## [Course Overview](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609)

### [Course Overview](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609)

[Hey, everyone.](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609&startTime=4.54) [My name is Brian Hansen, and welcome to my course,](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609&startTime=6.35) [Spring Data JPA using Hibernate.](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609&startTime=9.08) [I am the CEO of Complete Programmer and a director at Software Technology Group.](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609&startTime=11.94) [Hibernate and JPA are one of the most advanced time‑saving](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609&startTime=16.67) [frameworks to be introduced into Java development.](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609&startTime=20.19) [In this updated course, we're going to cover configuring Hibernate,](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609&startTime=23.04) [utilizing Spring Data JPA, using Docker to run our database,](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609&startTime=27.4) [various JPA tips and tricks,](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609&startTime=31.99) [and all of our configuration has been migrated from XML to](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609&startTime=35.24) [use Java configuration with annotations.](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609&startTime=39.46) [By the end of this course, you'll know all of the fundamentals of](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609&startTime=42.84) [Spring Data JPA using Hibernate as its provider.](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609&startTime=45.5) [Before beginning the course, you should be familiar](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609&startTime=49.04) [with Spring and Spring MVC some.](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609&startTime=51.73) [I hope you'll join me on this journey to learn Spring Data](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609&startTime=54.84) [JPA and Hibernate using the Spring Data with JPA Hibernate course, here at Pluralsight.](https://app.pluralsight.com/course-player?clipId=0dabd9ce-f397-4ddf-986d-45778e85f609&startTime=57.82)

## [Spring, the Java Persistence API (JPA), and Hibernate](https://app.pluralsight.com/course-player?clipId=4f175e47-1ad3-48b2-aea1-be84682b7718)

### [Version Check](https://app.pluralsight.com/course-player?clipId=4f175e47-1ad3-48b2-aea1-be84682b7718)

### [Course Overview](https://app.pluralsight.com/course-player?clipId=94d9665a-9109-47e9-8480-93ce29e72de8)

[Hello.](https://app.pluralsight.com/course-player?clipId=94d9665a-9109-47e9-8480-93ce29e72de8&startTime=0.54) [This is Brian Hansen from Pluralsight,](https://app.pluralsight.com/course-player?clipId=94d9665a-9109-47e9-8480-93ce29e72de8&startTime=1) [and welcome to my course on developing applications using](https://app.pluralsight.com/course-player?clipId=94d9665a-9109-47e9-8480-93ce29e72de8&startTime=2.85) [Spring and the Java Persistence API, or commonly referred to as JPA.](https://app.pluralsight.com/course-player?clipId=94d9665a-9109-47e9-8480-93ce29e72de8&startTime=6.33) [We don't assume that you have any knowledge of Spring or JPA,](https://app.pluralsight.com/course-player?clipId=94d9665a-9109-47e9-8480-93ce29e72de8&startTime=11.74) [but experience with Java and relational databases will help](https://app.pluralsight.com/course-player?clipId=94d9665a-9109-47e9-8480-93ce29e72de8&startTime=15.23) [accelerate your learning in this course.](https://app.pluralsight.com/course-player?clipId=94d9665a-9109-47e9-8480-93ce29e72de8&startTime=18.98) [We're going to be learning about developing with JPA, and we](https://app.pluralsight.com/course-player?clipId=94d9665a-9109-47e9-8480-93ce29e72de8&startTime=20.95) [will configure our application using Spring.](https://app.pluralsight.com/course-player?clipId=94d9665a-9109-47e9-8480-93ce29e72de8&startTime=24.77) [We'll also be diving fairly deep with both of these technologies,](https://app.pluralsight.com/course-player?clipId=94d9665a-9109-47e9-8480-93ce29e72de8&startTime=27.74) [and there are a lot of code samples that we'll walk through in this course.](https://app.pluralsight.com/course-player?clipId=94d9665a-9109-47e9-8480-93ce29e72de8&startTime=31.71) [If you haven't used Spring MVC before,](https://app.pluralsight.com/course-player?clipId=94d9665a-9109-47e9-8480-93ce29e72de8&startTime=35.35) [I would recommend that you take my Spring MVC course that's here](https://app.pluralsight.com/course-player?clipId=94d9665a-9109-47e9-8480-93ce29e72de8&startTime=37.71) [on Pluralsight prior to doing this course,](https://app.pluralsight.com/course-player?clipId=94d9665a-9109-47e9-8480-93ce29e72de8&startTime=41.04) [because we will be using the Spring MVC application we created in that course for the interface to our application.](https://app.pluralsight.com/course-player?clipId=94d9665a-9109-47e9-8480-93ce29e72de8&startTime=43.44)

### [What Is Spring?](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d)

[The Spring Framework started out as an Inversion of Control container,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=0.14) [and although I won't be covering all the details of Spring in this course,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=4.22) [I'm going to cover enough to get you comfortable with](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=8.36) [understanding what Spring is doing for us inside of our](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=10.84) [application while we learn more about JPA and Hibernate.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=14.18) [Spring was conceived to reduce or replace some of the complex](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=18.51) [configuration of the Java Enterprise Edition,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=22.8) [and later it was built around using Java without EJBs.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=25.86) [This is an important point because JPA was extracted out of the](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=30.34) [Enterprise API because people wanted to use JPA without EJBs.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=34.34) [So, what is Spring?](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=40.14) [It is a framework originally built around reducing the](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=42.24) [complexities of enterprise Java development and later also](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=45.78) [providing enterprise development without EJBs.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=50.72) [Spring can essentially be used with or without EJBs,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=54.24) [and this is an important point because Spring enabled us to do](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=57.04) [enterprise development without an application server.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=60.19) [This is one of the reasons that Tomcat and some of the other lightweight](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=64.74) [containers have taken the Java development space by storm.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=67.94) [It is easy to use and lightweight,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=72.14) [and until Spring, you were either using enterprise](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=74.56) [features with an application server,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=77.5) [and you had a more complex software development lifecycle,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=79.39) [or you were doing rich client applications.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=82.64) [Now,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=87.24) [Spring enables us to switch over to using a lightweight container like Tomcat,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=87.97) [which is easier and faster to develop applications with.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=92.79) [Spring is POJO based, and POJO, as you remember,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=97.24) [stands for Plain Old Java Object.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=100.81) [All of the objects that we're using can be used and wired without Spring.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=103.44) [The only reason I bring this point up is because some people often think](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=108.94) [there's some magic or black box that they don't understand about what's](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=112.21) [going on behind the scenes with the Spring Framework.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=116.58) [It is still built around simple POJOs.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=119.52) [We've talked about it being lightweight now,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=123.34) [but we should also point out that Spring was built out of the](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=126.02) [frustrations of J2EE and the older APIs.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=129.24) [They looked a lot at the blueprints and things like that and said,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=134.61) [what's a better way for us to use these tools and make our code more testable?](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=137.98) [Spring also heavily uses AOP, or aspect‑oriented programming,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=143.44) [to apply things like transactions to your code without you needing to go](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=148.2) [through and manually or explicitly define them inside your code.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=152.4) [We will use a AOP,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=157.02) [although you won't realize that it's in your code just](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=159.08) [through some of the simple annotations,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=162.39) [and your application will then automatically have transactions.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=164.13) [Spring is also built around best practices and design patterns,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=168.94) [which is one of the most appealing parts of Spring to me.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=173.61) [A lot of developers used to wade through the JEE blueprints](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=177.24) [and implement singletons or factories, facades and abstract factories.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=180.89) [You can still do that,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=186.81) [but all of these are built into the Spring Framework as well.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=188.38) [So if you have existing patterns that you've already developed,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=191.54) [Spring will work well with these.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=195.01) [But Spring also does this itself inside the application and](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=197.26) [inherently encourages better design in your code.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=201.36) [So these patterns, singleton, factory, and abstract factory,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=205.64) [if you've ever gone through and built some of the older style methods of](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=209.4) [making your database transparent to your application,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=213.09) [you've done this, and you've implemented a concrete factory.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=215.89) [But Spring also makes a lot of use of the template method pattern,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=219.31) [as well as callbacks and those types of things.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=223.67) [But lastly, it's heavily annotation based,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=227.03) [and some developers used to shy away from Spring](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=230.56) [because of its XML configuration.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=233.34) [With the more recent versions of Spring,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=235.51) [all configuration is annotation based, and more recently,](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=238.22) [configuration is all done within Java code, thus eliminating all XML, if desired.](https://app.pluralsight.com/course-player?clipId=843887d1-cbca-43f1-a098-eb4c70a0a35d&startTime=242.16)

### [History](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408)

[We're going to take a minute and just walk through a](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=0.14) [little bit of the history of Spring.](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=2.18) [Spring actually started out as a bunch of developers that were](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=4.64) [consulting and were tired of some of the shortcomings or](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=7.4) [painful pieces of developing with JEE.](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=10.53) [So this group of people got together and put together the Spring Framework,](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=13.74) [which actually used to be called Interface 21 and decided](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=17.21) [they wanted to roll this out as an enterprise framework](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=21.11) [available for the public to use.](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=23.68) [Their first milestone release was in 2003.](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=26.04) [Now, not really a big deal, but it's when things kind of got rolling for them.](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=30.1) [Now, in 2004, they had their 1.0 release,](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=36.04) [and one of the things you're going to see as we step through the](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=39.35) [years is that Spring had a pretty consistent,](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=41.63) [very stable release cycle.](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=44.71) [As part of their release cycle,](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=46.95) [they've always tried to keep it backwards and forwards compatible.](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=48.36) [In fact, all of the applications that I've ever written since 2003,](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=51.73) [I don't know of one thing that I've had break from backwards compatibility.](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=55.51) [I have actually also integrated some key dates in here with Hibernate in](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=60.04) [our timeline and notably started with Hibernate 3.0,](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=64.16) [which was released in 2005.](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=66.78) [Where it starts getting interesting though is in 2009 when JPA 2.0 was](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=69.94) [released and then again in 2013 when JPA 2.1 was released.](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=75.62) [All this time, Spring 2.0 and 3.0 were subsequently released in that timeline.](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=82.84) [Hibernate 4.3 was released in 2013,](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=88.33) [as well as to support the new features of JPA 2.1, and then](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=92.55) [Spring 4.0 and 5.0 were both released after that,](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=97.87) [integrating newer JVMs and continued long‑term support. Let's talk more about JPA though, since that really is the focus of this course.](https://app.pluralsight.com/course-player?clipId=79ad79a5-b8bf-4904-807d-748264bad408&startTime=103.1)

### [What Is JPA?](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05)

[JPA stands for the Java Persistence API.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=0.64) [And much like Spring's roots, JPA was designed to make things easier.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=3.97) [JPA focused on an object‑relational mapping,](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=9.44) [or commonly referred to as just an ORM design principle.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=12.66) [Originally, it was part of the EJB specification,](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=16.94) [but was later extracted out to be available just on its own.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=19.89) [So, what is JPA?](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=23.94) [Well,](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=26.14) [there's a little debate on whether or not JPA started off as](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=26.58) [Hibernate because there were some other frameworks that had an](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=30.27) [influence into that design as well.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=32.87) [But for our course,](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=35.54) [we're going to be using Hibernate for our implementation anyway.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=36.53) [It is an ORM, or an object‑relational mapping tool,](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=40.24) [and this is how we map our object‑oriented language to our relational database.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=43.99) [Much like Spring,](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=49.54) [it is POJO based and has a focus that's around being](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=50.52) [built on the object‑oriented development.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=54.6) [So if you've used things like JDBC or some of the](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=57.54) [other Java persistence frameworks,](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=60.28) [they have a tendency to focus more on the database side of things.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=62.44) [Not saying that they're more powerful for that,](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=65.74) [but they tend to make you have some bad object‑oriented development practices,](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=68.73) [where JPA and the JPA specification really focus on good OO design.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=72.82) [You can use XML configuration for POJOs much like Spring,](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=80.34) [or you can do the annotation‑based configuration](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=85.21) [that we'll be doing in this course.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=88.82) [Since it is like Spring,](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=90.94) [everything is going to be built around these best](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=92.5) [practices and how we want to design our code,](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=95.19) [keeping a better OO design inside of our application.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=97.47) [And lastly, we also have pluggable persistence providers.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=102.24) [Now, this is kind of an interesting point.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=106.95) [I've had people ask me before,](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=108.58) [why do I care if I can swap out a persistence provider?](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=110.26) [And I actually have on three different projects swapped out the entire](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=114.64) [persistence provider that I was using from one framework to another because](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=118.54) [it worked better with the database that I was using.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=122.62) [So for this example, we are going to be using Hibernate,](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=125.64) [but there's TopLink or EclipseLink.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=128.42) [And I won't say that they're better or worse than Hibernate,](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=131.1) [but they've been around, and they actually kind of solve some different problems.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=134.14) [So that we can have these swappable persistence providers is actually a good thing and keeps everybody in check.](https://app.pluralsight.com/course-player?clipId=bc4a7bd5-702c-47bb-9fa6-b3405ea89e05&startTime=137.64)

### [Current Release](https://app.pluralsight.com/course-player?clipId=e437e75c-7868-43f3-be54-d7595f65bc44)

[Continuing on our timeline of current versions that we're going to be using,](https://app.pluralsight.com/course-player?clipId=e437e75c-7868-43f3-be54-d7595f65bc44&startTime=0.14) [we had looked earlier at JPA, and JPA 2.2 was released in 2017.](https://app.pluralsight.com/course-player?clipId=e437e75c-7868-43f3-be54-d7595f65bc44&startTime=4.3) [I'll honestly admit that releases for JPA versions have slowed down a lot,](https://app.pluralsight.com/course-player?clipId=e437e75c-7868-43f3-be54-d7595f65bc44&startTime=11.94) [and some of that has to do with us tackling a lot of the](https://app.pluralsight.com/course-player?clipId=e437e75c-7868-43f3-be54-d7595f65bc44&startTime=16.65) [problems that we see inside of ORM tools.](https://app.pluralsight.com/course-player?clipId=e437e75c-7868-43f3-be54-d7595f65bc44&startTime=19.13) [Hibernate 5.4 was released in 2018,](https://app.pluralsight.com/course-player?clipId=e437e75c-7868-43f3-be54-d7595f65bc44&startTime=22.94) [and we will be using a new version of this release, just a minor dot revision.](https://app.pluralsight.com/course-player?clipId=e437e75c-7868-43f3-be54-d7595f65bc44&startTime=26.01) [And finally,](https://app.pluralsight.com/course-player?clipId=e437e75c-7868-43f3-be54-d7595f65bc44&startTime=31.04) [Spring 5.3 was released and has all of the current integrations baked into it.](https://app.pluralsight.com/course-player?clipId=e437e75c-7868-43f3-be54-d7595f65bc44&startTime=32.22) [So this is a pretty good snapshot of the current stack that we will be using with possibly some minor dot revisions in there as well.](https://app.pluralsight.com/course-player?clipId=e437e75c-7868-43f3-be54-d7595f65bc44&startTime=38.69)

### [The Problem](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1)

[Let's talk about the problem that JPA and Hibernate](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=0.04) [solve and why we want to use them.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=2.83) [Whenever I'm interviewing Java developers, I always ask them why](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=6.14) [should I use Hibernate or why should I use JPA?](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=9.74) [And a lot of times they don't understand what the](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=13.14) [problem is that we're trying to solve.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=15.29) [Let's take a second to talk about what that problem is.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=17.74) [One of these things is that developers don't always make good DBAs.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=21.74) [A developer doesn't always understand some of the reasonings behind why we](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=26.44) [have foreign key constraints the way that we do or how to best represent what](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=29.92) [they're trying to do in a relational database.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=34.81) [Relational databases are two dimensional where](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=37.13) [object‑oriented languages are three dimensional.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=39.45) [Also,](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=42.64) [the data model doesn't always line up with that object model because of that](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=43.13) [two‑dimensional versus three‑dimensional representation.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=47.82) [I'm talking about it from the object‑oriented side.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=51.24) [What if we have an existing database that we're trying to map to?](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=55.04) [Getting these two to line up isn't always easy.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=58.64) [Another problem is configuration. Although](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=62.04) [configuration is a lot better with JPA, it can still be better,](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=64.8) [and that's where Spring steps in.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=68.94) [Things like transactions, testing,](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=71.34) [data source injection and configuration, these are all things that](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=73.68) [we're going to solve with both Spring and JPA inside of our sample](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=77.79) [application that we're going to be writing.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=82.04) [The main point I want to talk about for a minute though is business focus.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=84.44) [The business doesn't care if I'm using Spring or JPA.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=88.84) [They care that I'm focusing on solving their problems.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=94.35) [Let's look at some sample code to show you exactly what I'm talking about.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=98.44) [This method that you have in front of you is an old‑school JDBC query,](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=104.34) [and yes, you'll notice it's really wordy.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=108.68) [In fact, I had to shrink it down just to fit it all on this screen.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=111.39) [I've got to get a connection, I've got to get a prepared statement,](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=116.04) [I've got my result set, I'm getting all the stuff,](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=119.36) [populating it, binding it, looping through it,](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=122.97) [everything going on,](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=126.04) [and then finally I've got this catch statement at the bottom where over half](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=127.23) [of my code is making sure that I've closed the result sets,](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=133.56) [and I've closed the statement,](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=137.44) [and I've closed the connection, because if I don't do all of](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=138.84) [that I'm going to end up having memory leaks and the database](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=142.06) [will run out of connections.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=144.99) [Believe me,](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=146.84) [if you've developed in Java code very long and you've done JDBC for very long,](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=147.5) [at some point in your career you forgot that finally block](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=151.86) [or one piece of that finally block and you've ran out of](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=155.34) [connections on your database.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=158.7) [So really, what is the business focus here?](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=160.84) [They care about two things,](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=163.64) [that I got this query done and I shoved it in that object.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=166.04) [So there's 35 to 45 lines of code there that they don't care how we do it.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=172.34) [They just care that I'm grabbing the car based off the Id and](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=177.79) [getting this object back and returning it.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=182) [It's all the application wants.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=184.11) [What does it mean to get a car by Id?](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=187.54) [Well, just that,](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=189.47) [it doesn't mean that I have a finally block and all](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=191.37) [this other stuff that's going on.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=193.79) [Our focus is really just on using a tool rather than](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=195.25) [getting the business what they need back,](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=199.22) [and you can see it's very error prone.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=201.7) [If I forget one line in here,](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=203.63) [the application will deploy and it will run, it'll just chew up](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=205.36) [resources and finally run into and out of resource exception or out of](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=208.7) [memory or heap space or perm gen or the number of database connections,](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=213.26) [all problems that you can experience in a full‑scale application if](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=217.36) [you're just using plain old JDBC. Let's talk about the solution though and how JPA fixes this.](https://app.pluralsight.com/course-player?clipId=8b6c731b-a544-4912-a85c-d36c3af1a5b1&startTime=222.82)

### [The Solution](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001)

[The solution is obviously JPA.](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=0.44) [It removes a lot of the boilerplate code,](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=3.64) [helps developers build objects and bridge that gap between our](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=7.24) [relational database and our object‑oriented code,](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=11.11) [Spring will handle all of our configuration and our](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=14.74) [transactions behind the scene,](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=18.51) [our code can just focus on testing and testability if we want to, we're](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=20.81) [not going to cover a lot of testing in this course,](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=26.57) [but we'll show you how some of it works just so you've seen](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=29.13) [it and you'll understand how you can build your code so that](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=31.97) [it's more easily unit tested.](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=35.09) [Transactions are also transparent to the developer,](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=37.84) [so when your code stops and starts a transaction,](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=40.88) [and now it's not just muddled throughout your code,](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=44.06) [you can just write your code how you normally would](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=46.58) [and apply transactions to it.](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=48.95) [You also get the option to do annotation‑based development,](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=52.04) [and for me this is a big one because development is a lot](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=55.29) [faster and a lot easier using annotations.](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=58.37) [As we go through our samples, you'll see us generate tables in the database and](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=61.94) [you'll be amazed at how easy it is to generate a data model.](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=65.71) [So, now I talked before about the business focus,](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=70.04) [let's look at that example again.](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=73.22) [Here's our JDBC example that we had before and all](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=76.54) [the problems that it has with it.](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=80.35) [Using JPA and Spring, all of this code ends up turning into this](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=82.64) [method here where I say I want to get a car by its Id,](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=86.64) [and literally that's all the code for it.](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=91.31) [I'm still going to have my car object, just like I had to have on the other side,](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=94.22) [but this is all I need to do to execute this query.](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=98.41) [It handles the transactions,](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=101.97) [it handles all the JDBC or SQL associated with it, and then](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=103.84) [we'll see as we go through these examples how it just wraps](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=108.85) [this all up into our object for us,](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=111.99) [but look at how much simpler this code is and our focus is just on getting back what the business needs.](https://app.pluralsight.com/course-player?clipId=18c1d6a8-27be-4524-bb1c-dac81409f001&startTime=113.95)

### [Summary](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0)

[In this module, we talked about what is Spring and a](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0&startTime=0.84) [little bit of the history of Spring.](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0&startTime=4.76) [It's a very stable framework, has a pretty consistent release cycle,](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0&startTime=6.69) [and it's always been very backwards and forwards compatible.](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0&startTime=11.38) [We also talked about what is JPA and kind of the roots of JPA, how it was](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0&startTime=15.34) [influenced from tools like Hibernate, TopLink, JDO, and became a 1.0](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0&startTime=19.87) [specification that was later extracted out of EJBs because people wanted to](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0&startTime=24.58) [use it without using Enterprise JavaBeans.](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0&startTime=29.03) [We also looked at the problem of what our business focus is and](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0&startTime=32.84) [all that JDBC code that really has nothing to do with us getting](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0&startTime=36.69) [this query back, and those are hoops we have to jump through to](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0&startTime=40.59) [find that information.](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0&startTime=43.73) [But really that's one line of query and getting that car object back](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0&startTime=45.44) [is what our business cares about and what JPA and Hibernate will help](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0&startTime=48.67) [us do inside of our Spring application.](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0&startTime=52.81) [Let's get rolling on our application though and look at what we](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0&startTime=56.04) [need to do to download the sample app and do a quick walkthrough of our Spring MVC application now.](https://app.pluralsight.com/course-player?clipId=6a282371-877b-4a22-827d-22a1331fecc0&startTime=59.53)

## [Download and Walkthrough of the Spring MVC Java App](https://app.pluralsight.com/course-player?clipId=97d34b31-1dc5-4592-a15d-85511cd0fc30)

### [Introduction](https://app.pluralsight.com/course-player?clipId=97d34b31-1dc5-4592-a15d-85511cd0fc30)

[Hello.](https://app.pluralsight.com/course-player?clipId=97d34b31-1dc5-4592-a15d-85511cd0fc30&startTime=0.14) [This is Bryan Hansen from Pluralsight.](https://app.pluralsight.com/course-player?clipId=97d34b31-1dc5-4592-a15d-85511cd0fc30&startTime=0.57) [In this module, we will configure and install the scaffold application that](https://app.pluralsight.com/course-player?clipId=97d34b31-1dc5-4592-a15d-85511cd0fc30&startTime=2.91) [we're going to build upon throughout the rest of this course.](https://app.pluralsight.com/course-player?clipId=97d34b31-1dc5-4592-a15d-85511cd0fc30&startTime=6.96) [We're going to cover the prerequisites for the course, as well](https://app.pluralsight.com/course-player?clipId=97d34b31-1dc5-4592-a15d-85511cd0fc30&startTime=10.14) [as walk through the scaffold application and verify that your environment is up and running.](https://app.pluralsight.com/course-player?clipId=97d34b31-1dc5-4592-a15d-85511cd0fc30&startTime=13.16)

