c3-bd2a252e5c36&startTime=2.23) [decline is what is requesting the flyweight object,](https://app.pluralsight.com/course-player?clipId=b6a3c2fc-72b6-44fe-97c3-bd2a252e5c36&startTime=5.94) [although often times it doesn't even know that it's a flyweight.](https://app.pluralsight.com/course-player?clipId=b6a3c2fc-72b6-44fe-97c3-bd2a252e5c36&startTime=8.93) [It requests it from a flyweight factory.](https://app.pluralsight.com/course-player?clipId=b6a3c2fc-72b6-44fe-97c3-bd2a252e5c36&startTime=12.35) [The factory returns the cached object,](https://app.pluralsight.com/course-player?clipId=b6a3c2fc-72b6-44fe-97c3-bd2a252e5c36&startTime=15.83) [or it creates a new instance of the flyweight](https://app.pluralsight.com/course-player?clipId=b6a3c2fc-72b6-44fe-97c3-bd2a252e5c36&startTime=18.49) [eventually at the end of the process,](https://app.pluralsight.com/course-player?clipId=b6a3c2fc-72b6-44fe-97c3-bd2a252e5c36&startTime=21.89) [if one doesn't already exist in our factory.](https://app.pluralsight.com/course-player?clipId=b6a3c2fc-72b6-44fe-97c3-bd2a252e5c36&startTime=24.16) [The concrete flyway is, in the end what gets returned to the client,](https://app.pluralsight.com/course-player?clipId=b6a3c2fc-72b6-44fe-97c3-bd2a252e5c36&startTime=28.15) [although it thinks it's just getting that object back often,](https://app.pluralsight.com/course-player?clipId=b6a3c2fc-72b6-44fe-97c3-bd2a252e5c36&startTime=32.86) [Time declined,](https://app.pluralsight.com/course-player?clipId=b6a3c2fc-72b6-44fe-97c3-bd2a252e5c36&startTime=36.96) [doesn't know the underlying structure and just has a simple interface.](https://app.pluralsight.com/course-player?clipId=b6a3c2fc-72b6-44fe-97c3-bd2a252e5c36&startTime=37.66) [But regardless, this is what happens underneath it all.](https://app.pluralsight.com/course-player?clipId=b6a3c2fc-72b6-44fe-97c3-bd2a252e5c36&startTime=40.97) [Now that we've seen the UML, let's look at some demo code that is an implementation of the flyweight.](https://app.pluralsight.com/course-player?clipId=b6a3c2fc-72b6-44fe-97c3-bd2a252e5c36&startTime=44.58)

### [Example: Integer](https://app.pluralsight.com/course-player?clipId=2aa59ac7-b662-4ca4-95e4-83e4966d62b3)

[[Autogenerated] If you've been developing with Java very long,](https://app.pluralsight.com/course-player?clipId=2aa59ac7-b662-4ca4-95e4-83e4966d62b3&startTime=2.19) [you probably know that strings are immutable and come](https://app.pluralsight.com/course-player?clipId=2aa59ac7-b662-4ca4-95e4-83e4966d62b3&startTime=4.96) [out of the string literal pool.](https://app.pluralsight.com/course-player?clipId=2aa59ac7-b662-4ca4-95e4-83e4966d62b3&startTime=8.04) [The literal pool is a sort of cash that all strings in the](https://app.pluralsight.com/course-player?clipId=2aa59ac7-b662-4ca4-95e4-83e4966d62b3&startTime=10.33) [jbm are stored in and retrieved from.](https://app.pluralsight.com/course-player?clipId=2aa59ac7-b662-4ca4-95e4-83e4966d62b3&startTime=13.22) [This is a great example of the flyweight pattern in action,](https://app.pluralsight.com/course-player?clipId=2aa59ac7-b662-4ca4-95e4-83e4966d62b3&startTime=15.91) [but most people don't realize the other rapper object for primitives such as](https://app.pluralsight.com/course-player?clipId=2aa59ac7-b662-4ca4-95e4-83e4966d62b3&startTime=19.25) [imager also make a great use of the flyweight pattern as well.](https://app.pluralsight.com/course-player?clipId=2aa59ac7-b662-4ca4-95e4-83e4966d62b3&startTime=23.07) [Here in this example, when we call the value of method,](https://app.pluralsight.com/course-player?clipId=2aa59ac7-b662-4ca4-95e4-83e4966d62b3&startTime=27.34) [it retrieves the object representing the number that we want the value of.](https://app.pluralsight.com/course-player?clipId=2aa59ac7-b662-4ca4-95e4-83e4966d62b3&startTime=30.89) [If that object doesn't exist, it will create it,](https://app.pluralsight.com/course-player?clipId=2aa59ac7-b662-4ca4-95e4-83e4966d62b3&startTime=35.94) [insert it and then return that object from there on out.](https://app.pluralsight.com/course-player?clipId=2aa59ac7-b662-4ca4-95e4-83e4966d62b3&startTime=39.14) [Other calls will get the same object. Let's look at this code in action.](https://app.pluralsight.com/course-player?clipId=2aa59ac7-b662-4ca4-95e4-83e4966d62b3&startTime=43.51)

### [Demo: Integer](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa)

[[Autogenerated] Here's Theisinger code that is utilizing the value of method,](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=1.44) [as we can see here,](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=5.33) [to grab an integer object from a primitive value U C in the 1st 2](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=6.43) [lines that we call value of with the value of five past in and](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=12.67) [get two different objects from that.](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=18.04) [Well, as we run this, you'll notice that down here in this system,](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=20.74) [without print Lynn, we have a system dot identity hash code.](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=24.12) [What this is is a little helper class that's in the system package that go](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=28.54) [out and and retrieve the identity hash code of this object.](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=32.45) [When we run it,](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=36.59) [you'll notice that the hash code for first and second end is the](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=37.5) [same because they're both for the value of five,](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=41.31) [meaning that it's grabbing that flyway object.](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=44.3) [And the third object into Juror third end,](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=46.94) [where we have a value of 10 will be a unique address.](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=51.36) [So once we run this run as Java application,](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=55.34) [you'll notice that those 1st 2 objects print out the same object address,](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=61.25) [and the 3rd 1 is a different address,](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=65.92) [and that's because the first ones creating it and](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=68.67) [storing it in the literal pool,](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=71.13) [the second one's just pulling it out of that literal polar.](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=72.85) [That flyweight cash and then 3rd 1 is creating a new object](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=75.62) [and retrieving that from the cash as well.](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=79.74) [So great example.](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=82.11) [And notice how your client really doesn't know anything unique](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=83.71) [or what's going on about the value of method, but under the hood, it's a perfect implementation of a flyway pattern.](https://app.pluralsight.com/course-player?clipId=5b6bebab-215b-499e-9992-834fae23cefa&startTime=87.05)

### [Exercise - Flyweight](https://app.pluralsight.com/course-player?clipId=75fdaae0-0788-4021-86a4-e1e10f80a752)

[[Autogenerated] Now we've seen a live demo.](https://app.pluralsight.com/course-player?clipId=75fdaae0-0788-4021-86a4-e1e10f80a752&startTime=1.34) [Let's go ahead and create our own flyway pattern for our exercise.](https://app.pluralsight.com/course-player?clipId=75fdaae0-0788-4021-86a4-e1e10f80a752&startTime=3) [We're going to build a flyweight that is a simplified](https://app.pluralsight.com/course-player?clipId=75fdaae0-0788-4021-86a4-e1e10f80a752&startTime=7.68) [version of an inventory management system that I worked on](https://app.pluralsight.com/course-player?clipId=75fdaae0-0788-4021-86a4-e1e10f80a752&startTime=10.15) [for a client a little while back.](https://app.pluralsight.com/course-player?clipId=75fdaae0-0788-4021-86a4-e1e10f80a752&startTime=13.26) [It will be comprised of a client, a catalog.](https://app.pluralsight.com/course-player?clipId=75fdaae0-0788-4021-86a4-e1e10f80a752&startTime=15.81) [The catalog will contain a factory of fly weights and order and an item.](https://app.pluralsight.com/course-player?clipId=75fdaae0-0788-4021-86a4-e1e10f80a752&startTime=19.92) [The items will be the actual implementation of the](https://app.pluralsight.com/course-player?clipId=75fdaae0-0788-4021-86a4-e1e10f80a752&startTime=25.22) [flyweight or are concrete flyweight.](https://app.pluralsight.com/course-player?clipId=75fdaae0-0788-4021-86a4-e1e10f80a752&startTime=28.05) [We're going to implement the fly weights in the factory and will run a](https://app.pluralsight.com/course-player?clipId=75fdaae0-0788-4021-86a4-e1e10f80a752&startTime=30.72) [report to see how many objects were actually created for the orders out of our inventory management system.](https://app.pluralsight.com/course-player?clipId=75fdaae0-0788-4021-86a4-e1e10f80a752&startTime=33.69)

### [Demo: Flyweight](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50)

[[Autogenerated] there's a few little moving pieces and parts to this pattern,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=0.94) [and rather than trying to code through it,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=4.04) [I've coated out the pattern.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=5.84) [And I'm just gonna walk through the individual pieces with you to start with.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=7.6) [We have an object name item item is our implementation of our flyweight.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=12.34) [It's the object that we're going to create a lot of.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=18.49) [Think of this in terms of like Amazon.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=22.01) [If you went out to every object on their site and pulled it up,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=24.73) [you would chew up a lot of memory.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=28.71) [And if everybody that was viewing it pulled back new instances of that object,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=30.72) [you could see how it could be very memory intensive.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=35.17) [So our item class is an example of our flyweight.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=37.94) [It is our flyway instance and notice that everything](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=42.03) [in here is final and immutable.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=44.68) [There's no centers or any of that type of information.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=46.62) [We can just set the name through the constructor](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=50.3) [and then call a two string on it.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=53.41) [We could put a getter and hair if we wanted to,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=54.78) [and you could add other attributes to this class.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=56.65) [If you wanted, you could have a U.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=60.29) [P C.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=61.62) [Code or description or a link to an image might be the actual path to the image.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=62.03) [The next piece I want to talk about is the order object.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=67.97) [The order object is just part of our application.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=70.79) [There's nothing need.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=73.5) [It really doesn't have anything particular to do with the flyway pattern.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=74.49) [Other than order is going to consume items.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=78.43) [CIA noticed that the order object has a constructor for an](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=82.04) [order number and an item to be passed into it.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=86.7) [And then we process our order and this is just a show](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=90.11) [that we're doing something with it now.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=92.64) [The catalog is where things get a little bit interesting.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=95.22) [The catalogue, which is how review.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=98.35) [Or you could also think of it as your search,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=100.23) [how we go through and look at our items.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=102.11) [It contains the hash map of our items and the factory](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=104.34) [method to see if we have these,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=109.01) [and if we don't to create him and what we want to do with him.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=111.4) [So it it has some very interesting attributes about how this](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=114.15) [gets handled and whether or not the client is getting back a](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=119.57) [cache of it or creating a new one.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=122.63) [But you can see.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=124.92) [It's a pretty simple implementation of how we look up these objects.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=125.69) [Now,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=130.24) [the last piece that won't talk about before we go to](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=130.53) [the client is the inventory system, the inventory system,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=132.55) [and this is just mocking out a much more both robust one](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=136.83) [on the back end has an instance of the catalogue and then](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=140.27) [an instance of our orders.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=143.64) [And it just basically creates some state in our system so we can](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=144.85) [take orders and we can process orders and then run a report on them](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=148.33) [and you'll see in here that this has a catalog dot total items made](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=152.54) [so it will go through and look at how many items we made from our](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=157.84) [catalogue object, which just contains the size of it.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=161.7) [So for our client,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=165.83) [we're gonna go through and create an instance of](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=167.58) [our inventory management system,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=169.62) [are basically bootstrap our inventory management system and start taking orders.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=170.95) [And now I've just got some basic strings put in there.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=175.51) [We could do something more sophisticated, but we can order room buzz.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=178.64) [We can order some Bose headphones or a Samsung TV,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=182.39) [and I'm just passing in some random order numbers on the](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=187.04) [side just to simulate our order system.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=189.76) [If you look at this at first glance, it would look like we're creating oh,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=193.29) [about a dozen or so items in our system when really there's only three](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=197.35) [things that we're allowing people to order a Roomba,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=202.33) [Bose headphones or Samsung TV.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=205.53) [When we take out those orders were eventually going to close](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=208.14) [out that system or close out the reports,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=210.55) [we're gonna do a process and then we'll print out a report of that.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=212.33) [Let's go ahead and see how many items were created.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=216.29) [We do run as Java application, you're going to see that we had all of our orders.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=219.78) [But at the end, we only made three objects.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=224.56) [The reason for that is when we take an order in our inventory management system,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=227.78) [we come through here and we do a look up from the catalogue for that item name.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=233) [So the item name that gets passed in is a Roomba,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=238.25) [a Bose headphones or Samsung TV.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=241.08) [Our inventory management system takes the order and looks](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=243.94) [it up out of the catalogue and says, Oh,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=247.12) [I'm gonna hand you back an instance of this object.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=249.25) [If it doesn't contain that object.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=252.44) [It creates a new one and puts it in that hash map.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=255.04) [If it contains it, it just returns.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=259.48) [That instance and you're good to go.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=261.37) [Now we go back to our inventory system.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=264.74) [It just adds those creates a new order each time and adds](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=267.04) [that order to our orders collection.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=270.49) [And then we go ahead eventually and process our orders.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=273.5) [Now, item nothing significant there.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=279.49) [But notice that everything inside of item is immutable.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=282.34) [Can't change it.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=287) [There's no getters, nothing on that.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=288.07) [It will just allow you to pass.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=290.4) [That instance of that object around order is unique because each order](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=291.94) [has its own item and order number associated with this.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=296.86) [So order has extrinsic things in there, but item has intrinsic values.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=301.62) [You don't need to get hung up on those details,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=306.61) [but just realize that the pieces of order can be changed](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=308.77) [where pieces of item cannot be changed,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=311.82) [and then catalog is what's doing our factory toe.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=314.44) [Look up those objects.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=317.19) [So when we run it,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=319.67) [it looks like we're creating all these item objects when really](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=320.8) [we're only creating three for this entire system.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=323.87) [And it wouldn't matter how many times we took orders for those.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=326.83) [We could take a 1,000,000 orders.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=329.08) [If he only had three of those objects,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=330.37) [it would only create three of them because that's all we](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=332.78) [had to choose from our flyway objects.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=336.29) [So you see how this could be a very big performance boost for your system,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=338.6) [especially if you start looking at some of your bigger](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=342.55) [online retailers such like Amazon or Walmart,](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=344.99) [or things like that that have a lot of objects or items that people could take advantage of and take orders for.](https://app.pluralsight.com/course-player?clipId=11e249c5-b736-4a76-a3a9-f78a53528e50&startTime=347.97)