### [Scaffold Application](https://app.pluralsight.com/course-player?clipId=381d23dc-14c7-40b6-bcfd-218ed1c1ec21)

[What are we going to build, you ask?](https://app.pluralsight.com/course-player?clipId=381d23dc-14c7-40b6-bcfd-218ed1c1ec21&startTime=0.34) [Well,](https://app.pluralsight.com/course-player?clipId=381d23dc-14c7-40b6-bcfd-218ed1c1ec21&startTime=2.54) [we're going to continue building on the conference](https://app.pluralsight.com/course-player?clipId=381d23dc-14c7-40b6-bcfd-218ed1c1ec21&startTime=2.75) [application that we've used in our other Spring courses](https://app.pluralsight.com/course-player?clipId=381d23dc-14c7-40b6-bcfd-218ed1c1ec21&startTime=5.29) [I've authored here on Pluralsight.](https://app.pluralsight.com/course-player?clipId=381d23dc-14c7-40b6-bcfd-218ed1c1ec21&startTime=8.18) [The UI is mostly built out for us in code that we will](https://app.pluralsight.com/course-player?clipId=381d23dc-14c7-40b6-bcfd-218ed1c1ec21&startTime=10.44) [download, and we will be wiring up the back end.](https://app.pluralsight.com/course-player?clipId=381d23dc-14c7-40b6-bcfd-218ed1c1ec21&startTime=13.78) [Before we do that though, let's look to see what we have the prerequisites listed for this application.](https://app.pluralsight.com/course-player?clipId=381d23dc-14c7-40b6-bcfd-218ed1c1ec21&startTime=17.54)

### [Prerequisites](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79)

[The prerequisites are similar to other courses I've produced here](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=0.34) [regarding Spring and some of the other libraries surrounding it. We're](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=5.17) [going to still be using the Java 11 LTS version.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=9.76) [Java 11 is the current version for long‑term support,](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=14.26) [and after that we don't have guaranteed long‑term support.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=18.54) [So yes, Java 12,](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=21.84) [13, and 14 have already been released, they're just not as stable as 11 is.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=23.57) [They work,](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=29.42) [and in most cases all the examples we'll be doing should work there as well.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=30.07) [This is just the one that's guaranteed by them to continue working.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=34.46) [I'm assuming you already know how to install Java, so we](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=38.24) [won't be covering that in this course.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=41.33) [I'm also going to use Maven in this course.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=44.14) [Spring no longer offers up a way to download just](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=47) [the JARs that you use for Spring.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=50.16) [You have to use Maven or Gradle to download these dependencies.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=52.81) [There is a Pluralsight course on Maven that I've actually authored here](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=57.74) [on Pluralsight. If you have more questions about that,](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=61.33) [you can go follow that course and learn how to use all the ins and outs](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=64.14) [of Maven, but it's pretty simple. If you aren't super familiar with it,](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=68.23) [we'll show you everything you need to know inside of the course here.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=72.51) [The next thing you'll need is an IDE. This course has now been updated](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=76.25) [to use IntelliJ.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=81.5) [We got feedback that the majority of our users wanted to](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=82.97) [see and use the examples with IntelliJ, so we have changed the course to use it.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=85.86) [I will be using an Enterprise version of IntelliJ.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=92.04) [They do have a 30‑day trial, as well as Student licenses available.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=94.94) [If you do want to use Spring STS, which I do like as well,](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=100.34) [I will try and answer any questions you might have on the](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=104.51) [forum for this course. And then Tomcat, the app will run](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=107.61) [under Spring Boot or Tomcat.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=112.68) [We're also going to use Docker to run the database,](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=115.01) [but we have a whole section dedicated to just that.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=117.82) [So let's recap here.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=121.94) [We're going to use Java 11 because of its LTS support, we have moved](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=123.4) [to IntelliJ, but all of the examples will work with Spring STS, and](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=128.71) [just the most recent version of Maven,](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=133.62) [as that's how Spring requires you to download those JARs anyway. Not](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=135.81) [required, but I do recommend having complete the Maven Fundamentals, Spring](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=140.06) [Fundamentals, and Spring MVC Fundamentals courses.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=145.58) [This course does build upon those, so it will answer a](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=149.04) [lot of questions you might have. Let's look at how we download that source code now.](https://app.pluralsight.com/course-player?clipId=6fec33bf-4941-45ba-bd3d-4ca1a3d5ed79&startTime=151.84)

### [Downloading the Scaffold App](https://app.pluralsight.com/course-player?clipId=9691393d-958e-4ad2-9dc0-e532e52e400a)

[Let's take a second to walk through the steps of](https://app.pluralsight.com/course-player?clipId=9691393d-958e-4ad2-9dc0-e532e52e400a&startTime=0.04) [downloading our scaffold application.](https://app.pluralsight.com/course-player?clipId=9691393d-958e-4ad2-9dc0-e532e52e400a&startTime=2.2) [First,](https://app.pluralsight.com/course-player?clipId=9691393d-958e-4ad2-9dc0-e532e52e400a&startTime=4.74) [you can download the app and slides right here on the course](https://app.pluralsight.com/course-player?clipId=9691393d-958e-4ad2-9dc0-e532e52e400a&startTime=5.21) [web page under the Exercise files heading.](https://app.pluralsight.com/course-player?clipId=9691393d-958e-4ad2-9dc0-e532e52e400a&startTime=8.31) [It's definitely a good option.](https://app.pluralsight.com/course-player?clipId=9691393d-958e-4ad2-9dc0-e532e52e400a&startTime=11.74) [I have also hosted the application up on GitHub just to make it](https://app.pluralsight.com/course-player?clipId=9691393d-958e-4ad2-9dc0-e532e52e400a&startTime=13.34) [so that I can update the files that are in there and that you](https://app.pluralsight.com/course-player?clipId=9691393d-958e-4ad2-9dc0-e532e52e400a&startTime=17.75) [can get the most recent version.](https://app.pluralsight.com/course-player?clipId=9691393d-958e-4ad2-9dc0-e532e52e400a&startTime=20.81) [Don't worry though if you've never used Git or GitHub,](https://app.pluralsight.com/course-player?clipId=9691393d-958e-4ad2-9dc0-e532e52e400a&startTime=22.84) [you actually don't need to have Git installed for this class, and you don't](https://app.pluralsight.com/course-player?clipId=9691393d-958e-4ad2-9dc0-e532e52e400a&startTime=25.68) [really need to have any prior working knowledge of Git either. We'll do a demo now of how to get that and get our environment set up.](https://app.pluralsight.com/course-player?clipId=9691393d-958e-4ad2-9dc0-e532e52e400a&startTime=29.68)

### [Download App Demo](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11)

[Let's show you both ways in which you can go ahead and](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=0.14) [download the source code for our course here.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=3.01) [The first is going to Pluralsight's website where](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=6.48) [you're already viewing this video from,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=10.21) [and you'll notice on the main page for this course there is](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=12.33) [an Exercise files tab as one of the menu items that you can](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=16.92) [choose under the course header.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=21.33) [And if you click on Exercise files,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=22.98) [it will go ahead and give you the option to download the exercise files here.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=25.64) [And it's a ZIP file, it's got a before and after for each module,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=30.57) [it contains all the slides and everything else.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=33.75) [I won't go into any more detail here because it's really](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=36.14) [straightforward and already has instructions on how to do that.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=38.78) [So that's the first way you can go ahead and grab the source code.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=41.18) [The second way is to go to GitHub,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=44.54) [and I've pulled up another browser window and typed in](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=47.54) [the URL github.com/bh5k/spring‑jpa.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=51.87) [So you can see right there in my address bar.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=59.34) [And if you actually look at the header of my source code,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=63.29) [you can see it typed out there as well for bh5k/spring‑jpa,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=65.79) [and this is just a repository I have,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=69.69) [and that will take you to the main page for this course](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=73.45) [and the branches and all of the source code that's](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=78.37) [associated with it is available here.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=82.43) [Now if you're already familiar with Git and GitHub,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=84.94) [you already know that you can fork this and pull it into your own personal](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=88.28) [repository and go ahead and start developing on it from there.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=93.74) [But if you're not, don't worry about it.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=97.91) [We're not going to go into that level of detail.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=99.97) [If you know that, go ahead and execute it that way.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=102.23) [If not,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=105.27) [you can just go ahead and click the download Code button](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=105.84) [here and choose to download a ZIP file.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=109.62) [It will download really fast because it doesn't contain any binaries,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=114.94) [just the source code for this application.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=118.49) [Navigating to the directory where your browser downloaded that zip file,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=121.24) [you'll see that you have a spring‑jpa‑main.zip,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=125.64) [or whatever your download was, maybe you grabbed the exercise files,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=130.71) [but the setup is pretty much the same from here on out.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=134.39) [Double‑click that and expand this folder.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=137.84) [I'm going to start off by renaming this to conference.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=141.64) [That's the name that our application is going to have inside of here.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=146.24) [And I'm going to copy that into my dev/workspace directory.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=150.04) [So,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=153.45) [yours may be c:/dev or you may be working on a Mac or a](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=153.98) [Linux‑based system where it's just /dev,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=157.45) [/workspace, wherever your workspaces at.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=159.48) [I'm going to copy that folder into my workspace.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=162.35) [And typically that's enough, but I do have other projects,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=165.84) [so I'm going to create a new folder, call this spring‑jpa,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=169.36) [and copy that conference folder into spring‑jpa.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=174) [And inside of here, I'll now see that I've got a couple of hidden files,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=181.44) [my .gitattributes, .gitignore, and then some setup information.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=186.18) [But really the two that I care about are our pom.xml and our source file,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=190.23) [which are both contained here now.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=194.2) [And we can go ahead and fire up our IDE to load this project in.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=197.04) [Launching my IDE for the first time to import this,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=201.81) [it'll bring up this dialog asking me what I want to do,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=205.55) [if I want to create a new project, import it,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=209.13) [open or get one from version control.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=211.16) [I'm going to go ahead and say Import Project,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=213.64) [and I'm going to point that to the directory that we just created.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=216.68) [So,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=221) [dev/workspace/spring‑jpa/conference and just choose that directory and](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=222.02) [select Open, and it will bring up a dialog where I can select Maven and say](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=229.59) [Import project from external model, and choose Finish, and your IDE will](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=236.84) [pull up with the application all configured,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=243.76) [installed, and ready to go.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=247.11) [We've got all of the pieces inside of here set up.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=249.03) [I'm going to walk through what the actual application does,](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=252.74) [but for now it's all installed with Maven configured, your library is downloaded, and everything ready to start development.](https://app.pluralsight.com/course-player?clipId=4b603b27-6a6e-48d8-ab6c-0e9318e49e11&startTime=255.55)

### [What Is in the App?](https://app.pluralsight.com/course-player?clipId=90fdf76e-26f4-4927-a774-d06fe2cc89b3)

[Now that we have our scaffold application downloaded, what's in it?](https://app.pluralsight.com/course-player?clipId=90fdf76e-26f4-4927-a774-d06fe2cc89b3&startTime=0.34) [What does it do?](https://app.pluralsight.com/course-player?clipId=90fdf76e-26f4-4927-a774-d06fe2cc89b3&startTime=4.54) [Well, it's a conference application.](https://app.pluralsight.com/course-player?clipId=90fdf76e-26f4-4927-a774-d06fe2cc89b3&startTime=6.04) [It's the same one that we've used and standardized across a lot of](https://app.pluralsight.com/course-player?clipId=90fdf76e-26f4-4927-a774-d06fe2cc89b3&startTime=8.1) [our Spring applications here on Pluralsight.](https://app.pluralsight.com/course-player?clipId=90fdf76e-26f4-4927-a774-d06fe2cc89b3&startTime=11.61) [It has a Registration section and Users, and we gather all of that information.](https://app.pluralsight.com/course-player?clipId=90fdf76e-26f4-4927-a774-d06fe2cc89b3&startTime=14.94) [It happens to be the same application we add security to in my](https://app.pluralsight.com/course-player?clipId=90fdf76e-26f4-4927-a774-d06fe2cc89b3&startTime=20.24) [Spring Security course here on Pluralsight. It captures posts,](https://app.pluralsight.com/course-player?clipId=90fdf76e-26f4-4927-a774-d06fe2cc89b3&startTime=23.69) [gets, does all of the things that we would expect inside of a](https://app.pluralsight.com/course-player?clipId=90fdf76e-26f4-4927-a774-d06fe2cc89b3&startTime=28.69) [standard web application, but it does not store any data yet.](https://app.pluralsight.com/course-player?clipId=90fdf76e-26f4-4927-a774-d06fe2cc89b3&startTime=32.27) [That's the whole goal of this course is to tie that into](https://app.pluralsight.com/course-player?clipId=90fdf76e-26f4-4927-a774-d06fe2cc89b3&startTime=37.65) [the back end where we show you all the annotations and](https://app.pluralsight.com/course-player?clipId=90fdf76e-26f4-4927-a774-d06fe2cc89b3&startTime=41.34) [configuration to store that data.](https://app.pluralsight.com/course-player?clipId=90fdf76e-26f4-4927-a774-d06fe2cc89b3&startTime=44.43) [So to show how it works though,](https://app.pluralsight.com/course-player?clipId=90fdf76e-26f4-4927-a774-d06fe2cc89b3&startTime=47.14) [let's walk through this architecture a little bit deeper so you kind of have a nice recap of what's inside of this app.](https://app.pluralsight.com/course-player?clipId=90fdf76e-26f4-4927-a774-d06fe2cc89b3&startTime=48.74)

### [Scaffold Application Walkthrough](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216)

[The first time you pull up your project,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=0.44) [there are a couple of things that are already defaulted for you,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=2.85) [one of which you don't want to use,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=6.07) [and that is the deployment configuration that already exists from Spring Boot.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=7.75) [If we go over to our Configuration drop‑down,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=13.34) [you'll see that we have an Edit Configurations option](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=16.54) [or a ConferenceApplication option.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=19.47) [The configuration that's already created for us is a Spring Boot instance,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=23.34) [and it uses tc Server, which is a modified Tomcat instance.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=29.04) [I'm going to be honest with you,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=34.04) [you don't want to use this because it breaks a lot of things.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=34.93) [It's meant to work with some of their tools.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=37.3) [I have found it to be more problematic than just](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=39.94) [creating a Tomcat instance here,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=42.31) [so I'm going to actually not use that and add a Tomcat Server,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=44.09) [and we want to create a local instance,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=51.74) [and I already have Tomcat downloaded on my laptop.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=53.87) [If you have not downloaded one,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=59.31) [you need to select one or configure one from this dialog.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=62.13) [And so you can go through here, hit Configure,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=68.53) [point it to a downloaded instance, choose whichever version you downloaded.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=71.39) [I am using 9.0.30.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=75.32) [I would keep it within the same major release as me](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=78.53) [just to guarantee that it works.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=82.28) [They do have some experimental versions,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=84.23) [some alpha versions that are out there that are later than this,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=86.69) [but 9.0 is working fine with all the examples that we have for this course,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=89.92) [and it's what I will continue to use.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=94.9) [Now, before we change anything else,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=97.22) [I want to point out that there is a warning on the bottom of our page](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=100.84) [already saying that no artifacts are marked for deployment.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=104.34) [You can click that Fix link or you can go up to the Deployment tab and click](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=107.84) [the plus button and say that we want to do an artifact.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=113.43) [We have two options inside of here,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=116.64) [we have the conference:war and the conference:war exploded.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=118.26) [I'm going to just choose conference:war.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=122.14) [And the application context that it is at the bottom of this is](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=125.84) [the URL to our application for development.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=130.08) [So if you don't want it to say conference\_war, you need to change this now.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=133.05) [You can back it off to just /conference.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=138.29) [I'm going to go ahead and do that and click Apply and then OK,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=142.74) [and now our configuration is ready to launch.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=147.54) [So if I go ahead and click on that and hit the Play button,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=150.68) [it will take it a second to load the first time,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=157.44) [but you'll see our application deploys, fires up Spring,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=159.64) [and then it will bring up our browser for us.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=165.34) [Our app's default configuration is to pull up the index or greeting page,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=168.88) [and so here we are at the root of our application,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=173.57) [and if we click Add Registration,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=176.58) [it's going to pull up the registration page and we can put in](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=178.71) [whatever we want and hit Add Registration,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=182.34) [and it just cycles back to this page.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=185.46) [It's not storing anything, there's nothing else happening,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=187.64) [and if we back up to the Add User, the same thing happens here as well.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=190.51) [It's going to pull down some default information because we're](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=196.32) [not pulling anything from that database yet.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=198.61) [So, let's go ahead and start implementing that now.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=201.85) [To point out some key files though before we dive right into the code,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=205.65) [first of all, this application was all configured using Java configuration,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=210.44) [so it's launched through the @SpringBootApplication annotation and a](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=216.34) [main method inside of our ConferenceApplication class.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=221.56) [The AppConfig is all set up inside of here and uses this](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=227.24) [ConferenceConfig file to wire together our application.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=231.84) [This is where we're going to be making almost all of the changes inside](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=236.01) [of our application for adding in Hibernate and JPA.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=239.88) [It's all annotation‑driven.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=244.94) [If we open up any of our controllers, you'll see that we have the @Controller,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=246.66) [we have our model stuff wired up the same way,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=253.43) [there's all of our registration and user inside of here,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=257.95) [and we're going to add and flesh out the details of our service tier](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=262.48) [and our repository tier doing this same fashion.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=268.61) [So we'll implement on top of these two model classes we](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=273.17) [have here and tie into this controller.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=276.5) [And, one last thing to mention is the application.properties.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=279.54) [This is where we will go through and wire in our database](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=284.13) [configuration to go ahead and connect to that database.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=287.99) [So, really, those key files there,](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=291.38) [that's what the bulk of our configuration for our Spring MVC app connecting to a database will take place.](https://app.pluralsight.com/course-player?clipId=187815b7-1b82-4c1d-a7e7-26bc22dbb216&startTime=294.37)

### [Spring MVC Recap](https://app.pluralsight.com/course-player?clipId=449d8493-1d86-412a-ab73-16d9356976cd)

[The key points we mentioned from our Spring MVC app were](https://app.pluralsight.com/course-player?clipId=449d8493-1d86-412a-ab73-16d9356976cd&startTime=0.94) [that it's all configured through Java.](https://app.pluralsight.com/course-player?clipId=449d8493-1d86-412a-ab73-16d9356976cd&startTime=4.21) [There's actually no XML in our app.](https://app.pluralsight.com/course-player?clipId=449d8493-1d86-412a-ab73-16d9356976cd&startTime=6.15) [There's not even a web.xml in our application.](https://app.pluralsight.com/course-player?clipId=449d8493-1d86-412a-ab73-16d9356976cd&startTime=8.43) [It's launched through the AppConfig, or our conference](https://app.pluralsight.com/course-player?clipId=449d8493-1d86-412a-ab73-16d9356976cd&startTime=11.94) [ApplicationConfig.java file, and everything is annotation‑driven, our](https://app.pluralsight.com/course-player?clipId=449d8493-1d86-412a-ab73-16d9356976cd&startTime=15.73) [requests from our web app to how we've configured our Spring tiers.](https://app.pluralsight.com/course-player?clipId=449d8493-1d86-412a-ab73-16d9356976cd&startTime=20.75) [And lastly,](https://app.pluralsight.com/course-player?clipId=449d8493-1d86-412a-ab73-16d9356976cd&startTime=24.44) [our application.properties contains all the pertinent information that we'll](https://app.pluralsight.com/course-player?clipId=449d8493-1d86-412a-ab73-16d9356976cd&startTime=25.17) [add to connect to our database, any pooling information,](https://app.pluralsight.com/course-player?clipId=449d8493-1d86-412a-ab73-16d9356976cd&startTime=29.34) [that type of stuff, will all be handled.](https://app.pluralsight.com/course-player?clipId=449d8493-1d86-412a-ab73-16d9356976cd&startTime=32.79) [So those are the four main files that we're going to focus on for a lot of this class.](https://app.pluralsight.com/course-player?clipId=449d8493-1d86-412a-ab73-16d9356976cd&startTime=34.87)

### [Summary](https://app.pluralsight.com/course-player?clipId=fbbed707-2ad1-4fe3-9c06-b0bda41f860a)

[To recap what we learned in this module, we downloaded the sample app](https://app.pluralsight.com/course-player?clipId=fbbed707-2ad1-4fe3-9c06-b0bda41f860a&startTime=1.34) [and we showed you that you could do that through the exercise files](https://app.pluralsight.com/course-player?clipId=fbbed707-2ad1-4fe3-9c06-b0bda41f860a&startTime=5.63) [or by using GitHub and forking that to your own repository or just](https://app.pluralsight.com/course-player?clipId=fbbed707-2ad1-4fe3-9c06-b0bda41f860a&startTime=8.54) [simply downloading the source code from that repository I have listed](https://app.pluralsight.com/course-player?clipId=fbbed707-2ad1-4fe3-9c06-b0bda41f860a&startTime=13.76) [there that's public.](https://app.pluralsight.com/course-player?clipId=fbbed707-2ad1-4fe3-9c06-b0bda41f860a&startTime=18.03) [We did a Spring MVC setup and recap of how to configure your application](https://app.pluralsight.com/course-player?clipId=fbbed707-2ad1-4fe3-9c06-b0bda41f860a&startTime=19.74) [to use Tomcat and walk through that, and we demoed that app to show you](https://app.pluralsight.com/course-player?clipId=fbbed707-2ad1-4fe3-9c06-b0bda41f860a&startTime=24.99) [what that basic functionality was inside of it and what the project](https://app.pluralsight.com/course-player?clipId=fbbed707-2ad1-4fe3-9c06-b0bda41f860a&startTime=30.38) [structure and pertinent files look like. Let's go ahead and dive into this next section now.](https://app.pluralsight.com/course-player?clipId=fbbed707-2ad1-4fe3-9c06-b0bda41f860a&startTime=34.04)

## [Architecture Walkthrough of a Spring JPA / Hibernate Application](https://app.pluralsight.com/course-player?clipId=57245027-2ae4-46ce-9b34-2eba1e82db12)

### [Introduction](https://app.pluralsight.com/course-player?clipId=57245027-2ae4-46ce-9b34-2eba1e82db12)

[Welcome back.](https://app.pluralsight.com/course-player?clipId=57245027-2ae4-46ce-9b34-2eba1e82db12&startTime=0.24) [This is Bryan Hansen from Pluralsight, and in this module,](https://app.pluralsight.com/course-player?clipId=57245027-2ae4-46ce-9b34-2eba1e82db12&startTime=1.3) [we're going to discuss architecture.](https://app.pluralsight.com/course-player?clipId=57245027-2ae4-46ce-9b34-2eba1e82db12&startTime=4.37) [We're specifically going to talk about the role of Spring in configuring JPA with regards to our architecture.](https://app.pluralsight.com/course-player?clipId=57245027-2ae4-46ce-9b34-2eba1e82db12&startTime=6.64)