### [Pitfalls](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56)

[[Autogenerated] what are some of the pitfalls of a flyweight?](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=0.92) [It is a bit of a complex pattern, as you notice is, we went through our example.](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=3.44) [There's Ah lot of little moving pieces to utilize it the right way,](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=8.2) [and you have to deal with a factory and some of the other pieces that you](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=11.67) [want to utilize just to take advantage of this pattern.](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=15.52) [I am personally not one that likes to prematurely optimize my code,](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=19.4) [and this is a pattern that you do that with.](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=23.74) [You are already planning up front for optimization.](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=27.06) [That's not necessarily a bad thing.](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=30.53) [If you've done a spike or you understand your product or architecture well](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=32.2) [enough that you know you're going to need to optimize upfront,](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=36.69) [then that's not necessarily a bad thing.](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=39.99) [But I often find that people figure that out later in their product lifecycle.](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=41.59) [Another pitfall with this is that you must understand the factory pattern now.](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=47.13) [That's not necessarily a bad thing,](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=51.49) [but if you have a pattern inside of a pattern,](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=53.21) [sometimes it can be a little bit confusing about which is](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=56.03) [the factory and which is the flyweight,](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=58.24) [and that the fly weights part of the factory of what?](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=60.01) [The factories returning and you get the example.](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=63.02) [It just becomes a little bit more complex.](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=65.64) [If you're looking at other examples out there.](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=69.03) [Ah, lot of them are graphical examples.](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=71.48) [Its value is well beyond graphical implementations.](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=75.09) [But a lot of research would lead you to believe that](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=78.94) [this is where it's on Lee Value is at.](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=81.2) [You can see through our example that we would utilize](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=83.94) [this in any sort of management system, you know,](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=86.37) [inventory management or a shopping cart system.](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=90.02) [Something to that nature where we have a lot of small objects](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=94.6) [that a lot of people will be utilising,](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=98.95) [and we need to take advantage of that memory management.](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=100.7) [So not just a graphical pattern,](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=103.89) [but a lot of the examples and samples you look at out. There definitely are graphical centric](https://app.pluralsight.com/course-player?clipId=026228d5-5707-42c8-a2ed-7fd08061ab56&startTime=106.01)

### [Contrast to Other Patterns](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d)

[[Autogenerated] to contrast the flyweight pattern.](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=1.02) [Let's compare it with the facade.](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=3.75) [And honestly,](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=6.4) [there aren't really a lot of other Strack structural patterns](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=7.18) [that are very similar to the flyweight, but this is a good one to compare it to.](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=10.81) [For various reasons, the flyweight is focused on memory optimization.](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=15.16) [It is by nature a optimization pattern and deals with immutable objects.](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=21.21) [The facade, on the other hand,](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=28.59) [is a re factoring pattern and is usually implemented after the fact.](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=30.48) [So the flyweight is definitely implemented upfront and early on.](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=35.87) [If not,](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=39.75) [you're going to be re factoring a lot of code where the facade is](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=40.13) [definitely something that's thought of after the fact.](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=43.59) [The facade is also centred around making a simplified](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=46.96) [client or making it easier for the client.](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=51.86) [Once we realize that the A.](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=54.17) [P I were dealing with his very complex in nature,](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=55.35) [it also provides a different interface.](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=59) [Its entire goal is a different interface for the client,](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=61.76) [where the flyweight was designed up front for the client to not know](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=65.43) [that that pattern was being utilized under the hood.](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=69.78) [All it knows is that it has an instance of whatever object it was](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=72.17) [trying to get so we would use a facade to provide a more simplified](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=76.36) [interface where the flyweight was designed up front to already deliver a simple interface to the client.](https://app.pluralsight.com/course-player?clipId=7c1775a7-6749-4ae7-bd5c-c3b1be0ee73d&startTime=81.57)

### [Summary](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7)

[[Autogenerated] Let's do a quick recap of what we](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=1.6) [learned with the flyway pattern.](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=3.22) [It is great for memory management.](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=6.18) [It's a pattern that we want to utilize if we know we're going to have a](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=9.34) [lot of objects that were going to pass around in our system and don't](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=13.24) [want to create those for every client or end user that's going to be](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=17.14) [accessing them from our system.](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=21.24) [It can't be a little bit of a complex pattern to deal with](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=23.72) [unnecessarily bad once you know the details of it.](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=27.2) [But you have a factory pattern in there.](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=29.77) [At a minimum, you have to make your objects immutable,](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=31.77) [and you're dealing with all these small little objects and how](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=35.61) [you pass them around where a lot of times people haven't](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=39.1) [thought of in terms of composition,](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=42.07) [you're going to pass an object into an object,](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=43.94) [and that's going to be an instance of your flyweight.](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=47.43) [It is used a lot by the core AP I.](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=51.5) [So there are some great examples out there,](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=54.42) [and now you know what you're looking for.](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=56.16) [You'll see all the time that oh,](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=58.08) [I'm using the java dot langdon integer value of our byte value of our character](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=60.37) [value of her strings are all great examples of fly weights,](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=64.94) [and they're not just used for graphical implementations.](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=69.34) [The next pattern that we're going to look at is the proxy](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=73.6) [pattern if you're following along this Siri's and that's the](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=76.43) [last one for the structural patterns. So let's go ahead and take a look at that now.](https://app.pluralsight.com/course-player?clipId=6e546a93-6979-412b-be1c-a4387d4a5bf7&startTime=79.56)

## [Proxy Pattern](https://app.pluralsight.com/course-player?clipId=7fa31637-999a-484c-b52b-b44b511b8d9e)

### [Introduction](https://app.pluralsight.com/course-player?clipId=7fa31637-999a-484c-b52b-b44b511b8d9e)

[[Autogenerated] Hi, This is Brian Hansen.](https://app.pluralsight.com/course-player?clipId=7fa31637-999a-484c-b52b-b44b511b8d9e&startTime=1.54) [And in this module, we're going to look at the proxy pattern. The proxy pattern is a pattern that acts as an interface to something else.](https://app.pluralsight.com/course-player?clipId=7fa31637-999a-484c-b52b-b44b511b8d9e&startTime=3.28)

### [Concepts](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055)

[[Autogenerated] the concept surrounding why you would choose the proxy](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=2.02) [pattern or what we want to wrap it really object with a proxy.](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=4.26) [For various reasons,](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=7.79) [you create an interface to an object by wrapping it](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=9.47) [with a class to create that proxy.](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=12.76) [It can also add more functionality to that wrapped object.](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=15.92) [Proxy could be used to solve multiple problems such as security](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=20.35) [or simplifying and interface to something a remote service call](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=25.2) [or just a expensive object to create.](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=30.03) [Well, oftentimes,](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=33.7) [rabbit with the project proxy and display loading message](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=34.67) [or something like that for a expensive object that we're](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=38.35) [trying to display to Are you?](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=41.55) [I or just loaded a memory.](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=43.34) [The proxy itself is called to access the rial objects will have](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=45.54) [an interface than a proxy that's wrapping the real object and](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=49.86) [then the underlying real object.](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=53.95) [Examples of a proxy in the Java empire actually kind of interesting.](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=56.64) [In different from some of the other patterns that we've looked at.](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=60.85) [The java dot lang dot reflect dot proxy object is a mechanism to](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=64.19) [facilitate creating proxy patterns using Java,](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=72.7) [so Java deep down,](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=76.92) [felt like this was an important enough concept that they](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=78.66) [create created a proxy class and object invocation handlers](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=81.49) [to facilitate creating proxies.](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=87.32) [And many of the frameworks you're used to seeing are built](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=89.36) [with java dot ling not reflect dot proxy.](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=92.67) [Also,](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=96.22) [the whole java dot r M I package is focused around](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=96.63) [proxy and remote method invocation.](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=101.52) [So as we looked at the concept above one of those being remote,](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=103.67) [the Java Dot are in.](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=108.07) [My package is all about accessing remote objects and retrieving that data across the wire.](https://app.pluralsight.com/course-player?clipId=e5948540-7ae1-454e-b8d0-2c97f51cb055&startTime=109.09)

### [Design Considerations](https://app.pluralsight.com/course-player?clipId=e97db935-2d2c-4741-a47d-92e285d3b6f3)

[[Autogenerated] The design of the proxy is simple in concept,](https://app.pluralsight.com/course-player?clipId=e97db935-2d2c-4741-a47d-92e285d3b6f3&startTime=2.37) [but it could be utilized in many different ways.](https://app.pluralsight.com/course-player?clipId=e97db935-2d2c-4741-a47d-92e285d3b6f3&startTime=5.53) [The basis for it is an intermediary object that intercepts calls.](https://app.pluralsight.com/course-player?clipId=e97db935-2d2c-4741-a47d-92e285d3b6f3&startTime=8.3) [That being said, it is typically interface based.](https://app.pluralsight.com/course-player?clipId=e97db935-2d2c-4741-a47d-92e285d3b6f3&startTime=13.34) [Many frameworks like spring and some uses of hibernate and other](https://app.pluralsight.com/course-player?clipId=e97db935-2d2c-4741-a47d-92e285d3b6f3&startTime=17.01) [various dependency injection frameworks use it and in doing so](https://app.pluralsight.com/course-player?clipId=e97db935-2d2c-4741-a47d-92e285d3b6f3&startTime=21.03) [typically have an interface and an implementation class that the](https://app.pluralsight.com/course-player?clipId=e97db935-2d2c-4741-a47d-92e285d3b6f3&startTime=24.65) [proxy resides in between the job, the A P.](https://app.pluralsight.com/course-player?clipId=e97db935-2d2c-4741-a47d-92e285d3b6f3&startTime=28.83) [I recognize the need for the proxy pattern and incorporated an interface.](https://app.pluralsight.com/course-player?clipId=e97db935-2d2c-4741-a47d-92e285d3b6f3&startTime=32.29) [The invocation handler and a class the java dot Laing don't](https://app.pluralsight.com/course-player?clipId=e97db935-2d2c-4741-a47d-92e285d3b6f3&startTime=36.89) [reflect up proxy class to facilitate this.](https://app.pluralsight.com/course-player?clipId=e97db935-2d2c-4741-a47d-92e285d3b6f3&startTime=42.16) [The pieces of the UML diagram are a client,](https://app.pluralsight.com/course-player?clipId=e97db935-2d2c-4741-a47d-92e285d3b6f3&startTime=46.06) [an interface invocation, handler proxy and its implementation. Let's look at that UML diagram now.](https://app.pluralsight.com/course-player?clipId=e97db935-2d2c-4741-a47d-92e285d3b6f3&startTime=50.13)

### [UML Diagram](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff)

[[Autogenerated] Here's the UML for the proxy pattern.](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=1.24) [As you can see,](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=4.34) [we start off with a client class that's going to make](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=5.15) [a reference call to some object,](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=8.87) [some subject and rather than it retrieving the real subject that we want,](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=12.15) [it's going to be intercepted with this proxy.](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=17.84) [So that subject would be an interface to whatever the](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=19.81) [implementation classes that we want to retreat.](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=23.12) [The proxy,](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=26.25) [using an invocation handler in the proxy class in Java intercepts](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=27.4) [that call and makes the call to the real subject.](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=31.89) [Or if it's a case like security,](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=35.7) [would deny it or do something different and turned around and sees if it needs](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=37.71) [to load that if it's gonna pull it from a cash or whatever,](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=42.04) [it's gonna dio.](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=44.45) [No, it didn't decides that.](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=45.53) [Yes,](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=46.93) [I am goingto low this really subject or this real object](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=47.23) [back and returns that back to the client.](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=50.38) [You can see how, really we've just got an implementation and a class, and that proxy handles the call in between those two](https://app.pluralsight.com/course-player?clipId=7285f098-09f3-491b-9bb9-58efb28d14ff&startTime=54.54)