### [Architecture](https://app.pluralsight.com/course-player?clipId=59512566-3244-44b9-8496-57351dda13fb)

[In the Spring MVC course,](https://app.pluralsight.com/course-player?clipId=59512566-3244-44b9-8496-57351dda13fb&startTime=0.24) [I spoke a lot about Spring and how it tied into the MVC framework and](https://app.pluralsight.com/course-player?clipId=59512566-3244-44b9-8496-57351dda13fb&startTime=1.58) [how Spring MVC is a model‑view‑controller framework, but it really is](https://app.pluralsight.com/course-player?clipId=59512566-3244-44b9-8496-57351dda13fb&startTime=6.4) [just dealing with the UI. We didn't tie a database into our](https://app.pluralsight.com/course-player?clipId=59512566-3244-44b9-8496-57351dda13fb&startTime=11.04) [application or anything like that.](https://app.pluralsight.com/course-player?clipId=59512566-3244-44b9-8496-57351dda13fb&startTime=14.47) [The next couple of slides I actually took from the Spring MVC course,](https://app.pluralsight.com/course-player?clipId=59512566-3244-44b9-8496-57351dda13fb&startTime=17.14) [but I'm going to talk about them in a different light.](https://app.pluralsight.com/course-player?clipId=59512566-3244-44b9-8496-57351dda13fb&startTime=20.64) [As I mentioned in the Spring MVC course,](https://app.pluralsight.com/course-player?clipId=59512566-3244-44b9-8496-57351dda13fb&startTime=23.65) [that software architecture has been around a long time,](https://app.pluralsight.com/course-player?clipId=59512566-3244-44b9-8496-57351dda13fb&startTime=25.77) [long since before Spring and Java were around.](https://app.pluralsight.com/course-player?clipId=59512566-3244-44b9-8496-57351dda13fb&startTime=28.99) [Architecture and design patterns give us a way to communicate](https://app.pluralsight.com/course-player?clipId=59512566-3244-44b9-8496-57351dda13fb&startTime=32.14) [what we're trying to do and to also implement some of the best](https://app.pluralsight.com/course-player?clipId=59512566-3244-44b9-8496-57351dda13fb&startTime=35.36) [practices so that we don't keep recreating the same errors or](https://app.pluralsight.com/course-player?clipId=59512566-3244-44b9-8496-57351dda13fb&startTime=39.31) [making the same mistakes.](https://app.pluralsight.com/course-player?clipId=59512566-3244-44b9-8496-57351dda13fb&startTime=43.46) [For us,](https://app.pluralsight.com/course-player?clipId=59512566-3244-44b9-8496-57351dda13fb&startTime=45.44) [having a framework like Spring is all about repurposing these best practices and not having to reinvent the wheel each time.](https://app.pluralsight.com/course-player?clipId=59512566-3244-44b9-8496-57351dda13fb&startTime=46.02)

### [MVC Design Pattern](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e)

[There is a standard MVC, or model‑view‑controller, design](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=0.04) [pattern that you may or may not have seen before.](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=3.27) [It's a pretty common pattern now,](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=6.14) [and most developers have at least seen it or heard of it.](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=7.63) [A request comes in through the view based off of some user event](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=10.84) [and then is interpreted by our controller.](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=14.88) [The controller can change the model, or not,](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=17.7) [and then it will select the view based off of our action.](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=20.77) [From here,](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=24.64) [the model can update the view with the database off of the user's](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=25.28) [actions. Now this graphic is sometimes confusing,](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=29.08) [though,](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=32.54) [because it's stemmed from rich client applications that were more event‑based or](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=32.76) [using a design pattern called the observer observable or subscribe listener type](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=37.53) [design patterns, not really applicable to a lot of web software development. The](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=42.32) [pattern and concept is still sound,](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=48.12) [but we usually don't have our model updating our view because](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=50.42) [we've gone back to a page at that point.](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=53.86) [This is a more accurate description of that kind of lifecycle](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=59.24) [that we maybe faced with in web development.](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=62.64) [This graphic is realistically more like the lifecycle](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=65.34) [that we will see in our web application.](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=67.94) [Our view can access our model, but it's usually done so through the controller.](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=70.16) [We'll look more at the lightweight approaches in the](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=76.04) [AJAX module later in this course,](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=78.36) [but the summary is we usually still make a request, even if it's](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=80.41) [a lightweight request, through our controller to access our](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=84.27) [model. We don't have our view typically going directly against our database or our model.](https://app.pluralsight.com/course-player?clipId=adee2453-b79a-4f0c-b3ce-e45b4f7c649e&startTime=87.06)

### [Tiers](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f)

[You'll often hear people talk about applications in terms of a](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=0.14) [tiered or an n tier architecture or layers.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=3.79) [We try to build our applications and tiers more now in enterprise languages,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=7.64) [and there are great reasons to do so.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=12.07) [A few of these are separation of concerns.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=14.34) [This just means that each layer is only concerned with](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=17.34) [the task that it's assigned to do.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=20.05) [Our presentation layer is only going to have presentation type things in it,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=22.84) [and our business logic is going to be contained in a layer,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=26.99) [and data access is going to also be contained in its own separate layer.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=30.39) [Now there's another term called reusable layers that sounds](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=35.94) [very similar to separation of concerns, and in some ways it is,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=38.93) [but its focus is different.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=43.2) [If I have business logic in my presentation tier,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=45.54) [I can't easily change my presentation tier or expose a web service,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=48.9) [for example,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=53.39) [without recreating some of that logic if I have extracted it into its own](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=54.18) [appropriate tier that I'm not duplicating that logic.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=59.72) [If you ever notice yourself copying and pasting code in your application,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=63.24) [it's probably not architected in the correct manner.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=67.05) [Now,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=71.84) [that's a little bit of a difference between the](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=72.29) [separation of concerns and the reusable layer.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=74.6) [Separation of concerns is not about reuse,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=77.11) [it's just about having things in the right layer so that I can](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=79.48) [rearchitect them later where reusable layers means that I have a](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=82.25) [purpose and a point that I'm trying to drive.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=85.86) [I can expose the same data in multiple ways without having to worry about it,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=88.74) [or I can replace my presentation tier without having to](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=93.37) [rearchitect my entire application.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=96.45) [And another term is maintenance, or refactoring might be a better way to put it.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=99.44) [That's the ability to change things without having those](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=104.35) [changes ripple through all of our code.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=106.79) [For example,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=109.64) [if I have Hibernate in my application and I have to change something](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=110.88) [in my UI based off of a change I made in Hibernate,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=113.9) [then it probably isn't architected correctly.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=117.74) [If done correctly, we can change our code and not have to retest everything,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=121.04) [but rather just the pieces that we changed.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=125.69) [This leads into a much larger discussion about unit testing,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=128.24) [but that's outside the focus of this course.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=131.44) [Since we're talking about layers or tiers of a Spring MVC application, and](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=134.04) [this is important because of how we annotate our components,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=138.75) [which we're going to actually talk about here next,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=141.41) [let's first talk about the data model that we would access using](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=144.24) [something like Hibernate or JDBC or Spring JDBC,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=148.26) [and this layer represents the data or model of our application.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=152.28) [Next,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=156.84) [we have a controller that interprets the user's requests and selects](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=157.36) [the appropriate view based off of what we've requested or what](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=161.81) [information we got back from our data model.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=165.33) [And then we have our view. For our case, we're going to be using](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=168.24) [for our model just simple JSPs, but we could also use FreeMarker,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=172.47) [Velocity or Web Services to just simply return data back from our](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=176.9) [requesting controller.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=183.96) [Now,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=185.94) [one thing that's often misunderstood by people is that Spring MVC](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=186.22) [has nothing to do with regards to our database,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=189.47) [but it has a model associated with it.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=193.37) [So, is this model talking about our database or the model talking about](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=197.04) [what the framework is going to represent to our JSP page?](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=200.69) [It's actually referring to the view, what we're going to](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=205.04) [represent to our JSP or our web service,](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=208.36) [but we always have to get that information for somewhere.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=211.21) [So, that's where our various components come in and what we're going to talk about next.](https://app.pluralsight.com/course-player?clipId=c7ac9053-1ef5-4515-9376-4af74715914f&startTime=214.01)

### [Components](https://app.pluralsight.com/course-player?clipId=f453f26d-5e51-46b3-bd01-35f2069db953)

[We talked about tiers and layers,](https://app.pluralsight.com/course-player?clipId=f453f26d-5e51-46b3-bd01-35f2069db953&startTime=0.04) [and we've even started to allude to components inside of our application now, so](https://app.pluralsight.com/course-player?clipId=f453f26d-5e51-46b3-bd01-35f2069db953&startTime=1.84) [how do we represent these tiers with Spring and Spring MVC?](https://app.pluralsight.com/course-player?clipId=f453f26d-5e51-46b3-bd01-35f2069db953&startTime=6.86) [We do that using these three components.](https://app.pluralsight.com/course-player?clipId=f453f26d-5e51-46b3-bd01-35f2069db953&startTime=11.14) [We have our controller, service, and our repository.](https://app.pluralsight.com/course-player?clipId=f453f26d-5e51-46b3-bd01-35f2069db953&startTime=13.59) [We've already discussed controllers already, they just](https://app.pluralsight.com/course-player?clipId=f453f26d-5e51-46b3-bd01-35f2069db953&startTime=17.34) [route where we're going and interpret the user's request,](https://app.pluralsight.com/course-player?clipId=f453f26d-5e51-46b3-bd01-35f2069db953&startTime=20.64) [and then there's the service, and that's where our business logic goes.](https://app.pluralsight.com/course-player?clipId=f453f26d-5e51-46b3-bd01-35f2069db953&startTime=25.14) [It should also be noted that it's where our transactions will likely start](https://app.pluralsight.com/course-player?clipId=f453f26d-5e51-46b3-bd01-35f2069db953&startTime=29.16) [if we're accessing more than one database table as well.](https://app.pluralsight.com/course-player?clipId=f453f26d-5e51-46b3-bd01-35f2069db953&startTime=32.84) [And then there's repositories.](https://app.pluralsight.com/course-player?clipId=f453f26d-5e51-46b3-bd01-35f2069db953&startTime=36.24) [The repository tier is also sometimes referred to](https://app.pluralsight.com/course-player?clipId=f453f26d-5e51-46b3-bd01-35f2069db953&startTime=38.15) [as a data access object, or DAO, and they usually have a one‑to‑one mapping with our database table.](https://app.pluralsight.com/course-player?clipId=f453f26d-5e51-46b3-bd01-35f2069db953&startTime=41.01)

### [Controller](https://app.pluralsight.com/course-player?clipId=cbaaecbe-e2e2-426d-b30c-3745c6cb2cd3)

[Controllers, as we've mentioned,](https://app.pluralsight.com/course-player?clipId=cbaaecbe-e2e2-426d-b30c-3745c6cb2cd3&startTime=0.24) [handle our incoming request and building the response.](https://app.pluralsight.com/course-player?clipId=cbaaecbe-e2e2-426d-b30c-3745c6cb2cd3&startTime=1.96) [I can't emphasize strongly enough that business logic](https://app.pluralsight.com/course-player?clipId=cbaaecbe-e2e2-426d-b30c-3745c6cb2cd3&startTime=6.24) [should not be handled in the controller.](https://app.pluralsight.com/course-player?clipId=cbaaecbe-e2e2-426d-b30c-3745c6cb2cd3&startTime=9.66) [This is also where our request and our response object should stop as well.](https://app.pluralsight.com/course-player?clipId=cbaaecbe-e2e2-426d-b30c-3745c6cb2cd3&startTime=12.94) [We shouldn't hand those off to separate tiers.](https://app.pluralsight.com/course-player?clipId=cbaaecbe-e2e2-426d-b30c-3745c6cb2cd3&startTime=18.09) [It should grab information from the request and the response](https://app.pluralsight.com/course-player?clipId=cbaaecbe-e2e2-426d-b30c-3745c6cb2cd3&startTime=21.29) [and hand it over to the business logic.](https://app.pluralsight.com/course-player?clipId=cbaaecbe-e2e2-426d-b30c-3745c6cb2cd3&startTime=24.17) [This works with our service and repository tier for](https://app.pluralsight.com/course-player?clipId=cbaaecbe-e2e2-426d-b30c-3745c6cb2cd3&startTime=27.64) [business logic and data gathering,](https://app.pluralsight.com/course-player?clipId=cbaaecbe-e2e2-426d-b30c-3745c6cb2cd3&startTime=31.67) [and it's also annotated with the @Controller annotation.](https://app.pluralsight.com/course-player?clipId=cbaaecbe-e2e2-426d-b30c-3745c6cb2cd3&startTime=33.74) [There are some convenience classes that you can extend,](https://app.pluralsight.com/course-player?clipId=cbaaecbe-e2e2-426d-b30c-3745c6cb2cd3&startTime=38.44) [but you either have to wire them up or annotate them with controllers](https://app.pluralsight.com/course-player?clipId=cbaaecbe-e2e2-426d-b30c-3745c6cb2cd3&startTime=41.5) [still. It should also be noted that this also handles exceptions and](https://app.pluralsight.com/course-player?clipId=cbaaecbe-e2e2-426d-b30c-3745c6cb2cd3&startTime=45.62) [routes views accordingly based off of whether or not we had an exception or we've gotten the correct information.](https://app.pluralsight.com/course-player?clipId=cbaaecbe-e2e2-426d-b30c-3745c6cb2cd3&startTime=51.44)

### [Service](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6)

[The service tier is annotated with the @Service annotation,](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=0.04) [and it describes the verbs or actions of our system.](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=4.71) [It is where our business logic should reside.](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=9.14) [In fact, it should all be contained here.](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=11.96) [It shouldn't bleed over into our repository tier.](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=14.37) [Another role of the service tier is to ensure that](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=18.74) [business logic is in a valid state.](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=21.48) [This is where all of our state management should be handled, confirming](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=24.44) [that we've got a valid object passed from a request.](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=27.58) [It meets the standards of our business objects or of our business requirements.](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=31.04) [Also, this is where our transactions should begin.](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=36.44) [If you are doing two‑phase commits or there's a chance we might](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=39.84) [have to roll back or access web services,](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=42.63) [those types of things, this is where we want all of our transactions to begin.](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=45.03) [It often has the same methods as the repository, but a different focus.](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=50.04) [We may have a method in here that says find user by last name,](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=56.13) [and we may have that same method in our repository, but what we do if we](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=59.91) [don't find a user or how many people will be returned or what state we might](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=64.15) [return these objects in is controlled by the service tier where the repository tier is just going to get that data.](https://app.pluralsight.com/course-player?clipId=97f9eb81-590c-44a3-8bef-236579cc22d6&startTime=68.4)

### [Repository](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f)

[And lastly, the repository tier. It is annotated with @Repository.](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f&startTime=0.14) [It also describes the nouns of our system.](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f&startTime=6.04) [You can see where the focus is different from service versus repository.](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f&startTime=8.93) [The service tier describes the verbs or actions that](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f&startTime=14.34) [we wanted to do in the system,](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f&startTime=17) [and the repository tier describes the nouns the data of the system.](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f&startTime=18.39) [It's focused on persisting and interacting with the](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f&startTime=23.34) [database or basic CRUD functions.](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f&startTime=27.77) [It's also typically a one‑to‑one mapping with an object to a database table.](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f&startTime=30.54) [You may have an address and have an address repository.](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f&startTime=36.14) [You would have a customer object and a customer repository.](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f&startTime=41.34) [It's also often a one‑to‑one mapping of those to the database table,](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f&startTime=46.54) [but that's not always the case based off your database design.](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f&startTime=51.51) [You may break things into multiple tables,](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f&startTime=54.9) [like a person in an employee table, but you may only have an](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f&startTime=57.81) [employee object inside of your application.](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f&startTime=61.69) [That is more up to the ORM tool that you're using and how you've structured that data.](https://app.pluralsight.com/course-player?clipId=e4e0a1aa-8402-4e93-8462-5e2d4235961f&startTime=64.34)

### [Summary](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995)

[Let's recap what we covered in this short module about software architecture.](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995&startTime=0.74) [It's a much needed thing inside of our industry to convey](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995&startTime=6.04) [information and vocabulary about what we're trying to do.](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995&startTime=9.67) [We talked about MVC and how the traditional MVC design](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995&startTime=13.64) [pattern isn't necessarily reflective of what we're doing](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995&startTime=17.56) [inside of our web applications.](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995&startTime=20.69) [We also talked about n‑tier architectures and why it's beneficial](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995&startTime=23.24) [for us, and that leads us into a deeper discussion about the](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995&startTime=26.89) [various components inside of our application and how we interact](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995&startTime=29.61) [with those components specifically using our controller, service,](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995&startTime=34.59) [and repository objects.](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995&startTime=38.8) [Those three pieces are what really builds up our access to our back](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995&startTime=41.04) [end and where our business logic should reside.](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995&startTime=45.11) [And even though there are more of Spring proper than Spring MVC,](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995&startTime=48.08) [we should always use those within the Spring MVC app to help](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995&startTime=52.16) [with our model‑view‑controller design pattern.](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995&startTime=55.75) [Let's dive into some deeper configuration and start using this inside of our sample out now.](https://app.pluralsight.com/course-player?clipId=73024b00-866d-44e1-bac5-ec0b27dfc995&startTime=59.44)

## [Recap of Spring Concepts that Are Used in This Course](https://app.pluralsight.com/course-player?clipId=6e83079f-9c6d-4d4c-90d6-20e280d2197a)

### [Introduction](https://app.pluralsight.com/course-player?clipId=6e83079f-9c6d-4d4c-90d6-20e280d2197a)

[Welcome back.](https://app.pluralsight.com/course-player?clipId=6e83079f-9c6d-4d4c-90d6-20e280d2197a&startTime=0.04) [This is Bryan Hansen from Pluralsight.](https://app.pluralsight.com/course-player?clipId=6e83079f-9c6d-4d4c-90d6-20e280d2197a&startTime=1.24) [And in this module, we're going to discuss Spring.](https://app.pluralsight.com/course-player?clipId=6e83079f-9c6d-4d4c-90d6-20e280d2197a&startTime=3.24) [We're going to do a little intro or recap of Spring,](https://app.pluralsight.com/course-player?clipId=6e83079f-9c6d-4d4c-90d6-20e280d2197a&startTime=6.06) [but just enough to convey the principles that we will use for configuring our application.](https://app.pluralsight.com/course-player?clipId=6e83079f-9c6d-4d4c-90d6-20e280d2197a&startTime=8.98)

### [Overview of Spring](https://app.pluralsight.com/course-player?clipId=e417cc75-08dc-4945-bcfa-b771931bd2b4)

[Spring is all about making things work better together.](https://app.pluralsight.com/course-player?clipId=e417cc75-08dc-4945-bcfa-b771931bd2b4&startTime=0.54) [It was designed from the ground up to help overcome difficult](https://app.pluralsight.com/course-player?clipId=e417cc75-08dc-4945-bcfa-b771931bd2b4&startTime=4.71) [configuration problems common in software development. For JPA,](https://app.pluralsight.com/course-player?clipId=e417cc75-08dc-4945-bcfa-b771931bd2b4&startTime=7.89) [we use Spring to configure the transactions, data](https://app.pluralsight.com/course-player?clipId=e417cc75-08dc-4945-bcfa-b771931bd2b4&startTime=11.98) [source, and overall JPA configuration.](https://app.pluralsight.com/course-player?clipId=e417cc75-08dc-4945-bcfa-b771931bd2b4&startTime=14.68) [With everything configured through Spring, we can then use dependency](https://app.pluralsight.com/course-player?clipId=e417cc75-08dc-4945-bcfa-b771931bd2b4&startTime=17.94) [injection and inject resources into the rest of our application.](https://app.pluralsight.com/course-player?clipId=e417cc75-08dc-4945-bcfa-b771931bd2b4&startTime=21.39) [Spring really helps tie everything together in a nice, non‑hard coded way.](https://app.pluralsight.com/course-player?clipId=e417cc75-08dc-4945-bcfa-b771931bd2b4&startTime=25.54) [Our controllers from our Spring MVC app can now seamlessly tie into our](https://app.pluralsight.com/course-player?clipId=e417cc75-08dc-4945-bcfa-b771931bd2b4&startTime=30.15) [database and JPA objects without having to go in and hard code or look](https://app.pluralsight.com/course-player?clipId=e417cc75-08dc-4945-bcfa-b771931bd2b4&startTime=34.42) [up references from within our application.](https://app.pluralsight.com/course-player?clipId=e417cc75-08dc-4945-bcfa-b771931bd2b4&startTime=39.32) [Now I'm going to remind you,](https://app.pluralsight.com/course-player?clipId=e417cc75-08dc-4945-bcfa-b771931bd2b4&startTime=42.14) [though, we are not going to cover Spring in its entirety because that's](https://app.pluralsight.com/course-player?clipId=e417cc75-08dc-4945-bcfa-b771931bd2b4&startTime=43.26) [in other courses I have published here on Pluralsight. We're going to just recap the principles that we need to use for our application](https://app.pluralsight.com/course-player?clipId=e417cc75-08dc-4945-bcfa-b771931bd2b4&startTime=47.2)

### [Types of Injection](https://app.pluralsight.com/course-player?clipId=5ce0a05a-09eb-49d4-848a-29bae9845b8c)

[There are two types of injection in Spring.](https://app.pluralsight.com/course-player?clipId=5ce0a05a-09eb-49d4-848a-29bae9845b8c&startTime=0.04) [Setter injection is the most common,](https://app.pluralsight.com/course-player?clipId=5ce0a05a-09eb-49d4-848a-29bae9845b8c&startTime=3.41) [and this is usually the case because classes have setters to manipulate](https://app.pluralsight.com/course-player?clipId=5ce0a05a-09eb-49d4-848a-29bae9845b8c&startTime=5.79) [variables, but it might not have the constructor that we want.](https://app.pluralsight.com/course-player?clipId=5ce0a05a-09eb-49d4-848a-29bae9845b8c&startTime=9.37) [As you may have guessed, the other type of injection is constructor injection.](https://app.pluralsight.com/course-player?clipId=5ce0a05a-09eb-49d4-848a-29bae9845b8c&startTime=13.94) [Constructor injection will help enforce a contract within the code](https://app.pluralsight.com/course-player?clipId=5ce0a05a-09eb-49d4-848a-29bae9845b8c&startTime=18.54) [that was intended by the creator of the class.](https://app.pluralsight.com/course-player?clipId=5ce0a05a-09eb-49d4-848a-29bae9845b8c&startTime=22.67) [Either way,](https://app.pluralsight.com/course-player?clipId=5ce0a05a-09eb-49d4-848a-29bae9845b8c&startTime=26.04) [the code will work the same regardless of which method we choose or which option is available.](https://app.pluralsight.com/course-player?clipId=5ce0a05a-09eb-49d4-848a-29bae9845b8c&startTime=26.63)