### [Example: Proxy](https://app.pluralsight.com/course-player?clipId=a70f3a26-7397-4102-b50f-205ea2e52bcc)

[[Autogenerated] this example is gonna be a little bit different](https://app.pluralsight.com/course-player?clipId=a70f3a26-7397-4102-b50f-205ea2e52bcc&startTime=1.91) [than some of the other examples we've done for.](https://app.pluralsight.com/course-player?clipId=a70f3a26-7397-4102-b50f-205ea2e52bcc&startTime=4.16) [Other patterns were going to actually use the proxy class in this](https://app.pluralsight.com/course-player?clipId=a70f3a26-7397-4102-b50f-205ea2e52bcc&startTime=6.82) [example and create a small sample that we're gonna tie into a real](https://app.pluralsight.com/course-player?clipId=a70f3a26-7397-4102-b50f-205ea2e52bcc&startTime=11.16) [application to pull a message back from Twitter.](https://app.pluralsight.com/course-player?clipId=a70f3a26-7397-4102-b50f-205ea2e52bcc&startTime=15.94) [So to start with will walk through the invocation handler and](https://app.pluralsight.com/course-player?clipId=a70f3a26-7397-4102-b50f-205ea2e52bcc&startTime=19.22) [the proxy class to build out a small piece,](https://app.pluralsight.com/course-player?clipId=a70f3a26-7397-4102-b50f-205ea2e52bcc&startTime=23.4) [and then we'll continue that on for a large, larger example.](https://app.pluralsight.com/course-player?clipId=a70f3a26-7397-4102-b50f-205ea2e52bcc&startTime=26.35)

### [Demo: Proxy](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc)

[[Autogenerated] So for this example,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=2.54) [we're going to start off and create an implementation of a proxy](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=3.74) [that's going to be used to call Twitter to do so.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=9.13) [We're going to start off by first building an interface because we typically](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=12.85) [have an interface and an underlying implementation class.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=17.23) [So to start with will have the Twitter service interface and](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=20.9) [go ahead and click finish and said here,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=28.88) [we're gonna add to method calls and I've already got these typed out.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=31.55) [Just go ahead and grab these and copy and paste them in.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=36.14) [We'll have to methods a get timeline in a post a timeline.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=41.64) [What we're going to do is we're going to put a security proxy in](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=45.36) [between this and the implementation class now,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=49.02) [because this demo would be too long to just do it.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=51.99) [Once when you break it up, we're going to start off by creating a stub,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=54.15) [which is just a method for us to try something out that doesn't](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=57.97) [isn't going to call the rial service itself going to do that in](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=62.98) [the second part of this example.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=66.14) [So now let's right click and create a new class,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=68.09) [and we're gonna call this the Twitter service stub,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=72.55) [and it's going to implement our Twitter service interface and quick finish.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=79.04) [Now it has two basic methods inside of here that it's](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=89.94) [overridden automatically generated for us.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=93.71) [Let's just return a string and we'll just put](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=95.93) [something in Harris some fake texts, my need o timeline,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=100.49) [and we can get rid of this to do for now on.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=109.14) [Just leave this blank.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=112.07) [So now we have our service and our stub.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=114.98) [We're going to swap this out with an implementation letter later.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=119.34) [Let's put a proxy in between here now.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=122.95) [What we want to do is we want to create a new class and](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=125.45) [we'll call this thesis a cure ity proxy.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=129.66) [And we're gonna make this implement the in vocation handler and](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=134.04) [click finish on this and you'll see that it drops in this invoke](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=143.98) [method for us that we have to implement as part of the](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=148.92) [invocation handler interface.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=153.21) [So let's go ahead and get rid of this to do out of here,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=156.01) [and I'm going to copy and some code that I already](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=159.08) [have written for the security proxy.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=161.72) [Just you're not sitting here watching me type,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=163.37) [so I'm gonna go to my demo notes and pull in a new instance and the invoke](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=166.51) [method that I have already written and paste that in here.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=174.99) [So now there's a couple things I need to add.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=186.63) [The way I have this written.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=189.2) [I'm going to store a private instance of the security object that the](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=190.55) [object that we're rapping with the proxy inside of here.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=196.75) [So we're going to go ahead and say, All right,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=199.8) [let's call this constructor with an object.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=202.73) [Say private object will be J and will make a private constructor security](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=206.74) [proxy were basically making a little factory pattern here.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=219.33) [I will say Object object.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=224.24) [This stuff object equals O B.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=229.14) [J.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=232.35) [And we're done with that section of it.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=233.11) [So that facilitates us passing in the object down here.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=235.49) [Now the next thing we need do is go ahead and handle any exceptions or at](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=241.15) [the things that the other things we have going on in here.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=244.76) [So let's go ahead and hit control shift.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=246.8) [Oh, and save this so that organized our imports.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=248.98) [Now we have the basis for this class in place.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=253.04) [Let's step through the code that I that I went ahead](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=256.53) [and copied and pasted in here.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=260.07) [So we implemented the implication handler and that forces](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=261.18) [us to have this at invoke over here.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=265.1) [In fact,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=267.52) [I could put the at override annotation on here for the compiler and save that.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=267.84) [But another thing we did is we turn this into a small little factory that](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=276.3) [we're gonna go ahead and grab an instance of this object back.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=280.77) [And this is where the proxy pattern comes into place.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=284.2) [You'll see that we return a java dot Laing dot Reflect up proxy,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=286.44) [new proxy instance where we pass in the object that get class,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=291.16) [get class \_\_\_\_\_\_\_\_\_ of this and the interfaces.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=295.31) [So it builds this proxy around the class and any interfaces its](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=298.98) [implementing and then returns a new security proxy object that is](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=303.28) [wrapping and then down below the invocation handler is where the](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=308) [magic happens of us invoking these calls.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=313.51) [So this is where the proxy really comes into play.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=315.98) [So we have our proxy it here they're gonna create.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=318.21) [But this is what tells it what methods we will or](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=320.35) [won't invoke on when we call this.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=322.54) [This is where we will eventually add some security](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=326.13) [around this as it stands right now,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=328.51) [we're saying anything you dio I'm just gonna go ahead and pass through.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=330.34) [So any method you try to call,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=333.8) [let's invoke whatever action you wanted to on that and return](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=335.7) [the result from that so you can see that we go ahead and pass](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=339.91) [things in and past results out, and now we have the basis of our proxy in place.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=342.96) [This is all you have to do to create that proxy.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=349.32) [Let's go ahead and create a demo class for this so you can see it in action.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=351.98) [So I'm gonna go ahead and now,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=357.84) [right click and say New class and I'll check the public static void Main](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=359.59) [create check box and we'll call this the Twitter demo finished.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=365.81) [Now let's go ahead and go in the main method that was](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=375.81) [created for us and create an instance of our proxy that](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=378.05) [wraps are stub that we created.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=382) [So first we want to start off by creating an instance of the Twitter](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=384.7) [service to assign our object twos will say service equals and this is](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=389.2) [where it gets a little more interesting.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=394.69) [I'll tell you right now we have to cast it,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=397.04) [so I know I'm going to end up doing this.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=398.96) [I say Twitter service and we want to do security.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=400.79) [Proxy dot knew instance.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=405.31) [And we're gonna pass into that a new Twitter service stub,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=410.91) [and we want to go ahead and put a semicolon on the end of that line.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=422.84) [And we can now just say,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=426.93) [system dot out of print Lynn and will pass in the service.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=429.69) [Get a timeline, and we'll just It's a stub right now.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=437.42) [So whatever value we pass in,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=441.38) [it's going to just return our default test data for us.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=444.78) [Let's go ahead and run this now Gonna click,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=447.77) [run right,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=449.52) [click and save Run as a Java application and you'll see it reported back](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=450.23) [the Mayan Ito timeline that came from our Twitter stubs.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=456.78) [So this is what we're returning out of our stub right now.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=461.54) [In the next example,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=464.34) [we're going to dive into a little bit more of what](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=465.4) [we did with this invoke method,](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=467.84) [and we're not going to allow people to post back because we don't](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=469.74) [have any security there and will take and replace this Twitter](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=474.05) [service stub with an actual call to Twitter.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=477.31) [Gotta pull on 1/3 party library for that.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=480.74) [But it's a real world example of something you can do and see how that security proxy comes into play.](https://app.pluralsight.com/course-player?clipId=8b0c7b6e-096b-4efc-842d-3a73ffb66ddc&startTime=482.74)