### [Setter Injection](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000)

[Setter injection using the Java configuration approach is](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=0.04) [really is as simple as a method call.](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=3.85) [Some of the mystery of injection just goes away.](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=6.94) [A lot of developers I talk to are concerned with the black box](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=10.9) [fail of dependency injection or inversion of control, and with](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=14.12) [the Java configuration approach,](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=17.8) [it's more visible as to what's actually going on. With XML, there's a](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=19.63) [lot of wondering what's wired up and what's calling in, who and how this](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=23.9) [auto wiring is all taking place, and that just kind of goes away with](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=28.13) [the Java configuration approach.](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=31.51) [Setter injection is simply a matter of calling a setter on a bean.](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=34.24) [We're going to define a bean using the @Bean annotation,](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=38.44) [and you can see here that we've got our getCustomerService](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=41.42) [method that returns a bean of type customerService, or a](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=44.81) [bean named customerService.](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=48.38) [And notice, though, that we have the setter injection in here.](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=50.64) [As we're building our beans,](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=54.32) [we're going to call this setCustomerRepository method](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=55.83) [on our customerService instance.](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=59.44) [To do that,](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=62.44) [we need to have a method called getCustomerRepository in our configuration](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=63.2) [that returns the customerRepository bean. This is going to wire the](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=68.55) [customerRepository inside of our customerService.](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=73.51) [Let me say that again.](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=77.94) [We're not going to call an instance or create, we're going to call and get an](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=79.54) [instance of the bean from the Spring configuration file.](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=85.48) [So when we define a bean such as our customerRepository here](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=89.04) [that returns an instance of customerRepository,](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=92.5) [you can see that those methods now line up.](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=95.26) [I'm going to call getCustomerRepository that's registered as a Spring bean,](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=98.64) [and that's going to return an instance for our setCustomerRepository instance](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=103.32) [on our service instance. Take note, Spring is still doing a lot of heavy](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=108.42) [lifting behind the scenes when a bean is registered,](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=114.38) [such as these beans are all by default a singleton and will only](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=116.68) [execute the method the first time it's called.](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=120.33) [It's a very key point because if I didn't have this set up this way,](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=123.13) [it would create a new bean every time we call this. Since it is in Spring,](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=126.54) [it's going to register this is as a singleton and only return one instance.](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=131.61) [Let's look at what the code would look like not using Spring since it's really the same code.](https://app.pluralsight.com/course-player?clipId=06b81495-c741-4c64-be73-fbb2ef28e000&startTime=135.94)

### [Setter Pojo](https://app.pluralsight.com/course-player?clipId=57a81f60-2432-4996-acf9-3f05125c3f9e)

[To use our setter‑injected Java code, all of our code can be configured just](https://app.pluralsight.com/course-player?clipId=57a81f60-2432-4996-acf9-3f05125c3f9e&startTime=0.04) [the same as a plain old Java object by having a typical run method like here,](https://app.pluralsight.com/course-player?clipId=57a81f60-2432-4996-acf9-3f05125c3f9e&startTime=5.65) [a main method where we can create a repository,](https://app.pluralsight.com/course-player?clipId=57a81f60-2432-4996-acf9-3f05125c3f9e&startTime=10.19) [then we can create a service, and lastly,](https://app.pluralsight.com/course-player?clipId=57a81f60-2432-4996-acf9-3f05125c3f9e&startTime=14.67) [we set that repository into that service.](https://app.pluralsight.com/course-player?clipId=57a81f60-2432-4996-acf9-3f05125c3f9e&startTime=17.84) [Conceptually, this is the exact same thing Spring is doing behind the scenes,](https://app.pluralsight.com/course-player?clipId=57a81f60-2432-4996-acf9-3f05125c3f9e&startTime=21.24) [but also adding a lot of inherited functionality.](https://app.pluralsight.com/course-player?clipId=57a81f60-2432-4996-acf9-3f05125c3f9e&startTime=25.9) [You can see,](https://app.pluralsight.com/course-player?clipId=57a81f60-2432-4996-acf9-3f05125c3f9e&startTime=30.84) [though, the Java configuration is just the same as if we were doing it with Spring or without, and you can test code the same way.](https://app.pluralsight.com/course-player?clipId=57a81f60-2432-4996-acf9-3f05125c3f9e&startTime=31.46)

### [XML and Spring Configuration](https://app.pluralsight.com/course-player?clipId=5dd50da6-baf1-4dd7-9109-59d66aeafbbd)

[The focus of this course has since been moved to complete Java](https://app.pluralsight.com/course-player?clipId=5dd50da6-baf1-4dd7-9109-59d66aeafbbd&startTime=0.24) [configuration, but to show the XML equivalent,](https://app.pluralsight.com/course-player?clipId=5dd50da6-baf1-4dd7-9109-59d66aeafbbd&startTime=4.68) [this is what it would look like.](https://app.pluralsight.com/course-player?clipId=5dd50da6-baf1-4dd7-9109-59d66aeafbbd&startTime=8.12) [You may maintain existing applications that still have XML in there,](https://app.pluralsight.com/course-player?clipId=5dd50da6-baf1-4dd7-9109-59d66aeafbbd&startTime=10.28) [and the XML configuration actually still works just fine, so I wanted to](https://app.pluralsight.com/course-player?clipId=5dd50da6-baf1-4dd7-9109-59d66aeafbbd&startTime=14.14) [show you the two so you could compare and contrast them.](https://app.pluralsight.com/course-player?clipId=5dd50da6-baf1-4dd7-9109-59d66aeafbbd&startTime=17.8) [We have a bean for the customerRepository, we have a bean](https://app.pluralsight.com/course-player?clipId=5dd50da6-baf1-4dd7-9109-59d66aeafbbd&startTime=21.04) [for the customerService, and the property for wiring the](https://app.pluralsight.com/course-player?clipId=5dd50da6-baf1-4dd7-9109-59d66aeafbbd&startTime=25.41) [repository into the service.](https://app.pluralsight.com/course-player?clipId=5dd50da6-baf1-4dd7-9109-59d66aeafbbd&startTime=29.83) [That's where our setter injection is occurring.](https://app.pluralsight.com/course-player?clipId=5dd50da6-baf1-4dd7-9109-59d66aeafbbd&startTime=31.73) [We created that bean and then injected it through that property into our service instance.](https://app.pluralsight.com/course-player?clipId=5dd50da6-baf1-4dd7-9109-59d66aeafbbd&startTime=34.98)

### [Autowiring Setters](https://app.pluralsight.com/course-player?clipId=262fb009-7926-4e69-bfee-d49b8d69e131)

[Instead of XML, and even just plain Java configuration,](https://app.pluralsight.com/course-player?clipId=262fb009-7926-4e69-bfee-d49b8d69e131&startTime=0.24) [we can utilize auto wiring in our code.](https://app.pluralsight.com/course-player?clipId=262fb009-7926-4e69-bfee-d49b8d69e131&startTime=4.75) [Auto wiring would still require us to have a bean](https://app.pluralsight.com/course-player?clipId=262fb009-7926-4e69-bfee-d49b8d69e131&startTime=8.24) [defined as our customer repository,](https://app.pluralsight.com/course-player?clipId=262fb009-7926-4e69-bfee-d49b8d69e131&startTime=10.89) [but we would then just mark the method in our service as being](https://app.pluralsight.com/course-player?clipId=262fb009-7926-4e69-bfee-d49b8d69e131&startTime=13.25) [auto wired with that bean. This is actually the methodology we](https://app.pluralsight.com/course-player?clipId=262fb009-7926-4e69-bfee-d49b8d69e131&startTime=16.58) [will use inside our application,](https://app.pluralsight.com/course-player?clipId=262fb009-7926-4e69-bfee-d49b8d69e131&startTime=20.94) [and it looks very similar to the Java configuration with a slight twist.](https://app.pluralsight.com/course-player?clipId=262fb009-7926-4e69-bfee-d49b8d69e131&startTime=22.85) [We define a bean as the customer repository, and then inside of our](https://app.pluralsight.com/course-player?clipId=262fb009-7926-4e69-bfee-d49b8d69e131&startTime=28.04) [application we mark the setter for auto wiring in the bean.](https://app.pluralsight.com/course-player?clipId=262fb009-7926-4e69-bfee-d49b8d69e131&startTime=33.47) [This also incorporates the use of a component scanner.](https://app.pluralsight.com/course-player?clipId=262fb009-7926-4e69-bfee-d49b8d69e131&startTime=38.44) [So instead of having everything all in one](https://app.pluralsight.com/course-player?clipId=262fb009-7926-4e69-bfee-d49b8d69e131&startTime=43.94) [configuration file in the individual services,](https://app.pluralsight.com/course-player?clipId=262fb009-7926-4e69-bfee-d49b8d69e131&startTime=46.29) [we can annotate and configure them as needed.](https://app.pluralsight.com/course-player?clipId=262fb009-7926-4e69-bfee-d49b8d69e131&startTime=49.51) [It does move some of your configuration code around,](https://app.pluralsight.com/course-player?clipId=262fb009-7926-4e69-bfee-d49b8d69e131&startTime=53.25) [but once you start using this approach, you'll find you generally like it a lot better.](https://app.pluralsight.com/course-player?clipId=262fb009-7926-4e69-bfee-d49b8d69e131&startTime=56.94)

### [Constructor Injection](https://app.pluralsight.com/course-player?clipId=1fb1725c-5a51-4b19-a800-ccf3e6d84cc0)

[Having seen setter injection now, constructor injection almost seems simpler.](https://app.pluralsight.com/course-player?clipId=1fb1725c-5a51-4b19-a800-ccf3e6d84cc0&startTime=0.14) [We have the same objects defined, but now we just move the call to get the](https://app.pluralsight.com/course-player?clipId=1fb1725c-5a51-4b19-a800-ccf3e6d84cc0&startTime=6.06) [repository to the constructor where we are creating the service. You can see](https://app.pluralsight.com/course-player?clipId=1fb1725c-5a51-4b19-a800-ccf3e6d84cc0&startTime=11.77) [inside of here we have our beans already defined, and then we just go ahead and](https://app.pluralsight.com/course-player?clipId=1fb1725c-5a51-4b19-a800-ccf3e6d84cc0&startTime=17.2) [call that instance to get it injected in there.](https://app.pluralsight.com/course-player?clipId=1fb1725c-5a51-4b19-a800-ccf3e6d84cc0&startTime=22.26) [So, you just simply put the constructor with arguments in the order that](https://app.pluralsight.com/course-player?clipId=1fb1725c-5a51-4b19-a800-ccf3e6d84cc0&startTime=25.24) [you want them to be injected and it will automatically call and](https://app.pluralsight.com/course-player?clipId=1fb1725c-5a51-4b19-a800-ccf3e6d84cc0&startTime=29.65) [instantiate those beans and fill that object for you. Let's look at that same configuration and how we used to do that with XML.](https://app.pluralsight.com/course-player?clipId=1fb1725c-5a51-4b19-a800-ccf3e6d84cc0&startTime=34.19)

### [Spring XML Config Constructor Injection](https://app.pluralsight.com/course-player?clipId=3357538a-b8f3-45ef-934c-aa893270415a)

[The only difference to do XML constructor injection is we've now](https://app.pluralsight.com/course-player?clipId=3357538a-b8f3-45ef-934c-aa893270415a&startTime=0.34) [moved from a property to a constructor‑arg element.](https://app.pluralsight.com/course-player?clipId=3357538a-b8f3-45ef-934c-aa893270415a&startTime=4.44) [It takes an index which specifies the position of the object we're trying to](https://app.pluralsight.com/course-player?clipId=3357538a-b8f3-45ef-934c-aa893270415a&startTime=10.04) [inject. Again, mostly showing this for historical purposes, you likely wouldn't be using XML configuration in a new project.](https://app.pluralsight.com/course-player?clipId=3357538a-b8f3-45ef-934c-aa893270415a&startTime=15.17)

### [Autowiring Constructors](https://app.pluralsight.com/course-player?clipId=217fbeea-7658-438a-90b1-11c317b54b64)

[Auto wiring constructors is very similar to auto wiring setters.](https://app.pluralsight.com/course-player?clipId=217fbeea-7658-438a-90b1-11c317b54b64&startTime=0.84) [Instead of the XML configuration, just like setters,](https://app.pluralsight.com/course-player?clipId=217fbeea-7658-438a-90b1-11c317b54b64&startTime=5.51) [we have our customerRepository bean that we have configured, and note that](https://app.pluralsight.com/course-player?clipId=217fbeea-7658-438a-90b1-11c317b54b64&startTime=9.15) [the code is truncated for that definition and now we just use the @Autowired](https://app.pluralsight.com/course-player?clipId=217fbeea-7658-438a-90b1-11c317b54b64&startTime=13.71) [annotation to a constructor that takes the argument passed in instead of a](https://app.pluralsight.com/course-player?clipId=217fbeea-7658-438a-90b1-11c317b54b64&startTime=18.52) [setter. It really is almost identical as just moving the @Autowired annotation up to that constructor.](https://app.pluralsight.com/course-player?clipId=217fbeea-7658-438a-90b1-11c317b54b64&startTime=22.36)

### [Context Files](https://app.pluralsight.com/course-player?clipId=795b8a62-d9a4-4ddd-9e60-e9948afe1d93)

[So we've seen that Spring can be configured in multiple ways.](https://app.pluralsight.com/course-player?clipId=795b8a62-d9a4-4ddd-9e60-e9948afe1d93&startTime=0.54) [There's the XML configuration,](https://app.pluralsight.com/course-player?clipId=795b8a62-d9a4-4ddd-9e60-e9948afe1d93&startTime=3.87) [there's annotation, and then there's also pure Java config.](https://app.pluralsight.com/course-player?clipId=795b8a62-d9a4-4ddd-9e60-e9948afe1d93&startTime=6.54) [Just to be clear,](https://app.pluralsight.com/course-player?clipId=795b8a62-d9a4-4ddd-9e60-e9948afe1d93&startTime=12.24) [you can have annotations with XML and you can have them with the Java config.](https://app.pluralsight.com/course-player?clipId=795b8a62-d9a4-4ddd-9e60-e9948afe1d93&startTime=13.55) [It doesn't mean that annotation‑based is Java](https://app.pluralsight.com/course-player?clipId=795b8a62-d9a4-4ddd-9e60-e9948afe1d93&startTime=18.56) [configuration‑based, that's actually just annotation‑based.](https://app.pluralsight.com/course-player?clipId=795b8a62-d9a4-4ddd-9e60-e9948afe1d93&startTime=21.83) [We are going to be using the Java configuration with annotation approach.](https://app.pluralsight.com/course-player?clipId=795b8a62-d9a4-4ddd-9e60-e9948afe1d93&startTime=25.14) [What also used to be done with a lot of XML,](https://app.pluralsight.com/course-player?clipId=795b8a62-d9a4-4ddd-9e60-e9948afe1d93&startTime=31.14) [the web.xml, loader listener, all of that configuration](https://app.pluralsight.com/course-player?clipId=795b8a62-d9a4-4ddd-9e60-e9948afe1d93&startTime=34.26) [is now all contained in our AppConfig,](https://app.pluralsight.com/course-player?clipId=795b8a62-d9a4-4ddd-9e60-e9948afe1d93&startTime=38.26) [which is a very welcome change and makes the configuration](https://app.pluralsight.com/course-player?clipId=795b8a62-d9a4-4ddd-9e60-e9948afe1d93&startTime=41.05) [in our app a lot less, and that's actually where we'll start off in the next module, integrating this all in to our application.](https://app.pluralsight.com/course-player?clipId=795b8a62-d9a4-4ddd-9e60-e9948afe1d93&startTime=44.53)

### [Summary](https://app.pluralsight.com/course-player?clipId=25f5b2c9-3dca-4803-ac7a-c8c1d61a6fa8)

[So in this module, we covered setter injection and constructor](https://app.pluralsight.com/course-player?clipId=25f5b2c9-3dca-4803-ac7a-c8c1d61a6fa8&startTime=0.74) [injection, we looked at code to see that it was all in basic POJOs under](https://app.pluralsight.com/course-player?clipId=25f5b2c9-3dca-4803-ac7a-c8c1d61a6fa8&startTime=4.84) [the hood, and we looked at doing both methods using XML configuration,](https://app.pluralsight.com/course-player?clipId=25f5b2c9-3dca-4803-ac7a-c8c1d61a6fa8&startTime=9.43) [as well as auto wiring using annotations.](https://app.pluralsight.com/course-player?clipId=25f5b2c9-3dca-4803-ac7a-c8c1d61a6fa8&startTime=13.75) [And lastly, we covered briefly the topic of context files, and it still](https://app.pluralsight.com/course-player?clipId=25f5b2c9-3dca-4803-ac7a-c8c1d61a6fa8&startTime=16.74) [has to be initiated or started through a context file, except now we're](https://app.pluralsight.com/course-player?clipId=25f5b2c9-3dca-4803-ac7a-c8c1d61a6fa8&startTime=21.2) [doing everything using Java configuration,](https://app.pluralsight.com/course-player?clipId=25f5b2c9-3dca-4803-ac7a-c8c1d61a6fa8&startTime=25.25) [that's kind of a historical approach.](https://app.pluralsight.com/course-player?clipId=25f5b2c9-3dca-4803-ac7a-c8c1d61a6fa8&startTime=27.46) [In the next module, we're going to walk through getting all of this](https://app.pluralsight.com/course-player?clipId=25f5b2c9-3dca-4803-ac7a-c8c1d61a6fa8&startTime=29.74) [configured and into our application so you can see these principles we've talked about and now put them to use.](https://app.pluralsight.com/course-player?clipId=25f5b2c9-3dca-4803-ac7a-c8c1d61a6fa8&startTime=32.79)

## [Configuration of Spring and JPA for Development](https://app.pluralsight.com/course-player?clipId=566e5db3-a845-4fad-8233-7b5f0db48cd6)

### [Introduction](https://app.pluralsight.com/course-player?clipId=566e5db3-a845-4fad-8233-7b5f0db48cd6)

[Welcome back.](https://app.pluralsight.com/course-player?clipId=566e5db3-a845-4fad-8233-7b5f0db48cd6&startTime=0.34) [This is Bryan Hansen from Pluralsight.](https://app.pluralsight.com/course-player?clipId=566e5db3-a845-4fad-8233-7b5f0db48cd6&startTime=1.36) [And in this module, we're going to discuss and walk through configuration.](https://app.pluralsight.com/course-player?clipId=566e5db3-a845-4fad-8233-7b5f0db48cd6&startTime=3.26) [We're going to walk through all of the configuration to get Spring and](https://app.pluralsight.com/course-player?clipId=566e5db3-a845-4fad-8233-7b5f0db48cd6&startTime=7.27) [JPA set up to develop the rest of our application.](https://app.pluralsight.com/course-player?clipId=566e5db3-a845-4fad-8233-7b5f0db48cd6&startTime=10.48) [This module will have a lot of demos and configuration aspects to it.](https://app.pluralsight.com/course-player?clipId=566e5db3-a845-4fad-8233-7b5f0db48cd6&startTime=13.94) [I did this so that we could get it all out of the way and](https://app.pluralsight.com/course-player?clipId=566e5db3-a845-4fad-8233-7b5f0db48cd6&startTime=18.84) [dive deeper on just the specific features of JPA and Hibernate in the rest of the course.](https://app.pluralsight.com/course-player?clipId=566e5db3-a845-4fad-8233-7b5f0db48cd6&startTime=21.44)

### [Configuration Problems](https://app.pluralsight.com/course-player?clipId=f9cfdccd-5340-4561-97ec-b685a914a780)

[Configuration is often a painful task.](https://app.pluralsight.com/course-player?clipId=f9cfdccd-5340-4561-97ec-b685a914a780&startTime=1.14) [It can honestly be some of the most complex and time‑consuming](https://app.pluralsight.com/course-player?clipId=f9cfdccd-5340-4561-97ec-b685a914a780&startTime=3.99) [parts of development. And Spring aims to make this easier, but](https://app.pluralsight.com/course-player?clipId=f9cfdccd-5340-4561-97ec-b685a914a780&startTime=9.02) [there are still a lot of moving pieces.](https://app.pluralsight.com/course-player?clipId=f9cfdccd-5340-4561-97ec-b685a914a780&startTime=13) [It should also be noted that Spring isn't just about making things easier,](https://app.pluralsight.com/course-player?clipId=f9cfdccd-5340-4561-97ec-b685a914a780&startTime=15.34) [but oftentimes making things more flexible as well.](https://app.pluralsight.com/course-player?clipId=f9cfdccd-5340-4561-97ec-b685a914a780&startTime=18.83) [So there can be a trade‑off for ease versus flexibility.](https://app.pluralsight.com/course-player?clipId=f9cfdccd-5340-4561-97ec-b685a914a780&startTime=22.09) [We're going to walk through each piece of the configuration to get the](https://app.pluralsight.com/course-player?clipId=f9cfdccd-5340-4561-97ec-b685a914a780&startTime=26.24) [development environment up and running. It's often the hardest part for developers when learning new technologies such as JPA.](https://app.pluralsight.com/course-player?clipId=f9cfdccd-5340-4561-97ec-b685a914a780&startTime=29)

### [Database Overview](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929)

[Let's start off by talking about the database for a minute.](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929&startTime=0.04) [JPA is an abstraction layer for our database.](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929&startTime=3.44) [We can use almost any relational database that we have a dialect for.](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929&startTime=7.16) [And if you don't know what dialects are,](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929&startTime=11.7) [we're going to talk about these more in greater detail later in the JPA](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929&startTime=14.14) [configuration section and some of the more detailed things that we can do with](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929&startTime=18.23) [those dialects because it's a pretty advanced topic.](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929&startTime=22.03) [For our course, we're going to use MySQL.](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929&startTime=24.65) [We're actually going to walk through installing that in just a bit.](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929&startTime=28.09) [But since this is a re‑release of an old course,](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929&startTime=30.83) [a new change is that we're going to use Docker to install the database and](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929&startTime=33.83) [keep it contained. Docker has become the industry standard.](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929&startTime=38.2) [And if you're not using it, you should be.](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929&startTime=42.22) [It actually made this course simpler,](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929&startTime=44.35) [and that was one of the deciding factors of why we used it.](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929&startTime=46.45) [If for some reason you don't want to use Docker,](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929&startTime=50.14) [you can install it natively, and all of the examples will work just the same. But I would encourage you to give Docker a shot if you haven't.](https://app.pluralsight.com/course-player?clipId=d701705a-8461-4a64-89a4-98f7349c9929&startTime=52.6)

### [docker-compose.yml](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03)

[All you need to do to run Docker is to have the Docker Desktop app installed.](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=0.14) [And for that, you just go to docker.com and download the](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=5.94) [version specific to your operating system.](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=9.47) [From there, we're going to add this docker‑compose file to our application,](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=12.94) [and it will set up everything.](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=17.84) [In this case, we're going to have a database,](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=19.52) [and you can tell that by the db: that sets up the container for this.](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=22.17) [Its image type is of mysql:5.7, and the container name is conference.](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=27.64) [Next,](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=36.14) [we're going to bind the ports that are exposed on our operating](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=36.44) [system to this port inside of the container,](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=39.16) [which is 3306.](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=41.61) [From there, we'll tell it where it's going to store the data,](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=44.04) [which is underneath our project in a .data directory /db](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=46.56) [and then for our environment as well.](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=51.13) [We're going to say that the MYSQL\_ROOT\_PASSWORD is pass, and](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=55.34) [the database name is conference. And we have all of our stuff](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=59.12) [set up and configured right here.](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=62.99) [So this will download that instance for us,](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=64.5) [store it,](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=66.76) [bind the ports, and set up the username and password and database name for us. Let's add this to our application now, and we can start up our Docker instance.](https://app.pluralsight.com/course-player?clipId=b5e4549c-0011-4f8e-bcf3-c661883cad03&startTime=67.52)