### [Exercise - Twitter Proxy](https://app.pluralsight.com/course-player?clipId=5b22a01f-72fb-4614-a089-cfe470aa86a8)

[[Autogenerated] to continue on with our proxy example.](https://app.pluralsight.com/course-player?clipId=5b22a01f-72fb-4614-a089-cfe470aa86a8&startTime=1.81) [We're going to go ahead and download and implementation of the Twitter AP](https://app.pluralsight.com/course-player?clipId=5b22a01f-72fb-4614-a089-cfe470aa86a8&startTime=5.01) [I with a little jar that's out there for calling it.](https://app.pluralsight.com/course-player?clipId=5b22a01f-72fb-4614-a089-cfe470aa86a8&startTime=9.34) [We're going to modify our stub to be an actual implementation,](https://app.pluralsight.com/course-player?clipId=5b22a01f-72fb-4614-a089-cfe470aa86a8&startTime=12.98) [so we'll switch that over to a classical.](https://app.pluralsight.com/course-player?clipId=5b22a01f-72fb-4614-a089-cfe470aa86a8&startTime=17.51) [The Twitter service simple, could honestly be named whatever we want.](https://app.pluralsight.com/course-player?clipId=5b22a01f-72fb-4614-a089-cfe470aa86a8&startTime=19.13) [But typically you have the service and in the](https://app.pluralsight.com/course-player?clipId=5b22a01f-72fb-4614-a089-cfe470aa86a8&startTime=22.38) [implementation of it in that naming convention.](https://app.pluralsight.com/course-player?clipId=5b22a01f-72fb-4614-a089-cfe470aa86a8&startTime=24.84) [And then we will finally restrict the post call to](https://app.pluralsight.com/course-player?clipId=5b22a01f-72fb-4614-a089-cfe470aa86a8&startTime=27.5) [requiring you to have some security.](https://app.pluralsight.com/course-player?clipId=5b22a01f-72fb-4614-a089-cfe470aa86a8&startTime=31.96) [Now we're going to stop that exercise a little bit short and just](https://app.pluralsight.com/course-player?clipId=5b22a01f-72fb-4614-a089-cfe470aa86a8&startTime=33.65) [not allow post calls right now with their A p I.](https://app.pluralsight.com/course-player?clipId=5b22a01f-72fb-4614-a089-cfe470aa86a8&startTime=37.39) [But you'll see how you can hook in security in that invocation handler in the proxy class that we created.](https://app.pluralsight.com/course-player?clipId=5b22a01f-72fb-4614-a089-cfe470aa86a8&startTime=40.59)

### [Demo: Twitter Implementation](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c)

[[Autogenerated] to get started to actually make our implementation.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=2.34) [Call the Twitter service.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=5.52) [We're going to need to download 1/3 party jar, and it's a small jar.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=7.71) [It's real simple.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=12.01) [Just makes this example lot easier to use.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=13.57) [So I'm gonna go ahead and come out here to Twitter for j dot](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=15.8) [org's and click the download link and will take us down here](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=19.7) [to the latest stable version.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=25.29) [Go ahead and click download already have it downloaded.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=27.84) [Once you have yours,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=31.06) [you're going to unzip it into a folder like this and go into live directory.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=32.36) [And all we care about is thedc Twitter for core Twitter for J.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=38.14) [Desk or example.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=42.15) [So I want to go ahead and drag that over into my live folder and we'll say,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=44.04) [copy files and then we can right click on it and say,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=51.91) [Build path, add to build path.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=57.22) [Now the other way you could do this is, of course,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=61.25) [pull it in through maven, and this project is actually set up.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=63.97) [Is maven maven project inside my I D.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=66.9) [But to keep it a simplest possible,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=69.82) [I just downloaded that link and copied it in there.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=71.82) [Now the next thing we need to do is to go out to Twitter and](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=75.85) [create a APP account to pull this information in.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=80.1) [Now I will tell you you have to do this because I am going to show you on](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=84.66) [the screen and I'm going to delete my keys afterwards.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=88.15) [So if you try to put the keys that I'm using in, it will not work.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=91.88) [I'm gonna switch back to my browser and go to dev dot twitter dot](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=95.97) [com and you'll need to log in with your account and verify that](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=101.4) [you're a developer and everything else,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=107.04) [and you go down the very bottom and you'll see a link for manager APs.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=108.79) [Once we go on here,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=114.44) [say you currently have any Twitter outscore hadn't create one.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=115.77) [So let's create a new app and I'm going to dio plural site proxy.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=118.85) [And this is an app to demo calling a proxy that](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=126.09) [calls Twitter and for the website.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=134.55) [When I just put http colon ford slash ford slash Yep, that'll work.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=140.2) [W w dot portal site dot com Author Brian Hansen You can put your own](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=144.96) [personal website in there and we don't have a callback,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=148.57) [your l so that's fine.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=153.16) [Yes, I agree.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=156.04) [Queer Creator.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=157.18) [Twitter application.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=158.01) [Now, this is gonna come in here and do two things for us.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=159.15) [You'll see that it shows some various consumer keys and that type of stuff.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=162.79) [What we want to do is we want to go to our keys and access tokens and you'll](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=169.34) [see that there is a consumer key and a consumer secret.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=174.31) [I shouldn't be showing you this,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=180.76) [And that's why I'm going to delete mine when this is all said and done.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=182.06) [So I'm gonna copy that consumer key,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=185.24) [and we're going to eventually paste this into our application.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=188.29) [Let's go create the class that we're going to utilize this in.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=193.05) [I have created a gist for you on get hubs or a guest,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=198.53) [Jesse,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=203.43) [and call it whatever you want toe where you don't have the type of this code in.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=203.85) [It doesn't add anything to the example.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=208.87) [But I wanted this to be a real world, real world example.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=210.71) [So I'm gonna head and copy this code in,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=213.89) [and I'm gonna go over to my I d e and create a new class in our proxy package.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=216.96) [That is the Twitter service Simple and click finish,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=225.81) [and I'm just going to replace all of this in here](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=234.24) [with this class here and save it.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=238.64) [Now you can go through and look at what it does.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=241.63) [It does a configuration builder and takes our keys and our Twitter](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=243.77) [factory and string builder and all that stuff and pace it in here and](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=246.98) [finally turn returns at at to our client.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=250.59) [But you'll see right now, this is where we're gonna put those keys.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=253.94) [So let's grab that Twitter key.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=256.51) [There's my consumer key.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=260.32) [Copy that.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=262.04) [And make sure you copy it.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=267.22) [Pace that over your put values here, your secret key.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=271.86) [And then we'll have to generate to other tokens.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=279.54) [It's white.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=282.38) [And just copy these in here.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=282.84) [So you're gonna come down here and say you have no access tokens.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=284.18) [I'm gonna create my access token for this and you'll](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=287.3) [see there's my first access token.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=292.03) [Be careful.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=294.41) [If it's got a hyphen in there, it won't just select all for you.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=295.01) [We'll put our access token in, and then our tokens secret.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=301.74) [Copy that.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=309.74) [And now we have everything put in place to do our call.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=310.82) [So the steps there we had to download from Twitter for j dot](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=314.96) [org's unzip It grabbed the core library.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=321.35) [We had to go to Twitter, log in and eventually goto manage our APS,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=324.59) [go down there, create our plural site proxy app,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=332.65) [and then generate our access key.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=335.61) [So we had our consumer Keilar consumer secret and our](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=337.84) [access token and access secret.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=340.83) [And then I had the Twitter service Empoli just here,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=342.97) [and this will always exist here.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=347.82) [In fact, I'm gonna go ahead and copy this u R L for you.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=349.81) [It's a public just so you can always download it and just put it in a comment](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=353.85) [inside the application here for you to see that you can go download it from](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=358.54) [this u R l That will always exist for you out there.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=363.17) [Now let's go ahead and go back to our Twitter demo,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=367.28) [Public static void, main method.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=371.76) [And instead of doing this stub,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=373.56) [we're going to replace that with the simple and save it.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=375.5) [Now.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=380.44) [When we call this, we should get what's on my timeline back, right?](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=380.95) [Click and say,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=387.36) [run as job application and it went out and pulled the most recent](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=387.92) [things off of my timeline or anywhere that they could search and](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=394.54) [have at B H five k inside of that string.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=398.22) [So you can see here we have a real world example where](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=403.41) [this is calling a remote object,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=405.95) [and we could control access to it or other information that we](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=408.84) [wanted to retrieve from that implementation.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=412.4) [One nice thing about this, this is why your dependency injection frameworks do.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=416.12) [This is now I can control whether or not this object gets created,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=420.02) [its lazily loaded.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=424.77) [If it's a remote resource and there's Nick big expense to it,](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=426.45) [we don't pull it in until we need Teoh.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=429.12) [We can wrap security around its.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=431.34) [You see, There's a lot of benefits around having this proxy in place.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=432.87) [And we did it with a real world example.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=436.94) [The rial catches just making sure you get those keys in the](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=439.43) [right way and creating that application.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=441.68) [Now, if you try these keys that I put in here, they're not gonna work.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=444.49) [You have to replace these with your own value, cause I'm deleting these off my account right now.](https://app.pluralsight.com/course-player?clipId=4bba3f01-1409-473c-957d-00f9cdea8f4c&startTime=448.41)

### [Demo: Security Proxy](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929)

[[Autogenerated] Now that we have our example working,](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=0.93) [let's go ahead and add that security to not allow people to](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=3.12) [call the post method in there cause currently,](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=6.47) [if we call it, it will let that in vocation go through.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=8.65) [I'm gonna show you by modifying the Twitter demo class that will do just that.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=12.54) [So if I call service dot post two timeline,](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=17.96) [give it a screen name, the H five k and a message,](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=23.94) [some message that shouldn't go through it currently will let it go through.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=31.61) [Now.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=41.3) [I don't have it actually implemented in the simple to go through and](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=41.65) [make that call because we're going to disallow it.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=45.09) [But as it stands right now, it will go through.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=47.61) [We'll just throw a system about out print linen here just](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=51.84) [to show that it is in fact happening.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=54.05) [And let's go ahead and say no.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=56.74) [Let's just paste the message in there and say that now if we call our Twitter,](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=60.33) [Twitter demo and run run as Java application,](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=67.02) [you'll see that it goes through and it says some](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=72.94) [message that shouldn't go through.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=75.27) [So it's going through a now doing that now to implement the](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=76.85) [security and We're just going to a poor man.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=80.73) [Security here.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=82.56) [You could do a real full fledged security interface like](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=83.17) [spring security or something else.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=86.28) [Look at some five or nine certificates or oh, author or whatever.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=88.48) [I'm gonna open up our security proxy and go down here to the invoke method.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=92.54) [And this is what's getting called by our proxy to actually](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=96.43) [invoke the various methods we want to call.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=99.97) [So one of things I can do is I can come down here and I can say m dot get name](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=104.09) [and this will return the name of the method I want to call.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=111.17) [So I want to just say,](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=114.07) [if m dot get name dot contains and what has passed in post,](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=114.92) [then let's go ahead and we'll close that if block off and](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=124.94) [say ehlz will allow it to go through.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=132.82) [So if it does post, then we'll throw an exception.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=137.84) [So let's go up in our F block here and say Throw new \_\_\_\_\_\_\_](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=141.8) [and let's dio a legal access exception and posts are currently](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=148.24) [not allowed and close that off.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=157.14) [So all we really did is grabbed the name and look at the method](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=161.4) [that's being called here and redirect or reroute it to whatever we](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=166.47) [want to do and you'll notice really quickly.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=170.33) [We can do lots of stuff based on retrievals or](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=172.03) [posting or any of the crowd functions,](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=176.18) [or what just based off of our naming convention.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=178.81) [So it's a little you get the power of having something like aspect](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=181.25) [oriented programming without a lot of the headaches of it,](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=184.69) [just because the proxy is here to intercept these calls for us.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=186.93) [So now if we go back and run our Twitter demo right click source,](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=190.69) [right click, run out a job application,](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=197.84) [excuse me and you'll see that we get an exception](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=200.25) [thrown saying unexpected invocation.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=203.8) [Exception.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=206.82) [Posts are currently not allowed,](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=207.42) [so it did not allow that call to go through and stopped our application there.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=209.4) [Clearly,](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=215.06) [we could clean that up a little bit and catch that runtime](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=215.48) [exception and do some various things.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=218.29) [But you see this nice feature now that we can go ahead](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=220.18) [and implement the security notice.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=224.03) [Our business case didn't have anything to do with that.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=226) [So when we're using this proxy pattern,](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=231.04) [we can put auditing or security or things like that in there and just](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=233.05) [allow the code to run how it was originally written.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=239.17) [If we want to let that user do his such so,](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=242.14) [it's a real nice feature and shows the real power of that proxy where we're intercepting those calls in the middle.](https://app.pluralsight.com/course-player?clipId=750407ee-02da-4068-82e0-fa2d161c5929&startTime=245.18)