### [Docker Download Demo](https://app.pluralsight.com/course-player?clipId=0d7a46e7-7fe0-4174-8652-432305c01de6)

[So I mentioned it in the previous slide, but to get Docker,](https://app.pluralsight.com/course-player?clipId=0d7a46e7-7fe0-4174-8652-432305c01de6&startTime=0.54) [you literally just go to docker.com,](https://app.pluralsight.com/course-player?clipId=0d7a46e7-7fe0-4174-8652-432305c01de6&startTime=4.78) [choose Products, and select Docker Desktop. From here,](https://app.pluralsight.com/course-player?clipId=0d7a46e7-7fe0-4174-8652-432305c01de6&startTime=7.1) [it'll bring you to a page where you can choose to download for](https://app.pluralsight.com/course-player?clipId=0d7a46e7-7fe0-4174-8652-432305c01de6&startTime=11.79) [the specific operating system that you're on.](https://app.pluralsight.com/course-player?clipId=0d7a46e7-7fe0-4174-8652-432305c01de6&startTime=14.79) [I am on a Mac, so I'll download the one for Mac,](https://app.pluralsight.com/course-player?clipId=0d7a46e7-7fe0-4174-8652-432305c01de6&startTime=17.19) [which I've actually already done, and just run through the install on it.](https://app.pluralsight.com/course-player?clipId=0d7a46e7-7fe0-4174-8652-432305c01de6&startTime=20.79) [Nothing special there.](https://app.pluralsight.com/course-player?clipId=0d7a46e7-7fe0-4174-8652-432305c01de6&startTime=23.97) [I do create an account and sign into that account on Docker just because it'll](https://app.pluralsight.com/course-player?clipId=0d7a46e7-7fe0-4174-8652-432305c01de6&startTime=25.74) [allow me to store and select images and do some other things.](https://app.pluralsight.com/course-player?clipId=0d7a46e7-7fe0-4174-8652-432305c01de6&startTime=30.81) [Really nothing promotional that comes out of it.](https://app.pluralsight.com/course-player?clipId=0d7a46e7-7fe0-4174-8652-432305c01de6&startTime=34.08) [But that's all you've got to do to get Docker installed on your machine so that we can start using the containers that we want to.](https://app.pluralsight.com/course-player?clipId=0d7a46e7-7fe0-4174-8652-432305c01de6&startTime=36.64)

### [docker-compose.yml Demo](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a)

[With Docker Desktop installed and running,](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=0.44) [I went ahead and switched back to our IDE,](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=3.79) [and I closed all of the open tabs we had earlier and shut](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=5.85) [down the tomcat instance that was running.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=9.72) [And I'm going to right‑click on our project and say New, File.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=11.86) [We want to name this file docker‑compose.yml.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=16.44) [This is a YAML file.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=21.24) [And yes, you do want to name your file the exact same thing as this.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=25.78) [It does follow convention over configuration.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=29.8) [So name your file this, and we'll hit Enter.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=32.91) [And it will ask if I want to add this to Git.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=36.45) [If you're using Git and have it set up that way,](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=39.16) [it's going to continually ask if you want to import those files.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=42.4) [So I will just cancel this and do it in the desktop](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=44.79) [IDE that I've got installed locally.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=49.37) [We can start editing this.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=52.22) [So I'm going to begin with typing in version, and this does have](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=53.69) [some context‑sensitive help. A lot of your IDEs do.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=59.18) [If you don't, it doesn't matter because this is literally just a text file.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=63.09) [A YAML file is just a text file.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=67.64) [So we're going to add networks inside of here, and we're just going](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=69.94) [to use the default network. From here, we want to start utilizing](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=73.03) [these services and specifically the database service. And we're](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=80.74) [going to begin with an image,](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=86.38) [and the image we want is mysql. And this is name and case‑sensitive, so I](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=88.94) [would follow the exact conventions I have typed in here.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=94.75) [The container name, we're just going to use conference.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=98.64) [And for the ports, we're actually going to use the default ports that they have.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=104.84) [You could change this to something else,](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=110.54) [but you have to get it configured correctly with your OS and](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=112.28) [with the port that's inside of the container.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=116.86) [We'll just use the defaults for now.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=119.16) [And this is for your local instance, so it shouldn't be affecting anything there.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=121.44) [We'll have volumes,](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=126.74) [and this is probably the one that's the most](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=130.54) [error‑prone for you typing incorrectly.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=133.3) [We're going to say,](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=136.14) [store our data for this underneath our project in a .data directory and](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=137.5) [under a folder named /db. And then for our environment, we'll say use](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=144.76) [var/lib/mysql. And our last environment entry, and this is the environment](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=153.18) [of our container, I'm going to say MYSQL\_ROOT\_PASSWORD, and we will use](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=168.15) [pass there. And for the database, we'll say MYSQL\_DATABASE, and this is](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=181.4) [the database name.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=190.89) [We will say conference as well there and just save this.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=193.14) [I'm going to switch over to our terminal, and we can actually run this docker‑compose file.](https://app.pluralsight.com/course-player?clipId=e0868619-e76e-4177-bb5a-14748ad7118a&startTime=198.94)

### [Start Container Demo](https://app.pluralsight.com/course-player?clipId=157f2b72-8c6d-4d64-885d-951ea9a58eb0)

[Inside of our terminal, you can see that I am at the root of our project.](https://app.pluralsight.com/course-player?clipId=157f2b72-8c6d-4d64-885d-951ea9a58eb0&startTime=0.44) [I just did a print working directory for us there.](https://app.pluralsight.com/course-player?clipId=157f2b72-8c6d-4d64-885d-951ea9a58eb0&startTime=5.82) [And from here, we can actually execute that docker‑compose file.](https://app.pluralsight.com/course-player?clipId=157f2b72-8c6d-4d64-885d-951ea9a58eb0&startTime=8.84) [So we'll say docker‑compose.](https://app.pluralsight.com/course-player?clipId=157f2b72-8c6d-4d64-885d-951ea9a58eb0&startTime=12.76) [You leave off the .yml because we're actually invoking the](https://app.pluralsight.com/course-player?clipId=157f2b72-8c6d-4d64-885d-951ea9a58eb0&startTime=16.44) [application here and say up ‑d. And this will go through and create](https://app.pluralsight.com/course-player?clipId=157f2b72-8c6d-4d64-885d-951ea9a58eb0&startTime=20.36) [that instance and start it for the first time.](https://app.pluralsight.com/course-player?clipId=157f2b72-8c6d-4d64-885d-951ea9a58eb0&startTime=27.55) [So it's actually up and running now,](https://app.pluralsight.com/course-player?clipId=157f2b72-8c6d-4d64-885d-951ea9a58eb0&startTime=30.22) [and we can verify that by switching over to our Docker Desktop instance to see which containers are running.](https://app.pluralsight.com/course-player?clipId=157f2b72-8c6d-4d64-885d-951ea9a58eb0&startTime=32.03)

### [Docker Desktop Demo](https://app.pluralsight.com/course-player?clipId=7a6de805-9b93-4f9a-95f3-d6d80a76888c)

[In my Docker Desktop,](https://app.pluralsight.com/course-player?clipId=7a6de805-9b93-4f9a-95f3-d6d80a76888c&startTime=0.34) [you can see any of the containers you currently have in there](https://app.pluralsight.com/course-player?clipId=7a6de805-9b93-4f9a-95f3-d6d80a76888c&startTime=2.08) [and that our conference container is running.](https://app.pluralsight.com/course-player?clipId=7a6de805-9b93-4f9a-95f3-d6d80a76888c&startTime=5.35) [So if I expand that, inside of here, you can tell that there is our container.](https://app.pluralsight.com/course-player?clipId=7a6de805-9b93-4f9a-95f3-d6d80a76888c&startTime=8.54) [And if I click into it, you can see the log files that tells you it was created,](https://app.pluralsight.com/course-player?clipId=7a6de805-9b93-4f9a-95f3-d6d80a76888c&startTime=14.84) [it was running, which port it's running on.](https://app.pluralsight.com/course-player?clipId=7a6de805-9b93-4f9a-95f3-d6d80a76888c&startTime=19.05) [All of that information is displayed,](https://app.pluralsight.com/course-player?clipId=7a6de805-9b93-4f9a-95f3-d6d80a76888c&startTime=21.37) [and it literally did all of that from that docker‑compose file.](https://app.pluralsight.com/course-player?clipId=7a6de805-9b93-4f9a-95f3-d6d80a76888c&startTime=23.81) [So just to clarify how much simpler that was, once](https://app.pluralsight.com/course-player?clipId=7a6de805-9b93-4f9a-95f3-d6d80a76888c&startTime=28.04) [I got Docker Desktop installed,](https://app.pluralsight.com/course-player?clipId=7a6de805-9b93-4f9a-95f3-d6d80a76888c&startTime=32.57) [I literally went out, put a docker‑compose file inside of our application](https://app.pluralsight.com/course-player?clipId=7a6de805-9b93-4f9a-95f3-d6d80a76888c&startTime=35.34) [with seven or eight lines inside of it that went out,](https://app.pluralsight.com/course-player?clipId=7a6de805-9b93-4f9a-95f3-d6d80a76888c&startTime=39.07) [downloaded the instance for us,](https://app.pluralsight.com/course-player?clipId=7a6de805-9b93-4f9a-95f3-d6d80a76888c&startTime=42.88) [set up the username and password and the port mappings,](https://app.pluralsight.com/course-player?clipId=7a6de805-9b93-4f9a-95f3-d6d80a76888c&startTime=45.3) [and we're up and running.](https://app.pluralsight.com/course-player?clipId=7a6de805-9b93-4f9a-95f3-d6d80a76888c&startTime=49.34) [We have our database set up for our application, ready to start development against.](https://app.pluralsight.com/course-player?clipId=7a6de805-9b93-4f9a-95f3-d6d80a76888c&startTime=50.84)

### [Docker Tips](https://app.pluralsight.com/course-player?clipId=cbffcadc-a897-4672-804e-48c125b3022e)

[Just to give you a cheat sheet of some of the Docker commands we're going to](https://app.pluralsight.com/course-player?clipId=cbffcadc-a897-4672-804e-48c125b3022e&startTime=0.04) [run in this course, there is the docker‑compose up ‑d,](https://app.pluralsight.com/course-player?clipId=cbffcadc-a897-4672-804e-48c125b3022e&startTime=3.89) [which is used to start up our Docker container and our image,](https://app.pluralsight.com/course-player?clipId=cbffcadc-a897-4672-804e-48c125b3022e&startTime=9.48) [docker‑compose down shuts it down,](https://app.pluralsight.com/course-player?clipId=cbffcadc-a897-4672-804e-48c125b3022e&startTime=14.34) [docker ps will show you the process that's currently running,](https://app.pluralsight.com/course-player?clipId=cbffcadc-a897-4672-804e-48c125b3022e&startTime=17.2) [and the last two, docker inspect with pid and pid grep IPAddress,](https://app.pluralsight.com/course-player?clipId=cbffcadc-a897-4672-804e-48c125b3022e&startTime=22.24) [will let us inspect pieces of an instance that are currently](https://app.pluralsight.com/course-player?clipId=cbffcadc-a897-4672-804e-48c125b3022e&startTime=30.15) [running and if we need to do anything specific with those](https://app.pluralsight.com/course-player?clipId=cbffcadc-a897-4672-804e-48c125b3022e&startTime=33.46) [processes. We've got our YAML file created. We're start adding in the JPA jars to our application.](https://app.pluralsight.com/course-player?clipId=cbffcadc-a897-4672-804e-48c125b3022e&startTime=37.31)

### [Adding Jars with Maven](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d)

[The previous release of this course required us to](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d&startTime=0.44) [import five different jars into it.](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d&startTime=3.67) [Since we're now using Spring Boot,](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d&startTime=6.59) [we can just include the spring‑boot‑starter‑data‑jpa jar that's listed here.](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d&startTime=8.54) [A couple of things to note though, we don't have a version on this code.](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d&startTime=14.44) [So if you've used Maven before or it's maybe not so](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d&startTime=19.22) [common for you to recognize it, there is not a version element inside of here.](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d&startTime=22.43) [And that's because we inherited from the parent version inside of our pom.xml.](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d&startTime=26.59) [Secondly, the Hibernate jars, you'll notice, aren't being imported here anymore.](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d&startTime=33.34) [So we just have the data‑jpa starter jar.](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d&startTime=38.7) [Well,](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d&startTime=42.3) [it pulls all of the other libraries we need in through transitive dependencies.](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d&startTime=43.1) [If that's foreign to you, don't worry about it.](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d&startTime=48.36) [But if you want to dig deeper,](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d&startTime=50.78) [I suggest going and watching my Maven Fundamentals course here, on](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d&startTime=52.41) [Pluralsight, and it will explain that greater detail to you.](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d&startTime=55.59) [Let's add the spring‑boot‑starter‑data‑jpa dependency to our pom.xml inside of our application now.](https://app.pluralsight.com/course-player?clipId=94875947-3549-4be4-85f6-3df6c0c0c83d&startTime=59.24)

### [Adding Jars Demo](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185)

[Picking up where we left off in our IDE,](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=0.14) [let's open up our pom.xml. And we can give ourselves a little](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=2.41) [bit of space just somewhere between spring‑boot‑starter web](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=7.74) [and spring‑boot‑starter‑tomcat.](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=11.82) [And let's add a dependency inside of here. And the groupId is](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=15.64) [going to be org.springframework.boot, and the artifactId is going](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=21.14) [to be spring‑boot‑starter‑data‑jpa.](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=32.88) [And when we save this,](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=43.44) [it's going to go ahead and download those dependencies in the background.](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=44.91) [I've already done it once before on my machine, so it did it quite fast.](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=49.62) [It was already cached.](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=52.77) [It may take it a minute or so for yours to download them. And a couple of](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=53.91) [things to note about this. Again, as I mentioned in the slides,](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=58.1) [there is no version here,](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=61.34) [and that's because it grabs this version from our](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=62.73) [spring‑boot‑starter parent version up above. So doing](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=65.28) [dependency management inside of our POM file,](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=69.52) [it grabs all of those based off of the version of the parent that we're using.](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=72.85) [If you want to verify that the libraries were, in fact, downloaded, you](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=77.84) [can expand the External Libraries section and see inside of here that](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=81.73) [we've got org.hibernate‑core. And we've got 5.4.12.Final for the](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=87.31) [version of the parent that I'm using.](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=93.64) [You've also got the various JPA libraries,](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=95.84) [the Spring Data libraries inside of here.](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=98.79) [So everything looks like it got downloaded correctly for what](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=101.13) [we're trying to include inside of our application. Now let's continue configuring the rest of the database connection.](https://app.pluralsight.com/course-player?clipId=b8d8fcde-cfad-467f-a8d1-211efa00a185&startTime=104.15)

### [persistence.xml](https://app.pluralsight.com/course-player?clipId=86d6f7e7-d087-4c2f-9f1b-59de2b2f61db)

[A very pleasant upgrade to this course is that Spring has enabled it to](https://app.pluralsight.com/course-player?clipId=86d6f7e7-d087-4c2f-9f1b-59de2b2f61db&startTime=0.34) [where we don't need a persistence.xml file any longer.](https://app.pluralsight.com/course-player?clipId=86d6f7e7-d087-4c2f-9f1b-59de2b2f61db&startTime=5.17) [Historically, this is where we would configure database connections,](https://app.pluralsight.com/course-player?clipId=86d6f7e7-d087-4c2f-9f1b-59de2b2f61db&startTime=9.84) [some various transaction things,](https://app.pluralsight.com/course-player?clipId=86d6f7e7-d087-4c2f-9f1b-59de2b2f61db&startTime=13.44) [the persistency unit that we were dealing with, things of that nature.](https://app.pluralsight.com/course-player?clipId=86d6f7e7-d087-4c2f-9f1b-59de2b2f61db&startTime=16.04) [But we can do all of this without this file anymore.](https://app.pluralsight.com/course-player?clipId=86d6f7e7-d087-4c2f-9f1b-59de2b2f61db&startTime=20.75) [This was actually the last piece of XML that our application had in it,](https://app.pluralsight.com/course-player?clipId=86d6f7e7-d087-4c2f-9f1b-59de2b2f61db&startTime=24) [and we no longer need it.](https://app.pluralsight.com/course-player?clipId=86d6f7e7-d087-4c2f-9f1b-59de2b2f61db&startTime=27.99) [I leave this slide in here just to show you that if you are looking at](https://app.pluralsight.com/course-player?clipId=86d6f7e7-d087-4c2f-9f1b-59de2b2f61db&startTime=30.34) [older examples or you're troubleshooting something,](https://app.pluralsight.com/course-player?clipId=86d6f7e7-d087-4c2f-9f1b-59de2b2f61db&startTime=34.93) [this is kind of a legacy piece.](https://app.pluralsight.com/course-player?clipId=86d6f7e7-d087-4c2f-9f1b-59de2b2f61db&startTime=38.11) [If you're just doing JPA by itself, you still need one.](https://app.pluralsight.com/course-player?clipId=86d6f7e7-d087-4c2f-9f1b-59de2b2f61db&startTime=41) [But if you're using Spring, we no longer need this file.](https://app.pluralsight.com/course-player?clipId=86d6f7e7-d087-4c2f-9f1b-59de2b2f61db&startTime=44.78) [And that's a much nicer upgrade to not have yet another place to go](https://app.pluralsight.com/course-player?clipId=86d6f7e7-d087-4c2f-9f1b-59de2b2f61db&startTime=47.68) [hunting and pecking through, looking for some other configuration attributes. So no longer need this XML inside of our app.](https://app.pluralsight.com/course-player?clipId=86d6f7e7-d087-4c2f-9f1b-59de2b2f61db&startTime=52.14)

### [Entity Manager Factory](https://app.pluralsight.com/course-player?clipId=750b0ecf-5eed-4ea4-8975-dcadd42b85fb)

[And Spring is continuing to make life even easier for you as a developer.](https://app.pluralsight.com/course-player?clipId=750b0ecf-5eed-4ea4-8975-dcadd42b85fb&startTime=0.04) [In the previous version of this course,](https://app.pluralsight.com/course-player?clipId=750b0ecf-5eed-4ea4-8975-dcadd42b85fb&startTime=5.34) [we needed to create an EntityManagerFactory.](https://app.pluralsight.com/course-player?clipId=750b0ecf-5eed-4ea4-8975-dcadd42b85fb&startTime=7.21) [It would have looked very similar to this code above.](https://app.pluralsight.com/course-player?clipId=750b0ecf-5eed-4ea4-8975-dcadd42b85fb&startTime=10.84) [But now Spring defaults to Hibernate as its EntityManagerFactory so you](https://app.pluralsight.com/course-player?clipId=750b0ecf-5eed-4ea4-8975-dcadd42b85fb&startTime=13.9) [can omit creating one. Like the persistence.xml, I want to mention it in](https://app.pluralsight.com/course-player?clipId=750b0ecf-5eed-4ea4-8975-dcadd42b85fb&startTime=18.99) [case you're looking at legacy examples,](https://app.pluralsight.com/course-player?clipId=750b0ecf-5eed-4ea4-8975-dcadd42b85fb&startTime=24.01) [as well as to point out the declarative nature of this older code where Spring](https://app.pluralsight.com/course-player?clipId=750b0ecf-5eed-4ea4-8975-dcadd42b85fb&startTime=26.09) [simply now just encourages convention over configuration.](https://app.pluralsight.com/course-player?clipId=750b0ecf-5eed-4ea4-8975-dcadd42b85fb&startTime=31.11) [If you need to create an EntityManagerFactory, you can.](https://app.pluralsight.com/course-player?clipId=750b0ecf-5eed-4ea4-8975-dcadd42b85fb&startTime=35.24) [But if the common defaults work for you, you can just simply begin coding.](https://app.pluralsight.com/course-player?clipId=750b0ecf-5eed-4ea4-8975-dcadd42b85fb&startTime=38.94) [I also want to point out look at how we had to create the EntityManagerFactory](https://app.pluralsight.com/course-player?clipId=750b0ecf-5eed-4ea4-8975-dcadd42b85fb&startTime=43.54) [and then begin our transactions, actually persist our code,](https://app.pluralsight.com/course-player?clipId=750b0ecf-5eed-4ea4-8975-dcadd42b85fb&startTime=48.79) [then remember to commit it, close it, and close the factory. Very](https://app.pluralsight.com/course-player?clipId=750b0ecf-5eed-4ea4-8975-dcadd42b85fb&startTime=53.14) [error‑prone things that are more indicative of a library rather than](https://app.pluralsight.com/course-player?clipId=750b0ecf-5eed-4ea4-8975-dcadd42b85fb&startTime=58.85) [a framework where Spring, as a framework, it takes care of all of this for us behind the scenes.](https://app.pluralsight.com/course-player?clipId=750b0ecf-5eed-4ea4-8975-dcadd42b85fb&startTime=62.5)

### [Adding MySql Dependency](https://app.pluralsight.com/course-player?clipId=bb053715-8786-4220-a18f-88a85223c462)

[I opted to separate adding the Spring Data dependency and the](https://app.pluralsight.com/course-player?clipId=bb053715-8786-4220-a18f-88a85223c462&startTime=0.04) [MySQL dependency into separate exercises,](https://app.pluralsight.com/course-player?clipId=bb053715-8786-4220-a18f-88a85223c462&startTime=4.22) [and this was to clearly differentiate that the JDBC driver has](https://app.pluralsight.com/course-player?clipId=bb053715-8786-4220-a18f-88a85223c462&startTime=6.91) [nothing to do with the Spring libraries.](https://app.pluralsight.com/course-player?clipId=bb053715-8786-4220-a18f-88a85223c462&startTime=10.89) [We are going to use the parent POM to pull in the correct](https://app.pluralsight.com/course-player?clipId=bb053715-8786-4220-a18f-88a85223c462&startTime=13.26) [version of this transitive dependency.](https://app.pluralsight.com/course-player?clipId=bb053715-8786-4220-a18f-88a85223c462&startTime=16.79) [But if you weren't using MySQL,](https://app.pluralsight.com/course-player?clipId=bb053715-8786-4220-a18f-88a85223c462&startTime=18.94) [this is also where you would choose something else like Postgres](https://app.pluralsight.com/course-player?clipId=bb053715-8786-4220-a18f-88a85223c462&startTime=21.04) [or Hypersonic, H2, Derby, some of the Oracle drivers or SQL](https://app.pluralsight.com/course-player?clipId=bb053715-8786-4220-a18f-88a85223c462&startTime=23.92) [Server drivers. So completely separate.](https://app.pluralsight.com/course-player?clipId=bb053715-8786-4220-a18f-88a85223c462&startTime=30.44) [We have our JPA libraries and then the JDBC driver that](https://app.pluralsight.com/course-player?clipId=bb053715-8786-4220-a18f-88a85223c462&startTime=33.09) [talks to the database that we are utilizing. So let's add this library in now.](https://app.pluralsight.com/course-player?clipId=bb053715-8786-4220-a18f-88a85223c462&startTime=36.52)

### [MySQL Maven Demo](https://app.pluralsight.com/course-player?clipId=24ff5844-7fe7-4552-9899-2bb483ff8d47)

[Inside of our IDE,](https://app.pluralsight.com/course-player?clipId=24ff5844-7fe7-4552-9899-2bb483ff8d47&startTime=0.14) [let's go below the spring‑boot‑starter‑data‑jpa dependency that we](https://app.pluralsight.com/course-player?clipId=24ff5844-7fe7-4552-9899-2bb483ff8d47&startTime=1.26) [just added and add another dependency inside of here.](https://app.pluralsight.com/course-player?clipId=24ff5844-7fe7-4552-9899-2bb483ff8d47&startTime=5.99) [The groupId is going to be mysql, and the artifactId is the](https://app.pluralsight.com/course-player?clipId=24ff5844-7fe7-4552-9899-2bb483ff8d47&startTime=10.04) [mysql‑connector‑java. Again, no version because it's going to inherit](https://app.pluralsight.com/course-player?clipId=24ff5844-7fe7-4552-9899-2bb483ff8d47&startTime=16.46) [that from the Spring Boot parent starter jar,](https://app.pluralsight.com/course-player?clipId=24ff5844-7fe7-4552-9899-2bb483ff8d47&startTime=21.42) [even though this is on MySQL jar, because it's using dependency management.](https://app.pluralsight.com/course-player?clipId=24ff5844-7fe7-4552-9899-2bb483ff8d47&startTime=23.6) [So when we save this,](https://app.pluralsight.com/course-player?clipId=24ff5844-7fe7-4552-9899-2bb483ff8d47&startTime=27.85) [it'll automatically download the correct version of that library](https://app.pluralsight.com/course-player?clipId=24ff5844-7fe7-4552-9899-2bb483ff8d47&startTime=29.13) [for the package that we have inside of our app.](https://app.pluralsight.com/course-player?clipId=24ff5844-7fe7-4552-9899-2bb483ff8d47&startTime=32.44) [And now we have all of those dependencies inside of here and can begin configuring our data source and the other resources.](https://app.pluralsight.com/course-player?clipId=24ff5844-7fe7-4552-9899-2bb483ff8d47&startTime=34.92)

### [application.properties Demo](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873)

[With all of our libraries now in place and all the other configuration,](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=0.24) [we can begin to set up our data source, and it's actually quite simple.](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=4.03) [If we go to src, main, resources,](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=8.44) [we have our application.properties file inside of here.](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=12.42) [And we can begin by configuring using the Spring properties inside of here.](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=16.07) [So we can just say spring.datasource.url and type in here](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=21.93) [jdbc:mysql://localhost:3306/conference,](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=34.81) [and this should be the database that we created in our docker‑compose file. And](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=43.76) [then we want to create spring.datasource.username, and we're just going to use](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=58.98) [root for this and spring.datasource.password=pass.](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=68.21) [And if you didn't use the same values that I did in your docker‑compose,](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=81.44) [you'll want to change those to whatever values you put inside of there. Then](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=85.02) [finally, we'll say spring.datasource.driver‑class‑name,](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=91.94) [and we will put inside of here com.mysql.cj.jdbc.Driver,](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=100.64) [and we'll also specify the dialect for our database.](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=107.84) [So we'll say spring.jpa.database‑platform.](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=112.12) [We want to set that equal to org.hibernate.dialect.MySQL5InnoDBDialect.](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=119.94) [Make sure that you get MySQL5InnoDBDialect.](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=129.26) [If you just do the MySQLDialect,](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=135.07) [it actually won't generate tables correctly in the next module.](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=137.84) [So make sure you've got that exact dialect and then save](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=142.34) [this. And you'll notice that inside of here,](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=146.34) [all of my name value pairs are blue‑green with the exception of the driver,](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=150.14) [and that's because it looks the driver up off the class path.](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=155.28) [If you have any red text here right now,](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=158.24) [you need to fix what it is pointing to because it's got something incorrect.](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=160.96) [Our URL, username, password, and dialect are all correct based off of the container that we set up.](https://app.pluralsight.com/course-player?clipId=4e5b59fa-46b9-4f32-85d5-34731860d873&startTime=167.04)

### [Transactional](https://app.pluralsight.com/course-player?clipId=3b88a6b6-dea7-4a88-8b22-14ef70350c3f)

[Transactions are enabled by default for us,](https://app.pluralsight.com/course-player?clipId=3b88a6b6-dea7-4a88-8b22-14ef70350c3f&startTime=0.54) [and I wanted to point that out that they're there and are](https://app.pluralsight.com/course-player?clipId=3b88a6b6-dea7-4a88-8b22-14ef70350c3f&startTime=3.7) [implicit since we are just using Hibernate.](https://app.pluralsight.com/course-player?clipId=3b88a6b6-dea7-4a88-8b22-14ef70350c3f&startTime=6.57) [You can see in this example here that we just have to annotate our method](https://app.pluralsight.com/course-player?clipId=3b88a6b6-dea7-4a88-8b22-14ef70350c3f&startTime=9.24) [with Transactional, and it will wrap it with a transaction.](https://app.pluralsight.com/course-player?clipId=3b88a6b6-dea7-4a88-8b22-14ef70350c3f&startTime=12.82) [We will do this throughout our code, but we used to have](https://app.pluralsight.com/course-player?clipId=3b88a6b6-dea7-4a88-8b22-14ef70350c3f&startTime=16.64) [to explicitly set up the configuration,](https://app.pluralsight.com/course-player?clipId=3b88a6b6-dea7-4a88-8b22-14ef70350c3f&startTime=19.63) [and now it's just implied since we are using the standard convention over configuration.](https://app.pluralsight.com/course-player?clipId=3b88a6b6-dea7-4a88-8b22-14ef70350c3f&startTime=21.83)

### [Tips and Tricks](https://app.pluralsight.com/course-player?clipId=29d59ee7-f7d9-496c-a697-c233496bc153)

[We're almost all the way set up in our app now to where we can](https://app.pluralsight.com/course-player?clipId=29d59ee7-f7d9-496c-a697-c233496bc153&startTime=0.44) [go ahead and start creating our entities.](https://app.pluralsight.com/course-player?clipId=29d59ee7-f7d9-496c-a697-c233496bc153&startTime=3.43) [But I want to sneak in a couple of tips and tricks that have](https://app.pluralsight.com/course-player?clipId=29d59ee7-f7d9-496c-a697-c233496bc153&startTime=5.52) [helped me to learn Hibernate and JPA quicker.](https://app.pluralsight.com/course-player?clipId=29d59ee7-f7d9-496c-a697-c233496bc153&startTime=8.23) [First is to tune the logging level for Hibernate to debug.](https://app.pluralsight.com/course-player?clipId=29d59ee7-f7d9-496c-a697-c233496bc153&startTime=10.75) [This will generate quite a bit of logs,](https://app.pluralsight.com/course-player?clipId=29d59ee7-f7d9-496c-a697-c233496bc153&startTime=15.16) [but it is really helpful to see what queries are being executed.](https://app.pluralsight.com/course-player?clipId=29d59ee7-f7d9-496c-a697-c233496bc153&startTime=17.29) [Next is to tell JPA to show the actual SQL and to format](https://app.pluralsight.com/course-player?clipId=29d59ee7-f7d9-496c-a697-c233496bc153&startTime=21.94) [that SQL Let's add this to our project, and then we're ready to start coding the business logic.](https://app.pluralsight.com/course-player?clipId=29d59ee7-f7d9-496c-a697-c233496bc153&startTime=26.78)

### [Logging Configuration](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e)

[Since our properties file is actually a java.properties file](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e&startTime=0.54) [and not just a Spring properties file,](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e&startTime=4.72) [we can go ahead and change these parameters right](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e&startTime=7.31) [inside of our application.properties.](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e&startTime=10.94) [So I'm going to go ahead and set logging.level.org.hibernate.SQL=DEBUG,](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e&startTime=13.84) [and you can turn that up and down to the various](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e&startTime=20.57) [logging levels for whatever you want.](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e&startTime=22.95) [Once you've maybe got the basis of your application set up,](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e&startTime=25.54) [you'll switch it to warn or even error.](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e&startTime=28.4) [Then I'm going to turn on spring.jpa.show‑sql=true and](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e&startTime=31.64) [spring.jpa.properties.hibernate.format\_sql=true.](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e&startTime=38.12) [These are really JPA properties,](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e&startTime=44.64) [not Spring properties, but Spring does have an interface to those to tune those.](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e&startTime=46.56) [So now that we have all these, we can save this.](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e&startTime=52.24) [And when we fire up our application for the first time in the next module,](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e&startTime=54.88) [it will produce those SQL log statements for us.](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e&startTime=58.59) [It'll show the actual SQL that's being executed, and it'll be formatted to a human‑readable format.](https://app.pluralsight.com/course-player?clipId=cd794928-157f-4a6a-95a6-2023e662520e&startTime=63.08)

### [Summary](https://app.pluralsight.com/course-player?clipId=f4ec6a22-3cf6-40cf-9c69-1699d3b0dbc7)

[We covered a lot of random things in this module.](https://app.pluralsight.com/course-player?clipId=f4ec6a22-3cf6-40cf-9c69-1699d3b0dbc7&startTime=1.34) [We started off by looking at our database and how that's](https://app.pluralsight.com/course-player?clipId=f4ec6a22-3cf6-40cf-9c69-1699d3b0dbc7&startTime=4.06) [going to integrate into our application.](https://app.pluralsight.com/course-player?clipId=f4ec6a22-3cf6-40cf-9c69-1699d3b0dbc7&startTime=8.12) [We actually installed that database using Docker.](https://app.pluralsight.com/course-player?clipId=f4ec6a22-3cf6-40cf-9c69-1699d3b0dbc7&startTime=9.86) [Quickly pointed out some Docker tips if you're not familiar with it,](https://app.pluralsight.com/course-player?clipId=f4ec6a22-3cf6-40cf-9c69-1699d3b0dbc7&startTime=13.34) [maybe haven't used it before.](https://app.pluralsight.com/course-player?clipId=f4ec6a22-3cf6-40cf-9c69-1699d3b0dbc7&startTime=16.56) [Talked about all of the legacy stuff that we could omit because Spring is](https://app.pluralsight.com/course-player?clipId=f4ec6a22-3cf6-40cf-9c69-1699d3b0dbc7&startTime=18.44) [following the convention‑over‑configuration approach.](https://app.pluralsight.com/course-player?clipId=f4ec6a22-3cf6-40cf-9c69-1699d3b0dbc7&startTime=23.38) [Added jars for JPA and MySQL to our application. Discussed](https://app.pluralsight.com/course-player?clipId=f4ec6a22-3cf6-40cf-9c69-1699d3b0dbc7&startTime=27.24) [that transactions were actually implicit,](https://app.pluralsight.com/course-player?clipId=f4ec6a22-3cf6-40cf-9c69-1699d3b0dbc7&startTime=32.99) [which is a key point because you used to have to explicitly include them.](https://app.pluralsight.com/course-player?clipId=f4ec6a22-3cf6-40cf-9c69-1699d3b0dbc7&startTime=36.34) [Then we wrapped that all up with some tips and tricks that](https://app.pluralsight.com/course-player?clipId=f4ec6a22-3cf6-40cf-9c69-1699d3b0dbc7&startTime=40.84) [help you learn JPA and Hibernate quicker.](https://app.pluralsight.com/course-player?clipId=f4ec6a22-3cf6-40cf-9c69-1699d3b0dbc7&startTime=43.82) [We are now ready to dive into the meat of our course now,](https://app.pluralsight.com/course-player?clipId=f4ec6a22-3cf6-40cf-9c69-1699d3b0dbc7&startTime=47.04) [which is creating our first entity and going through the](https://app.pluralsight.com/course-player?clipId=f4ec6a22-3cf6-40cf-9c69-1699d3b0dbc7&startTime=51.17) [repositories and all of the tiers of our application so we really can just focus on business logic now.](https://app.pluralsight.com/course-player?clipId=f4ec6a22-3cf6-40cf-9c69-1699d3b0dbc7&startTime=55.84)

## [Overview of JPA and Creating Your First Entity](https://app.pluralsight.com/course-player?clipId=3e8d7e56-1233-48e0-85db-5cc2f190f736)

### [Introduction](https://app.pluralsight.com/course-player?clipId=3e8d7e56-1233-48e0-85db-5cc2f190f736)

[Welcome back.](https://app.pluralsight.com/course-player?clipId=3e8d7e56-1233-48e0-85db-5cc2f190f736&startTime=0.14) [This is Bryan Hansen from Pluralsight, and in this module we're going to](https://app.pluralsight.com/course-player?clipId=3e8d7e56-1233-48e0-85db-5cc2f190f736&startTime=1.19) [set up our first entity and also create the database.](https://app.pluralsight.com/course-player?clipId=3e8d7e56-1233-48e0-85db-5cc2f190f736&startTime=4.87) [I'm going to use some of the defaults that are currently just](https://app.pluralsight.com/course-player?clipId=3e8d7e56-1233-48e0-85db-5cc2f190f736&startTime=8.44) [there by convention over configuration,](https://app.pluralsight.com/course-player?clipId=3e8d7e56-1233-48e0-85db-5cc2f190f736&startTime=11.97) [and then show you how to override those for your own preferences in your data model.](https://app.pluralsight.com/course-player?clipId=3e8d7e56-1233-48e0-85db-5cc2f190f736&startTime=14.32)

### [Creating Your First Entity](https://app.pluralsight.com/course-player?clipId=7b344699-125b-4ee1-95e2-a3d053ed71da)

[Let's dive right into annotating an entity.](https://app.pluralsight.com/course-player?clipId=7b344699-125b-4ee1-95e2-a3d053ed71da&startTime=0.04) [The @Entity annotation is the simplest tagging to mark](https://app.pluralsight.com/course-player?clipId=7b344699-125b-4ee1-95e2-a3d053ed71da&startTime=3.44) [something as being tied to a database.](https://app.pluralsight.com/course-player?clipId=7b344699-125b-4ee1-95e2-a3d053ed71da&startTime=7.15) [For now, we're going to just accept the defaults,](https://app.pluralsight.com/course-player?clipId=7b344699-125b-4ee1-95e2-a3d053ed71da&startTime=9.64) [but we will improve upon them later.](https://app.pluralsight.com/course-player?clipId=7b344699-125b-4ee1-95e2-a3d053ed71da&startTime=11.76) [It can't stand alone though. With just this tagging, we also need to add](https://app.pluralsight.com/course-player?clipId=7b344699-125b-4ee1-95e2-a3d053ed71da&startTime=14.34) [the @Id annotation to signify which field is the primary key and also](https://app.pluralsight.com/course-player?clipId=7b344699-125b-4ee1-95e2-a3d053ed71da&startTime=18.66) [which type it is by using the @GeneratedValue. Let's switch over to our IDE and add these fields to our user object now.](https://app.pluralsight.com/course-player?clipId=7b344699-125b-4ee1-95e2-a3d053ed71da&startTime=24.74)

### [@Entity Demo](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd)

[I've closed all the files we had open and shut down our server from the](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=0.04) [previous demo so we're starting with a clean IDE.](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=4.34) [Let's open up src/main/java and go down into our model package and](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=8.14) [open up User. User is a pretty basic class right now,](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=15.62) [we're going to continue to add stuff to it throughout the rest of this course.](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=21.99) [We can begin by going above the class markings and say @Entity](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=25.64) [and choose the javax.persistence entity. And you'll notice](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=34.24) [that we already have a red error, and if you hover over it,](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=40.14) [it will tell you that it doesn't have a primary key designated in it.](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=43.43) [So, let's go down to above the rest of the member variables and say @Id, and](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=48.14) [choose the javax.persistence annotation and @GeneratedValue.](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=55.42) [And we need to give it a field that it can tie to, so we want](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=62.94) [to create a member variable of private Long,](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=67.25) [and we'll just name it id.](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=74.14) [We can go down below the rest of the variables and right‑click and say Generate,](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=78.74) [Getter and Setter,](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=86.84) [select id, and save this. And we've got everything set up](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=88.64) [for this class to now tie to a user table,](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=93.8) [but we haven't created that table yet. Let's talk about how we do that.](https://app.pluralsight.com/course-player?clipId=8d158ba4-97d4-4bfe-b8cd-857eac4f56bd&startTime=97.76)

### [Database Creation](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e)

[Database creation is actually an interesting yet easy](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=0.24) [thing to do with JPA and Hibernate.](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=3.65) [By adding these two lines to the end of our application.properties,](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=6.84) [we can tell Hibernate to create the database and its tables upon startup.](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=10.94) [There are four different values that we can use here, create,](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=15.44) [which is used to create the database if it doesn't already](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=19.33) [exist and any respective tables; update,](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=22.31) [which will just look for changes upon the existing structure that](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=25.89) [exists there, but it will not remove columns if you have modified your](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=29.87) [entity to no longer have that column; create‑drop, which will create](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=34.67) [and drop the schema each time the app is redeployed, and this is](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=40.21) [probably the most useful early on in your development, bear in mind it](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=45.47) [does delete any data that you have stored in your app right now; and](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=50.03) [then lastly,](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=55.72) [validate. Validate seems like it would be the least used when](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=56.31) [in fact this is what you should likely use once your app is](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=59.86) [stable to alert you to any changes.](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=62.79) [Technically there's a fifth one too, which is simply just none, but it does](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=66.24) [nothing, and you may choose that after your app has gone through QA and any](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=70.87) [other testing that you have to switch it to none.](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=76.41) [I do like validate.](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=78.69) [One thing between validate and none is that validate can slow](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=79.93) [your app deployment if you have a very,](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=85.04) [very large database as it will go through and verify the structure of all of those entities.](https://app.pluralsight.com/course-player?clipId=fa37762a-e4c4-4699-8c75-e6d63012357e&startTime=87.24)

### [Database Creation Demo](https://app.pluralsight.com/course-player?clipId=17b3db21-dfa3-416f-be5b-63aad98b095a)

[Switching back to our IDE. If we exit full screen out of User.java and go](https://app.pluralsight.com/course-player?clipId=17b3db21-dfa3-416f-be5b-63aad98b095a&startTime=0.44) [back over to src/main/resources/application.properties,](https://app.pluralsight.com/course-player?clipId=17b3db21-dfa3-416f-be5b-63aad98b095a&startTime=6.68) [go to the end of our file and add in spring.jpa.generate‑ddl=true and](https://app.pluralsight.com/course-player?clipId=17b3db21-dfa3-416f-be5b-63aad98b095a&startTime=11.84) [spring.jpa.hibernate‑ddl‑auto=create, and let's save this, and now what](https://app.pluralsight.com/course-player?clipId=17b3db21-dfa3-416f-be5b-63aad98b095a&startTime=24.38) [it will do is it'll go through when the application starts up, it will](https://app.pluralsight.com/course-player?clipId=17b3db21-dfa3-416f-be5b-63aad98b095a&startTime=37.34) [read our entities and look for the values inside of here and map them](https://app.pluralsight.com/course-player?clipId=17b3db21-dfa3-416f-be5b-63aad98b095a&startTime=41.9) [back to a database table.](https://app.pluralsight.com/course-player?clipId=17b3db21-dfa3-416f-be5b-63aad98b095a&startTime=48.6) [And it's going to do its best to guess what these types are and](https://app.pluralsight.com/course-player?clipId=17b3db21-dfa3-416f-be5b-63aad98b095a&startTime=51.03) [what they should be mapped to in the database.](https://app.pluralsight.com/course-player?clipId=17b3db21-dfa3-416f-be5b-63aad98b095a&startTime=55.65) [So it's going to look at the Long id, the String firstname, the string lastname, and the int age and map that to a user table for us.](https://app.pluralsight.com/course-player?clipId=17b3db21-dfa3-416f-be5b-63aad98b095a&startTime=57.27)

### [Verify Database Demo](https://app.pluralsight.com/course-player?clipId=7630ea27-8012-4186-85b9-da9c643e8386)

[Let's begin by opening up our Docker Desktop.](https://app.pluralsight.com/course-player?clipId=7630ea27-8012-4186-85b9-da9c643e8386&startTime=0.04) [And if you're running Docker natively,](https://app.pluralsight.com/course-player?clipId=7630ea27-8012-4186-85b9-da9c643e8386&startTime=3.6) [you can just open up the admin app for that as well.](https://app.pluralsight.com/course-player?clipId=7630ea27-8012-4186-85b9-da9c643e8386&startTime=5.82) [But looking to see that your database is,](https://app.pluralsight.com/course-player?clipId=7630ea27-8012-4186-85b9-da9c643e8386&startTime=9.74) [in fact, running. And you can see that mine is running here on port 3306,](https://app.pluralsight.com/course-player?clipId=7630ea27-8012-4186-85b9-da9c643e8386&startTime=12.14) [and I just pulled up the log files. And sure enough,](https://app.pluralsight.com/course-player?clipId=7630ea27-8012-4186-85b9-da9c643e8386&startTime=15.24) [it is started up and is running.](https://app.pluralsight.com/course-player?clipId=7630ea27-8012-4186-85b9-da9c643e8386&startTime=18.48) [One common mistake I'll see from a lot of people is when they have](https://app.pluralsight.com/course-player?clipId=7630ea27-8012-4186-85b9-da9c643e8386&startTime=21.94) [pulled a new version down from GitHub or they've restarted their](https://app.pluralsight.com/course-player?clipId=7630ea27-8012-4186-85b9-da9c643e8386&startTime=25.55) [server for whatever reason, an update on their laptop or whatever,](https://app.pluralsight.com/course-player?clipId=7630ea27-8012-4186-85b9-da9c643e8386&startTime=30.29) [it will stop their database,](https://app.pluralsight.com/course-player?clipId=7630ea27-8012-4186-85b9-da9c643e8386&startTime=34.06) [and they can't figure out what's going on when they go to run their](https://app.pluralsight.com/course-player?clipId=7630ea27-8012-4186-85b9-da9c643e8386&startTime=36.1) [database with that create script. So make sure it's running.](https://app.pluralsight.com/course-player?clipId=7630ea27-8012-4186-85b9-da9c643e8386&startTime=38.86) [It looks like ours is up and everything is ready to go from that end.](https://app.pluralsight.com/course-player?clipId=7630ea27-8012-4186-85b9-da9c643e8386&startTime=41.88) [Now let's switch over and look at the MySQL admin to see that those tables are currently there.](https://app.pluralsight.com/course-player?clipId=7630ea27-8012-4186-85b9-da9c643e8386&startTime=45.61)

### [MySQL Workbench Download](https://app.pluralsight.com/course-player?clipId=0f55c57b-0bb0-4ff5-b11b-d605ba4e1300)

[I didn't include a video of me installing the MySQL Workbench](https://app.pluralsight.com/course-player?clipId=0f55c57b-0bb0-4ff5-b11b-d605ba4e1300&startTime=0.14) [because there's a lot of tools out there that you can use. If](https://app.pluralsight.com/course-player?clipId=0f55c57b-0bb0-4ff5-b11b-d605ba4e1300&startTime=4.11) [you don't want to use MySQL Workbench,](https://app.pluralsight.com/course-player?clipId=0f55c57b-0bb0-4ff5-b11b-d605ba4e1300&startTime=7.53) [you could use MySQL Admin or SQuirreL or some of the](https://app.pluralsight.com/course-player?clipId=0f55c57b-0bb0-4ff5-b11b-d605ba4e1300&startTime=9.43) [other database administration tools.](https://app.pluralsight.com/course-player?clipId=0f55c57b-0bb0-4ff5-b11b-d605ba4e1300&startTime=13.11) [I don't mind the MySQL Workbench,](https://app.pluralsight.com/course-player?clipId=0f55c57b-0bb0-4ff5-b11b-d605ba4e1300&startTime=15.54) [so I just went ahead and went to the mysql.com/products/workbench URL and](https://app.pluralsight.com/course-player?clipId=0f55c57b-0bb0-4ff5-b11b-d605ba4e1300&startTime=17.72) [click the Download Now link and installed that app, and that's what I'll be using for the next demo.](https://app.pluralsight.com/course-player?clipId=0f55c57b-0bb0-4ff5-b11b-d605ba4e1300&startTime=24.88)