### [Pitfalls](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d)

[[Autogenerated] What are some of the pitfalls of a proxy?](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=1.44) [Well, you can Onley have one proxy.](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=3.84) [So if we want to implement security and auditing,](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=6.38) [we have to do it in that one proxy.](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=10.67) [We can't separate those out.](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=12.64) [Some other patterns allow you to change or rap.](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=15.18) [When you use the proxy, though you can only have that one instance,](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=18) [it also adds another abstraction layer.](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=22.14) [Now some might argue that this isn't a bad thing,](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=24.84) [but it can lead to other issues in case of like a remote proxy.](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=27.73) [If you believe you're accessing something local and it is in fact remote,](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=31.66) [you might get errors that you wouldn't maybe be expecting.](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=35.57) [It's also really similar to other patterns now.](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=40.24) [This may not seem like much of a pitfall,](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=43.41) [but it can be a little bit hard to identify.](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=45.32) [If you aren't familiar with the alternatives that you need a proxy instead of,](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=47.7) [say, a decorator or an adapter of sorts,](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=51.65) [it is easier if the proxy is for a remote object,](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=55.03) [but you can see how this can had a little confusion. If you're trying to determine which pattern you should be using,](https://app.pluralsight.com/course-player?clipId=92ac658e-8541-4c61-be2d-0fa45385053d&startTime=57.96)

### [Contrast to Other Patterns](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b)

[[Autogenerated] to contrast the proxy.](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=1.01) [Let's compare it with a decorator.](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=2.55) [The proxy can add functionality, but it's really not its main purpose.](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=5.78) [We can really only have one proxy for that class instance, and it is.](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=11.43) [Functionality is set at compile time.](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=18.24) [It's not really the focus of what the decorator is.](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=20.99) [We are going to determine upfront what class were trying to call a remote call.](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=25.57) [Two or whatever other type of interface were trying](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=31.32) [to provide virtual or remote.](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=34.61) [The decorator, on the other hand, dynamically adds functionality.](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=37.49) [Its purpose is to add functionality and chain them as we go.](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=42.13) [They are a chained pattern, as I mentioned to.](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=46.16) [It also always points to its own type,](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=49.55) [where a proxy is intercepting a call to some different subclass or subtype.](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=52.87) [A decorator is usually looking at something else,](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=59.04) [and it's High Article chain,](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=61.62) [and the other contrast is that its functionality is usually determined](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=63.68) [at runtime instead of compile time like the proxy,](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=68.44) [we're gonna go ahead and change these things together at run time, and that object will figure out then what it can dio](https://app.pluralsight.com/course-player?clipId=914cf99e-5541-489a-9870-e8e48eb9d25b&startTime=71.75)

### [Summary](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1)

[[Autogenerated] Let's go ahead and recap what we've](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=0.52) [learned about the proxy pattern.](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=2.02) [There's great utilities built into the Java A P I.](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=4.54) [To implement the proxy pattern.](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=8.67) [You can see there's the proxy class,](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=10.65) [and the invocation handler interface would make it really easy for](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=12.49) [us to implement this pattern inside of Java.](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=16.66) [One drawback to it is that you only get to use one proxy per object.](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=19.82) [You're trying to proxy, too, so you can't chain them or build upon them.](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=25.45) [So if you have to add things to it,](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=30.28) [you might get some bloat inside that proxies or adding different features to it.](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=32.05) [I should also point out that this is used a lot by various dependency,](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=37.9) [injection and inversion of control framework.](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=42.29) [So a few years in spring or juice or tools like that, we briefly touched on it.](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=45.61) [But this is this technique, or this concept is used a lot in there.](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=50.5) [One thing that people often think of that this pattern is that](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=54.38) [it's a great way to just implement lazy loading,](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=57.64) [which that really doesn't have a lot to do with the proxy pattern.](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=59.84) [But you can see how out of minimum that's what it could be used for.](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=63.96) [I like to use this pattern a lot when you're intercepting a call](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=67.49) [to maybe go out to a remote server and return that instance in](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=70.94) [there and not have all that code cluttered inside your object or how that gets handled.](https://app.pluralsight.com/course-player?clipId=f2af47ea-20a1-4c77-b2f8-3991816702c1&startTime=75.7)

## [Next](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde)

### [What Next?](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde)

[[Autogenerated] Well, if you've made it this far,](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=1.44) [you've completed the structural design patterns course,](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=3.28) [and I thank you for sticking with it through this.](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=6.28) [Patterns are a great tool in a great asset,](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=9.38) [and I hope you refer to this back in time and look at as you get more](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=12.09) [experience with patterns and refresh her memory of what you're using and](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=16.25) [what might be a good fit for this pattern.](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=19.98) [If you're wondering what to look at next,](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=22.24) [there are various courses that I'm working on or have worked on.](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=24.73) [You may have already seen the creation of design](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=28.99) [patterns course that's out there.](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=31.28) [I'm also working on the behavioral patterns course that will finish this three](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=32.91) [part series and plan on doing more courses from patterns.](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=37.62) [As I've already had requests from other people to do so,](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=41.1) [I've got many courses out there is well on maven fundamentals,](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=44.94) [Spring fundamentals, The Spring,](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=48.98) [NBC and springing Me see four intro courses as well.](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=51.23) [A spring data J.](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=55.73) [P.](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=56.82) [A hibernate and spring security fundamentals,](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=57.01) [just to name a few out of the library.](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=60.24) [Thank you for watching this course, and if you have any other suggestions,](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=63.34) [feel free to reach out to be through the author.](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=67.46) [Aliases on the plural site website or my Twitter handle, which is on all the slides or connect with me on LinkedIn is well.](https://app.pluralsight.com/course-player?clipId=3dde280f-4ccc-4076-a77b-7b0434c04cde&startTime=70.8)