### [MySQL Workbench Demo](https://app.pluralsight.com/course-player?clipId=af27b0ca-968a-4952-8792-b86a224d99d6)

[After installing MySQL Workbench, the first screen that pulls up is this](https://app.pluralsight.com/course-player?clipId=af27b0ca-968a-4952-8792-b86a224d99d6&startTime=null) [MySQL Connections page. I'm going to click the plus sign. And inside of](https://app.pluralsight.com/course-player?clipId=af27b0ca-968a-4952-8792-b86a224d99d6&startTime=4.2) [here, it's almost already set up for me.](https://app.pluralsight.com/course-player?clipId=af27b0ca-968a-4952-8792-b86a224d99d6&startTime=9.07) [I'm going to give it a name and just call it](https://app.pluralsight.com/course-player?clipId=af27b0ca-968a-4952-8792-b86a224d99d6&startTime=11.4) [conference. And it has a username of root.](https://app.pluralsight.com/course-player?clipId=af27b0ca-968a-4952-8792-b86a224d99d6&startTime=13.5) [It's telling me it's going to store it in the keychain. And I can](https://app.pluralsight.com/course-player?clipId=af27b0ca-968a-4952-8792-b86a224d99d6&startTime=17.99) [choose the default schema of conference as well,](https://app.pluralsight.com/course-player?clipId=af27b0ca-968a-4952-8792-b86a224d99d6&startTime=22.03) [although it's not created yet, and I'll click OK. Then once I click on it,](https://app.pluralsight.com/course-player?clipId=af27b0ca-968a-4952-8792-b86a224d99d6&startTime=25.21) [it will ask me to enter the password, and if you feel remember, we](https://app.pluralsight.com/course-player?clipId=af27b0ca-968a-4952-8792-b86a224d99d6&startTime=32.72) [put the password as pass in our docker‑compose file and choose to](https://app.pluralsight.com/course-player?clipId=af27b0ca-968a-4952-8792-b86a224d99d6&startTime=37.66) [save that password since this is on my local machine and click OK.](https://app.pluralsight.com/course-player?clipId=af27b0ca-968a-4952-8792-b86a224d99d6&startTime=42.92) [We're actually in the schema, connected to our Docker image that's running.](https://app.pluralsight.com/course-player?clipId=af27b0ca-968a-4952-8792-b86a224d99d6&startTime=48.44) [If I click on Tables,](https://app.pluralsight.com/course-player?clipId=af27b0ca-968a-4952-8792-b86a224d99d6&startTime=56.25) [there's nothing there, and so there's nothing to be expanded and viewed upon yet. But that's what we're about to change.](https://app.pluralsight.com/course-player?clipId=af27b0ca-968a-4952-8792-b86a224d99d6&startTime=57.65)

### [Run the App and Verify Tables Demo](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3)

[Switching back over to our IDE, without changing anything else because](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=0.04) [we have our properties set in our application.properties, and our](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=4.58) [user.java has now been annotated, we can click the Play button or the](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=8.28) [Run button next to our Tomcat configuration for our conference WAR.](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=14.2) [And this will go through and actually create those tables in our](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=19.24) [database for us.](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=25.26) [If you watch these log files down below,](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=25.96) [I'm going to leave this window open more so you can see it,](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=27.69) [it'll go through and evaluate the database schema and see](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=30.43) [that it has not created those yet.](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=34.79) [So all of those logging statements that we put in](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=36.5) [application.properties and show sql, all of that stuff. You'll](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=39.5) [notice it says in here drop table if it exists,](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=43.42) [drop this other table if it exists, so it creates a sequence and the user table.](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=46) [Create those values inside of there. Establish any foreign](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=51.04) [and primary key constraints that it needs to. And it's](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=55.04) [creating those with the engine=InnoDB, which is the transactional engine.](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=58.34) [You can do a non‑transactional engine for MySQL that's used for reporting.](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=64.18) [So you really want to make sure that does say InnoDB, which we](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=68.24) [specified that in our application.properties.](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=72.52) [But that is a common mistake I see people make. Switch](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=74.75) [back over to our MySQL Workbench.](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=77.88) [And if we come inside of our schema and refresh it,](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=81.04) [you'll notice that we now have our user table inside of here and](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=87.04) [our columns inside of that table, our id, age, firstname, and lastname.](https://app.pluralsight.com/course-player?clipId=39c31c56-9bbe-45fa-9f7e-e09c47e4afd3&startTime=91.44)

### [Summary](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902)

[This was a short module, but it was intended to be.](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=0.94) [I wanted to show you how easy it was to create an entity and](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=4.9) [have that generate your database table.](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=8.79) [We also wired up the schemas so that when we started up our app,](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=10.82) [it created our schema for us.](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=17.27) [And then we downloaded a workbench or admin tool to verify](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=19.31) [what was going on inside of our database and that it did, in](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=23.71) [fact, create those tables for us.](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=26.56) [Now I will point out all of the stuff we did was just utilizing the defaults.](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=28.94) [In fact, you may have not caught it,](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=33.53) [but it created a Hibernate sequence table inside of there,](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=35.21) [which is kind of an odd default that Hibernate does for any](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=38.3) [primary key values inside of our application. We're going](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=42.59) [to look in the next module,](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=46.17) [and it's a big module, of how we dive in and override all of those defaults.](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=47.71) [And we're actually going to go through and use almost](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=52.44) [every annotation inside of JPA to show you its](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=54.56) [functionality in one fashion or another.](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=57.09) [So this is really the core of what we're going to cover in the entire app, and it is a very big module.](https://app.pluralsight.com/course-player?clipId=bb802779-47a9-4f00-a00e-d553bc207902&startTime=59.11)

## [JPA Annotations and How to Use Them](https://app.pluralsight.com/course-player?clipId=e0f4676c-6350-4365-84ff-0a36e3fbd485)

### [Introduction](https://app.pluralsight.com/course-player?clipId=e0f4676c-6350-4365-84ff-0a36e3fbd485)

[Welcome back.](https://app.pluralsight.com/course-player?clipId=e0f4676c-6350-4365-84ff-0a36e3fbd485&startTime=0.04) [This is Bryan Hansen from Pluralsight.](https://app.pluralsight.com/course-player?clipId=e0f4676c-6350-4365-84ff-0a36e3fbd485&startTime=1.06) [And in this module, we're going to discuss JPA annotations.](https://app.pluralsight.com/course-player?clipId=e0f4676c-6350-4365-84ff-0a36e3fbd485&startTime=3.12) [This will be a larger module with a lot of demos covering a](https://app.pluralsight.com/course-player?clipId=e0f4676c-6350-4365-84ff-0a36e3fbd485&startTime=7.44) [lot of the JPA annotations and walking through practical applications of how to use them.](https://app.pluralsight.com/course-player?clipId=e0f4676c-6350-4365-84ff-0a36e3fbd485&startTime=11.19)

### [Annotations](https://app.pluralsight.com/course-player?clipId=72c3754d-3b25-40f1-a2de-6267f26e3fc6)

[Annotations are a very powerful method of exposing](https://app.pluralsight.com/course-player?clipId=72c3754d-3b25-40f1-a2de-6267f26e3fc6&startTime=0.14) [functionality while staying within the domain.](https://app.pluralsight.com/course-player?clipId=72c3754d-3b25-40f1-a2de-6267f26e3fc6&startTime=3.67) [What I mean by this is that I can mark up the object that I am in](https://app.pluralsight.com/course-player?clipId=72c3754d-3b25-40f1-a2de-6267f26e3fc6&startTime=6.84) [with the functionality that I want it to have.](https://app.pluralsight.com/course-player?clipId=72c3754d-3b25-40f1-a2de-6267f26e3fc6&startTime=10.68) [Annotations aren't the only way to develop with JPA.](https://app.pluralsight.com/course-player?clipId=72c3754d-3b25-40f1-a2de-6267f26e3fc6&startTime=13.74) [We can use orm.xml files or straight Hibernate hbm.xml files](https://app.pluralsight.com/course-player?clipId=72c3754d-3b25-40f1-a2de-6267f26e3fc6&startTime=16.8) [and bind classes to tables that way as well.](https://app.pluralsight.com/course-player?clipId=72c3754d-3b25-40f1-a2de-6267f26e3fc6&startTime=22.92) [But the industry trend has currently moved towards developing through annotations.](https://app.pluralsight.com/course-player?clipId=72c3754d-3b25-40f1-a2de-6267f26e3fc6&startTime=26.26)

### [Entity Annotations](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca)

[We've seen some of the basic Entity annotations so far in the previous modules,](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=null) [so let's describe in more detail what they mean exactly.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=4.56) [An entity declares the object as an entity and how](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=8.34) [the database should be aware of it.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=11.56) [Basically, it declares to JPA, hey, pay attention to me.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=13.74) [I want you to know who I am.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=17.27) [The Table annotation describes more specific details about the database,](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=19.74) [for example,](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=24.58) [the name or the schema or how we want to access that by uppercase or lowercase,](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=25.52) [things like that nature.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=30.47) [The Id is the identifier attribute for a very simple primary key type.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=32.4) [You can do an Id class for a compound primary key,](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=38.64) [but it's kind of out of the scope of what we're trying to cover in this module.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=42.01) [Then there's GeneratedValue.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=46.64) [A GeneratedValue is used in conjunction with Id.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=48.74) [And there are four options for us to choose for GeneratedValue.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=52.4) [There is IDENTITY,](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=57.24) [and IDENTITY is used to specify an identity column in the database.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=59.29) [These can be a little problematic because the ID isn't available to return](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=64.84) [back to the user until after the transaction has committed.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=69.04) [It can also be a little slower as they cannot preallocate IDs for inserts.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=72.94) [The auto‑incrementing field in MySQL is an example of an identity](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=78.24) [column. Although they can be a little problematic as far as some of](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=81.84) [the features that you're looking for,](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=86.01) [they are simpler to use as far as just wiring your bean up and saying](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=87.8) [go. Let's just persist something now. The next option is AUTO, and](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=92.13) [AUTO defaults to IDENTITY if available.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=98.1) [If there's auto‑incrementing fields on the database vendor,](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=101.34) [it will automatically choose that one.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=104.41) [But it will fall over to whatever is available if that's](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=107.04) [not available in that implementation.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=110.85) [Databases like Oracle don't have auto‑incrementing fields.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=113.37) [You have to use a sequence,](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=117.34) [and so it's not going to default because that's not an option for Oracle.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=118.61) [Speaking of sequence,](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=124.44) [one of the GeneratedValue choices is SEQUENCE, and SEQUENCE](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=126.44) [works with a sequence if that database supports it. Now](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=129.85) [MySQL doesn't support sequences, so this wouldn't be a valid option for that.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=133.81) [But Oracle and Db2 or some of the other database vendors that are](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=138.05) [out there have sequences, and you just plug in the sequence using](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=141.77) [@SEQUENCE generator tag annotation, and that will tie to the](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=146.1) [underlying implementation.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=149.82) [The most portable of the options is TABLE. TABLE will work](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=152.54) [with all implementations of the database.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=156.51) [It's a little bit simple, but it works anywhere.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=159.54) [It just uses an identity table and column to ensure uniqueness, and you also have to tie this in using the TABLE generator annotation.](https://app.pluralsight.com/course-player?clipId=61c15bed-d92e-4bd4-8f34-ded35237e6ca&startTime=162.64)

### [Entity Annotations Demo](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351)

[Last time that we ran our application, we did not use the Table annotation,](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=0.54) [and you can see over here on the left side,](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=4.97) [and sorry there is actually no way to zoom in on the MySQL Workbench,](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=7.2) [that it created the table user, just that.](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=11.63) [Just user.](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=16.5) [It didn't specify users,](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=17.5) [which a more traditional or common naming convention](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=19.48) [for tables is somewhat plural.](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=23.06) [A lot of times you'll have your database table named](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=26.14) [users where your object is user,](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=28.35) [and that's because we can have a collection of the user objects,](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=30.99) [but the table is all of the users in our system,](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=34.81) [if that makes sense.](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=39.38) [So let's switch over to our IDE and annotate the user object](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=40.36) [to specify that we want the users table.](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=44.84) [Users is actually a reserved table name inside of the MySQL space.](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=48.57) [And so we could name our table the same,](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=55.05) [but we're going to have some collisions as for things that](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=57.73) [they use for security on the back end.](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=60.52) [So we'll actually add our Table annotation,](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=62.21) [and we'll just name ours conf\_users and save this.](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=65.91) [And when we start up our server,](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=73.53) [it will go ahead and create that table in our database schema for us.](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=76.14) [Let's switch over to our MySQL Workbench and see what it created.](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=82.74) [Refreshing our schema,](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=87.94) [we can see that it has now created our table with conf\_users,](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=89.28) [but we also have our user table hanging out there.](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=94.96) [Why, you might ask. Well,](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=100.64) [one thing that is a little bit misleading in the JPA and Hibernate](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=103.24) [documentation is that the create and create drop hbm2ddl auto](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=107.79) [generation doesn't drop your entire schema.](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=113.92) [It only drops tables that are currently mapped to objects.](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=117.41) [So to be honest,](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=121.74) [the simplest way for us to fix this right now is just to right‑click](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=122.62) [on user and say drop table and drop it now. And now everything is](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=125.64) [cleaned up inside of our schema how we would expect it to be. The](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=132.07) [hbm2ddl auto stuff works great.](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=136.95) [It just has a few little caveats that, if you're not aware of, make it a little more difficult.](https://app.pluralsight.com/course-player?clipId=359c580e-55ac-4c42-bc6d-77ca348b9351&startTime=139.56)

### [Uppercase Name](https://app.pluralsight.com/course-player?clipId=5f626561-1d4f-4a18-aa1a-47ad72d4ebd1)

[Another update requested of this re‑release was how to specify naming to](https://app.pluralsight.com/course-player?clipId=5f626561-1d4f-4a18-aa1a-47ad72d4ebd1&startTime=0.04) [force uppercase. It's not an uncommon practice to have table names inside](https://app.pluralsight.com/course-player?clipId=5f626561-1d4f-4a18-aa1a-47ad72d4ebd1&startTime=4.66) [your database all uppercase. And in Hibernate, we can use the physical](https://app.pluralsight.com/course-player?clipId=5f626561-1d4f-4a18-aa1a-47ad72d4ebd1&startTime=9.81) [naming strategy standard implementation,](https://app.pluralsight.com/course-player?clipId=5f626561-1d4f-4a18-aa1a-47ad72d4ebd1&startTime=14.48) [and this just goes in our application.properties,](https://app.pluralsight.com/course-player?clipId=5f626561-1d4f-4a18-aa1a-47ad72d4ebd1&startTime=18.14) [and it will force uppercase in our table and column names. Let's add that to our application now and drop and recreate our database.](https://app.pluralsight.com/course-player?clipId=5f626561-1d4f-4a18-aa1a-47ad72d4ebd1&startTime=20.71)

### [Uppercase Name Demo](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b)

[To force that uppercase name,](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b&startTime=0.04) [we can just go ahead and add the](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b&startTime=1.78) [spring.jpa.hibernate.naming.physical‑strategy=org.hibernate.boot.model.naming.PhysicalNamingStrategyStandardImpl](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b&startTime=3.91) [in our application.properties.](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b&startTime=10.58) [And once we save this, inside of our user object,](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b&startTime=19.74) [we can come in here and say conf\_users,](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b&startTime=23.52) [and this will force that to an uppercase naming convention.](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b&startTime=30.24) [Let's restart our server and switch over to our MySQL Workbench.](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b&startTime=35.74) [Refreshing our schema, we can see that our tables are now named](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b&startTime=43.44) [how we thought they would be, conf\_users,](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b&startTime=49.12) [and it has updated everything.](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b&startTime=52.64) [And since it was named the same as the lowercase version,](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b&startTime=54.47) [it did update that to uppercase because it could](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b&startTime=57.34) [alter that table that it was tied to.](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b&startTime=60.8) [As we mentioned before, when we were switching complete table names,](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b&startTime=63.34) [it didn't know how to bind that other one anymore,](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b&startTime=66.84) [and so it just left it there, where this one will update it to the correct naming conventions.](https://app.pluralsight.com/course-player?clipId=34e750d0-a48f-4e3a-bb17-425619768a0b&startTime=69.84)

### [Default Columns](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0)

[In our last demo, we had columns that we hadn't specified a name for yet,](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=0.14) [but they were still mapped.](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=4.61) [It was pretty subtle, but when we created our users table,](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=6.25) [all of the other fields inside that object were](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=9.35) [automatically mapped to our database.](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=12.15) [JPA will look for the name and type of the column that the object is and](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=14.64) [make assumptions about what to map it as. We don't have to accept those](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=19.42) [defaults that are created for us though. We can use the @Column](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=23.69) [annotation, and it will allow us to override names and column mappings](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=27.98) [and specific attributes like that.](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=32.28) [Some of these only apply to the data type that we're using,](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=34.4) [such as decimal or numeric type in the database.](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=37.56) [And they actually won't do anything if you tie them to](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=40.48) [something like a string, for instance. Precision, scale, length](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=43.13) [all pertain to certain types of objects.](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=47.3) [Some of these are also just a way of applying foreign key constraints.](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=50.18) [For example,](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=53.49) [unique is just guaranteeing a unique value in that column through a constraint,](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=54.52) [and another example is updatable, whether or not we can or can't change that value in the column.](https://app.pluralsight.com/course-player?clipId=3b87b33e-78e4-4860-a652-bbb16d90f7f0&startTime=60.14)

### [Column Names Demo](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342)

[Opening our user object back up,](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=0.24) [I'll go ahead and give ourselves some space between our Long id and our](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=2.63) [String firstname and specify @Column from javax.persistence,](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=7.51) [and we'll give this a name = FIRST\_NAME.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=14.04) [And we can do the same thing with lastname.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=21.94) [We'll say @Column, and we will give it a name = LAST\_NAME,](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=23.68) [and that will get us through the example of what we're trying to](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=34.99) [show that we can have different columns named for specific member](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=42.15) [variables inside of our entity here.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=46.95) [I do want to also point out that you can also use this](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=49.94) [Column annotation with the private Long id,](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=53.52) [the primary key associated with our object.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=57.73) [So if you want to name your primary key something other than id,](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=59.58) [maybe USER\_ID or CONF\_USERS\_ID, you can use the Column annotation on it as well.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=64.64) [Let's save this and restart our server.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=73.14) [And once it redeploys, we'll switch over to our MySQL Workbench.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=76.95) [Let's refresh our schema. And once we expand that,](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=86.44) [we can see that we have CONF\_USERS and our Columns are FIRST\_NAME and LAST\_NAME.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=91.63) [So it went ahead and updated and altered the table how we thought it would,](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=100.04) [which was great.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=103.87) [That's actually the functionality we're looking for,](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=104.97) [and you can see how we can override column names by default.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=107.38) [I do want to go ahead and change our ddl update to create‑drop.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=110.84) [As we're doing a lot of these changes,](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=118.06) [it's often an inconvenience that something gets](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=119.61) [stuck because we've changed a value.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=123.03) [So I'm going to switch back over to my IDE and change that right](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=125.41) [now. Inside of our application.properties, we left this as](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=128.71) [create. We'll change it to create‑drop.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=133.1) [Now I will remind you that as we start adding data into these tables,](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=135.73) [this will drop that data.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=140.45) [But as we're making a lot of changes,](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=142.68) [you'll notice that from time to time something may get stuck.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=144.86) [You'll change a column that didn't exist or did exist, and you've removed it.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=147.72) [Now it's kind of confused as to the state that it should](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=151.78) [be in. By changing this to create‑drop,](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=154.02) [and if we stop our server before we make those changes,](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=156.84) [it should drop those tables, and things should not get stuck for us.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=161.76) [So I'm going to go ahead and change mine to create‑drop, stop the server,](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=165.69) [and it should go ahead and drop all of that stuff for us.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=170.16) [And as we bring it back up next time, it'll keep recreating that exactly how we would like.](https://app.pluralsight.com/course-player?clipId=6667bf4e-2a69-4407-b6a7-fb7df6db5342&startTime=173.86)

### [How We Use It](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b)

[So we have all these pieces we've started putting together,](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=0.04) [but how do we use them all in one application?](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=2.9) [We've gone through and overridden IDs and column names,](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=6.43) [tables, got all these things set up.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=9.59) [How do we actually start combining them all with Spring?](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=12) [We've looked at both halves, Spring and JPA.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=15.46) [Well, let's put them all together in our application now.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=18.94) [I'm going to start with the PersistenceContext.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=21.43) [And this annotation is used to inject our EntityManager,](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=25.34) [which is how we persist things through Hibernate to our database.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=28.9) [It gets our EntityManager for us.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=33.07) [The next thing we need is our service tier.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=36.54) [Now I'll be honest.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=39.95) [You can do all of this without creating your service tier.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=41.35) [But architecturally, this is how it's intended to be used.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=44.69) [And this is where we put our business logic at.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=47.79) [It also happens to be where we start our transactions from as well.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=51.34) [And then next we have our Repository annotation or our repository tier.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=55.24) [This is a one‑to‑one mapping of our model objects to our database.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=61.16) [Trust me,](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=65.47) [this is a lot to learn or bite off all at once, but it will](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=66.16) [all make sense as we start cobbling the pieces together in](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=69.88) [this next couple of demos.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=72.52) [Lastly, we need transactional,](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=74.64) [and that is the beginning of our transaction. And that](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=76.46) [should start at our service tier.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=78.79) [Although if we're just doing an update against one table,](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=80.51) [it is implied that it's in a transaction because it's just one commit.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=84.62) [It's when it spans multiple tables that you need to](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=88.26) [start and stop a transaction. Let's begin by creating our service tier now.](https://app.pluralsight.com/course-player?clipId=357de935-a5f2-40f8-bb90-6e7791eee86b&startTime=90.88)

### [Service Demo](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664)

[To create our service tier,](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=1.24) [I'm going to start off by minimizing and making sure my server is shut](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=2.85) [down and then right‑click on our src, main, java,](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=6.69) [com.pluralsight.conference package and say New, Java Class. And inside of](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=10.21) [here, I'm going to give it the name service.UserServiceImpl.](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=18.64) [And inside of here, we can create our method.](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=28.74) [Do public User save and pass in User.](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=32.44) [Let's choose the com.pluralsight.conference.model.User. And for now,](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=39.24) [we'll return null.](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=47.01) [We'll save that. Now if we right‑click and say Refactor and Extract Interface,](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=50.34) [we can create the user service interface, and it will be in the](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=59.04) [package com.pluralsight.conference.service.](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=65.07) [And let's have that also include the save method in our interface. Hit](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=68.64) [Refactor. It'll ask us if we want to make sure that that is, in fact, included](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=75.89) [and replace any concrete uses of that with the interface,](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=84.24) [which we are good.](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=88.31) [We also want to annotate this as a service,](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=91.54) [and it's the org.springframework.stereotype service annotation.](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=96.44) [We'll save that. Now opening up our controller,](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=101.58) [we go over to our UserController. And inside of here, we can](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=106.84) [now auto wire the UserService inside of here. And in our](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=113.39) [postUser method that we have down below,](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=128.58) [we can actually call our userService.save and pass in that user.](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=131.64) [We have now wired up our service tier to take our object that's](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=141.66) [coming from our post and call our save method that's auto wired](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=148.02) [in to our ServiceImpl. We're not done yet though. We still need to do the repository on the back end.](https://app.pluralsight.com/course-player?clipId=365e29f2-2c62-4eca-aa2b-e23a50d74664&startTime=153.42)

### [Repository Demo](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534)

[Creating the repository is almost identical to what we just did](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=0.04) [with the service with a few slight changes.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=3.38) [So let's right‑click on com.pluralsight.conference again.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=5.54) [We'll say New, Java Class, and we'll call this repository.UserRepositoryImpl.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=10.14) [Hit Enter.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=19.11) [And then we'll create almost the same method in here.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=25.14) [We're going to replace a couple things in here in another demo.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=27.79) [We'll say public User save User user.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=31.72) [And then we'll return that user instance as well and save this.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=43.74) [The next thing we want to do inside of here though is annotate](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=51.24) [this as a repository instead of a service.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=53.84) [And then we're going to right‑click and refactor this](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=60.14) [as well and say Extract Interface.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=63.81) [This will also be in the repository package.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=68.74) [We will call this the UserRepository, not UserRepositoryImpl.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=72.34) [We'll also opt to include that saveUser method and say Refactor,](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=75.68) [Yes, and click OK.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=82.52) [And now we can go back to our UserServiceImpl and auto](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=86.34) [wire inside of here our UserRepository.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=89.86) [And our UserRepository now can be used to call save on that object.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=99.25) [So we'll say UserRepository.save user.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=111.11) [We have all of our pieces wired up for the user repository and the user service.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=119.04) [One thing we don't have yet though, inside of our UserRepository,](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=125.48) [is our PersistenceContext.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=129.03) [To add that, we can just use the annotation @PersistenceContext,](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=132.64) [and we'll create a private instance of the EntityManager and store it to the](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=136.9) [entityManager variable because that's really what the PersistenceContexxt is](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=143.83) [under the annotation is our EntityManager.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=148.58) [Now that we're in sight of our save method,](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=152.14) [we can just say entityManager.persist user.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=155.54) [And since we are doing a persist or a save instead of just read‑only data,](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=163.54) [we do need to wrap this whole thing with a transaction.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=168.38) [So let's switch back to our UserServiceImpl, go to our save method, and we](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=171.26) [will add an annotation for @Transactional, and we will choose the one from](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=176.92) [the javax.transaction annotations and save this. And our entire code base](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=181.57) [is now wrapped in a transaction from the beginning of this method till we](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=190.46) [exit back out of this method. So our save will be persisted wrapped in a](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=195.49) [transaction.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=200.84) [If we try and run it without this now, it'll actually give us an error. If you omit this step, you'll probably see that error.](https://app.pluralsight.com/course-player?clipId=4e0d1ee6-02f0-4fd8-944f-697695f3d534&startTime=201.58)

### [Registration End-to-end Demo](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a)

[To test our application,](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=0.04) [I've made it even easier by going out and just opening up](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=1.35) [Postman to do a post back against my server.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=5.61) [I'm not even going through the user interface yet.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=9.27) [So you can see inside of here, I've got a URL of localhost:8080/conference/user.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=12) [And inside of there, I am putting in the params,](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=17.25) [firstname equals Bob, lastname equals Builder,](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=23.11) [age equals 44, and it does rewrite my URL to use those params.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=26.74) [And when I click Send, it'll go through and send that to my server.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=33.04) [Let's switch over to our IDE and see what the output was on our console.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=38.44) [Opening up our logs, we can see that it executed that SQL like we expected it to,](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=44.18) [and it's got all the debug information associated with it.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=50.8) [Let's verify what actually went out to our database.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=54.81) [In my MySQL Workbench query window, if I just enter in select \* from](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=57.78) [CONF\_USERS and then run the query of the SQL underneath the cursor,](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=64.19) [you can see that it pulls up with Bob the Builder,](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=73.1) [and I've ran it a couple of times so I've got that](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=75.8) [entry in there more than once.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=77.65) [If you get an error that there's no schema selected,](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=79.54) [you need to right‑click on your schema and say Set as](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=83.07) [Default Schema, and then you can run it.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=86.64) [That catches me off guard from time to time.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=89.64) [But we have actually wired up all of our application.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=91.94) [Let's walk through all those pieces again.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=95.29) [We had our Postman where we did a post against our URL, went with our](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=98.44) [firstname parameter, lastname, and age, clicked Send,](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=103.15) [which in turn goes to our controller.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=107.54) [Our controller has a post mapping where we injected in](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=111.94) [the userService that we created,](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=116.62) [which was auto wired up above. The userService was annotated as a service](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=118.83) [and had auto wired into it the userRepository. And the userRepository had](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=125.3) [the PersistenceContext injected into it.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=134.6) [We had to annotate our UserServiceImpl with Transactional](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=138.74) [for everything to be allowed to persist.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=143.73) [So you always start your transactions at your service tier,](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=146.31) [and it carries through all your repositories.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=149.15) [The reason for that is if we had two, three, four](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=151.49) [repositories injected into our service tier, that transaction could start and span across those multiple repositories.](https://app.pluralsight.com/course-player?clipId=07fc1708-ab9d-4883-b57f-5491b452f58a&startTime=153.96)

### [Recap](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7)

[Let's do the same thing we just did to our user object,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=0.24) [UserController, UserService, and UserRepository to our registration.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=5.26) [We'll go through and annotate our registration model,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=10.28) [inject resources into our RegistrationController,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=14.34) [create our registration service and repository,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=17.59) [and be able to use those for that web interface.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=20.3) [We start out by going to our Registration and annotate that as](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=24.24) [an Entity and then add our Table annotation.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=29.83) [We can give this a name = REGISTRATION.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=36.04) [We'll want to add an ID in here.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=45.24) [We'll say @Id and @GeneratedValue.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=47.65) [We can do a private Long id.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=56.44) [Once we go below our name,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=62.94) [we can right‑click on that and say Generate and](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=64.97) [select Getter and Setter for our ID.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=70.9) [Click OK.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=73.81) [We'll save this.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=76.04) [Now we can go ahead and start creating our service and repository.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=78.34) [So let's go out to our service package and right‑click on it and say New,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=84.49) [Java Class.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=90.53) [We'll call this RegistrationServiceImpl.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=92.94) [Inside of here, just for the sake of showing the example,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=98.59) [I call this method public Registration addRegistration](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=107.19) [because it is the business logic tier.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=120.44) [It's not just about saving.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=122.76) [There may be some business logic wrapped around adding the registration.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=124.36) [We'll pass into that the registration.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=129.09) [And for now, we will just return that registration instance.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=137.04) [We're going to swap that functionality out,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=141.82) [but we want to annotate this class as a service.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=147.54) [And we know we're going to end up wrapping this in a transaction](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=153.65) [because we're going to save this to the database.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=158.84) [So we'll say @Transactional.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=161.26) [And then we can right‑click in here and say Refactor, Extract Interface.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=166.34) [I'll call this the RegistrationService and select that addRegistration](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=176.74) [method so that it gets extracted into that interface.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=183.34) [We'll choose Refactor,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=187.24) [and it's going to ask us to double‑check if there's anything we want to change.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=189.54) [Everything looks fine.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=194.54) [Going to our RegistrationController,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=198.74) [we can now auto wire in our RegistrationController the RegistrationService,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=202.94) [and I'll save that.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=214.3) [Going down to our addRegistration method, we can add an else on our method here.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=222.04) [If there's no errors, we'll go ahead and persist to the database.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=232.34) [So we'll say registrationService.addRegistration,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=235.65) [and we'll pass in our registration and save that.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=240.08) [And now we got to go out and add our registration repository.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=249.84) [We'll say New, Class after we've right‑clicked on our repository package.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=254.99) [And this will be the RegistrationRepositoryImpl.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=263.53) [And very similar to what we did in our UserRepositoryImpl,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=270.63) [we are going to auto wire in our PersistenceContext or inject it.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=281.44) [So we'll say our PersistenceContext.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=287.94) [We'll do private, it actually is auto wiring behind the scenes,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=289.52) [EntityManager, and our method inside of here will be public Registration.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=295.94) [We will call this one save because at this point we are saving the registration.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=311.84) [There shouldn't be any business logic that's inside of here,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=316.28) [just persistence logic.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=318.37) [So we'll say Registration registration,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=321.34) [and we'll do EntityManager.persist and pass in our](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=331.74) [registration object and save that, and we can return that instance as well.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=337.65) [We're not modifying anything on it,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=347.9) [but that's a good habit to get into is to return that object](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=349.44) [in case you have updated anything in there.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=353.04) [We want to annotate our class as a Repository.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=357.04) [And everything inside of here is set now.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=365.34) [We'll do the same thing as we did before.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=367.44) [We'll right‑click, Refactor, extract our interface.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=369.39) [Call it the RegistrationRepository.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=375.34) [We'll choose to have that method included in that interface.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=379.34) [Hit Refactor.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=383.36) [Everything is fine there.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=386.23) [Going back to our RegistrationService,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=389.73) [we can now auto wire in our RegistrationRepository.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=392.87) [And we'll choose the interface and go down to our return statement,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=400.31) [and we will say registrationRepository.save and pass](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=411.42) [in our registration and save that.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=418.49) [We're now ready to fire up our server,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=425.93) [and it will go out and create those tables for us,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=428.52) [and we can go run our web application as we do that.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=431.49) [After starting up our server,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=435.14) [we can go ahead and pull up localhost:8080/conference, click Add](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=437.27) [Registration, and put whatever name you want inside of here.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=442.65) [I'll do Bryan and say Add Registration.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=446.49) [And the page is set to refresh back to itself.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=450.2) [If I go over to our MySQL Workbench,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=454.24) [I can go ahead and type in select \* from REGISTRATION,](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=459.54) [put my cursor over it, and select to run the SQL underneath my keyboard cursor.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=464.24) [And we'll see that it has, in fact, put my registration in there.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=470.77) [I ran it once or twice.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=475.43) [You may have done so as well.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=476.82) [So you see I've got Bryan 1 and Bryan 2 in there.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=478.14) [That's just the names that I passed in there.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=481.17) [So now we've got both our app wired up.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=483.43) [We've got the web services wired up for Postman to go into.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=485.87) [We have registration and users wired up.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=489.22) [We can actually go through and now start looking at some of the more complex](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=491.73) [annotations of pulling back the various JPA entities based off of things like join types and more concrete examples like that.](https://app.pluralsight.com/course-player?clipId=018793f2-ee53-4ccb-82fe-dbdd92925bf7&startTime=495.47)

### [Join Types](https://app.pluralsight.com/course-player?clipId=12d5cddc-db38-44ce-be84-ef6de855b044)

[So far,](https://app.pluralsight.com/course-player?clipId=12d5cddc-db38-44ce-be84-ef6de855b044&startTime=0.14) [everything we have seen and have been dealing with](https://app.pluralsight.com/course-player?clipId=12d5cddc-db38-44ce-be84-ef6de855b044&startTime=0.88) [has been simple primitive types.](https://app.pluralsight.com/course-player?clipId=12d5cddc-db38-44ce-be84-ef6de855b044&startTime=3.02) [How do we deal with objects or lists other than simple primitives?](https://app.pluralsight.com/course-player?clipId=12d5cddc-db38-44ce-be84-ef6de855b044&startTime=5.34) [Since JPA is all about dealing with objects,](https://app.pluralsight.com/course-player?clipId=12d5cddc-db38-44ce-be84-ef6de855b044&startTime=8.89) [we need to be able to bind collections of objects to the database.](https://app.pluralsight.com/course-player?clipId=12d5cddc-db38-44ce-be84-ef6de855b044&startTime=12.21) [There are essentially four types of annotations that we can use to](https://app.pluralsight.com/course-player?clipId=12d5cddc-db38-44ce-be84-ef6de855b044&startTime=16.34) [join objects and collections to one another.](https://app.pluralsight.com/course-player?clipId=12d5cddc-db38-44ce-be84-ef6de855b044&startTime=19.71) [There is a OneToOne, a OneToMany, a ManyToOne, and a ManyToMany.](https://app.pluralsight.com/course-player?clipId=12d5cddc-db38-44ce-be84-ef6de855b044&startTime=22.84) [These can be used in various configurations,](https://app.pluralsight.com/course-player?clipId=12d5cddc-db38-44ce-be84-ef6de855b044&startTime=28.24) [such as unidirectional or bidirectional.](https://app.pluralsight.com/course-player?clipId=12d5cddc-db38-44ce-be84-ef6de855b044&startTime=30.95) [And then we also have cascading features associated with them.](https://app.pluralsight.com/course-player?clipId=12d5cddc-db38-44ce-be84-ef6de855b044&startTime=34.75) [The most common is typically the OneToMany and ManyToOne joins, and the most complex is definitely the ManyToMany.](https://app.pluralsight.com/course-player?clipId=12d5cddc-db38-44ce-be84-ef6de855b044&startTime=38.94)

### [@OneToMany](https://app.pluralsight.com/course-player?clipId=aab21e22-5512-48ad-9b24-4fa4d72e9404)

[OneToMany is the most common of the joined type annotations.](https://app.pluralsight.com/course-player?clipId=aab21e22-5512-48ad-9b24-4fa4d72e9404&startTime=0.64) [It's used to define a one‑to‑many relationship between](https://app.pluralsight.com/course-player?clipId=aab21e22-5512-48ad-9b24-4fa4d72e9404&startTime=4.86) [an object and a list of objects.](https://app.pluralsight.com/course-player?clipId=aab21e22-5512-48ad-9b24-4fa4d72e9404&startTime=7.96) [In our application,](https://app.pluralsight.com/course-player?clipId=aab21e22-5512-48ad-9b24-4fa4d72e9404&startTime=10.64) [we will have a registration and a collection or a list](https://app.pluralsight.com/course-player?clipId=aab21e22-5512-48ad-9b24-4fa4d72e9404&startTime=11.67) [of courses tied to that registration.](https://app.pluralsight.com/course-player?clipId=aab21e22-5512-48ad-9b24-4fa4d72e9404&startTime=15.22) [We just need a OneToMany annotation on our](https://app.pluralsight.com/course-player?clipId=aab21e22-5512-48ad-9b24-4fa4d72e9404&startTime=17.54) [registration class tying to our course list.](https://app.pluralsight.com/course-player?clipId=aab21e22-5512-48ad-9b24-4fa4d72e9404&startTime=20.16) [We can then specify a ManyToOne on the course back to the](https://app.pluralsight.com/course-player?clipId=aab21e22-5512-48ad-9b24-4fa4d72e9404&startTime=23.64) [registration. And this is all tied together using the mappedBy from](https://app.pluralsight.com/course-player?clipId=aab21e22-5512-48ad-9b24-4fa4d72e9404&startTime=29.85) [the OneToMany onto the object on the opposing side.](https://app.pluralsight.com/course-player?clipId=aab21e22-5512-48ad-9b24-4fa4d72e9404&startTime=35.72) [Courses will belong to a registration, or this registration has a list or many of these courses.](https://app.pluralsight.com/course-player?clipId=aab21e22-5512-48ad-9b24-4fa4d72e9404&startTime=40.44)

### [@OneToMany Demo](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab)

[I've closed out all of the open tabs that I had just so we can](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=0.04) [focus on doing this one‑to‑many mapping.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=3.23) [Let's begin by right‑clicking on model and creating a new Java class,](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=6.24) [and its name is going to be Course.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=11.94) [We're going to annotate this just like we did our registration.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=14.47) [We're going to give it the @Entity annotation, @Table.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=18.79) [We'll name this COURSE, all uppercase.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=25.84) [Inside of our class, we'll also give it an @Id and @GeneratedValue.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=32.4) [We'll have a member variable private Long id.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=46.54) [And then let's give it a couple of other fields just to make it more meaningful.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=53.54) [We'll have inside of here an @Column, and we'll name this name,](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=58.81) [which will just be the name of the course,](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=67.69) [and it will be a private String name.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=71.74) [And then another column, and we'll name this one DESCRIPTION.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=77.43) [And this is a bug I often see people introduce into their code base.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=90.44) [They will name this field DESC,](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=95.44) [which in some database queries stands for descending.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=97.83) [So if you're going to sort the results on something,](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=101.52) [you might sort it descending.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=104.33) [Then we'll make this a string as well.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=106.59) [And since we're already in this class,](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=116.94) [we'll add the many‑to‑one mapping back to our registration list here.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=120.03) [This will make more sense in a minute,](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=125.71) [but to save us from switching back and forth,](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=127.69) [we'll do it while we're here.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=131.64) [We'll say private Registration registration.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=133.84) [We'll save that.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=140.06) [Give ourselves some white space at the bottom and Generate, Getters and Setters.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=142.04) [Select all the fields.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=149.43) [Click OK and save that.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=151.54) [Now we have our basic course object filled out here,](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=153.89) [and we did half of our one‑to‑many join.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=158.99) [We did our many‑to‑one, which is our join back to our object.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=161.44) [Let's go back to our Registration object now. And inside of here, below](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=165.04) [name, but above our getter for the ID, let's add an OneToMany annotation,](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=170.6) [and it is mapped by registration. And we're going to set cascade using the](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=180.64) [enum CascadeType.ALL. And then this is on a private List of Courses. So](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=192.79) [we'll pass in the object Course,](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=208.8) [and we'll name it Courses. And this is equal to a](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=210.28) [new ArrayList, and we'll save it.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=215.05) [And let's go below our get id and right‑click and say Generate, Getter and](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=221.44) [Setter. We'll choose Courses. Hit OK. And we've actually specified our](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=229.04) [one‑to‑many join and the many‑to‑one back to it.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=237.69) [One key thing to point out here is that the mappedBy = registration,](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=241.44) [that string should tie to the name of the member variable on the course object.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=246.64) [So you'll see we have registration over here.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=254.09) [We have registration here. So that's saying that on the courses, our course](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=258.64) [object has a field named registration that we have getters and setters for. Tie](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=264.76) [that to that object, and that's how we keep that list, that one‑to‑many mapping in check.](https://app.pluralsight.com/course-player?clipId=26f41592-82f9-4ac0-91d6-384ce09310ab&startTime=272.19)

### [@ManyToOne Demo](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3)

[Let's add the code necessary to get our courses tied to our registration.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=1.24) [We're really close to having this done,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=7.25) [but there's a few things were going to tweak to make](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=9.34) [it actually easier in the long run.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=11.1) [First of all,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=12.89) [let's change our GeneratedValue that goes with our Id on](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=14.02) [our registration to a different strategy.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=18.08) [So we're going to go into the GeneratedValue(strategy = GenerationType,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=22) [and we want to select IDENTITY.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=30.44) [And what this is going to do is use the auto‑incrementing IDs in](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=32.36) [MySQL to automatically populate our objects.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=38.74) [This is a nicer strategy for when we're cascading things.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=42.14) [The other thing we were doing was working just fine.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=45.91) [This is better for what we're trying to cascade saves across multiple](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=48.22) [objects and one‑to‑many mapping such as we're doing now.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=51.89) [Let's do the same thing over on Course.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=55.84) [Let's open it up and change the GeneratedValue here.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=57.94) [I'll say strategy, and the identity here will be GenerationType.IDENTITY.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=62.64) [There's an enum for that.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=73.39) [So everything is saved there.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=75.24) [Now let's go into our RegistrationServiceImpl,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=77.84) [and I want to go here because this is where your business logic should reside.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=83.39) [So let's say that everybody who registers for our](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=90.19) [conference should attend an introductory course.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=92.96) [So what we're going to do is we're still going to leave](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=98.64) [our registrationRepository setting here,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=100.48) [but what we're going to do is get rid of that return for now and](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=104.25) [say registration is equal to that object that gets returned from](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=108.64) [the registrationRepository.save.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=116.04) [And if you'll remember,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=118.38) [I very subtly mentioned earlier that I like to always return the object.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=119.53) [This is why.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=123.46) [We're going to actually use that object here now.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=124.81) [So let's get our return registration back inside of here,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=128.84) [and let's go create a repository layer for our course.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=133.24) [So we'll right‑click on Repository and say New, Java Class.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=139.24) [And this will be the CourseRepositoryImpl.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=145.14) [And this is going to be just like the other ones that we did.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=151.24) [You're starting to see a little bit of pattern here.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=153.52) [I'll say Repository.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=155.94) [We'll go inside of here.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=158.94) [We'll inject our PersistenceContext, store that to an EntityManager,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=160.4) [and then we'll create a method that is public,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=171.94) [returns Course, and we'll call this save.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=175.54) [It's going to take Course as a parameter,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=181.54) [and then we will use our entityManager to persist it.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=186.74) [And then finally, we will return our course object that we just created.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=196.94) [So now that we have this,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=203.34) [let's right‑click and refactor and extract an interface.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=204.45) [We'll call this CourseRepository and include that save method,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=210.14) [Refactor, and have it look for any places that it can change.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=216.92) [There are none.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=222.51) [Everything's okay there.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=223.15) [Go back to our RegistrationService.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=224.74) [And now that we're in our RegistrationService,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=228.34) [we can actually auto wire our new repository that we just created in here.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=230.63) [So we'll say @Autowired private CourseRepositoryImpl,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=236.44) [except we want to choose the interface, not the implementation.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=243.38) [Say CourseRepository and save that.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=247.54) [And now since we're just going to create this](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=253.14) [course for anybody that comes along,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=255.06) [we could actually retrieve one out of the database,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=256.8) [but this will work for our example.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=258.97) [We'll say Course course = to new Course,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=260.95) [and we'll just set the name on that to Intro,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=269.84) [and we'll say course.setDescription.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=281.54) [Every attendee the must complete the intro.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=289.24) [And then we will now say course.setRegistration,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=298.06) [and this is the registration we saved up above,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=309.78) [and that will pass in registration.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=312.97) [Now we can use the repository we just created.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=319.24) [So I'll courseRepository.save, pass in our course, and those will now be bound.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=321.92) [I want to point out if we go look at our RegistrationRepositoryImplementation,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=333.94) [we are using a pass‑by‑reference here.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=340.64) [Registration gets altered when it gets persisted and handed back](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=344.9) [to us to when we use it, over in our service,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=349.91) [it will have the ID stored in there.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=354.46) [So let's fire up our server.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=358.04) [Our web page will pull up.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=359.54) [We'll add a registration.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=361.03) [And you'll see we'll have this course now bound to our registration.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=362.02) [Now that our server has started up,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=367.04) [I can go into our app and click on Add Registration,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=368.65) [type in my name and Add Registration and now switch over to our MySQL Workbench,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=373.14) [and this should all be synced up.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=380.52) [First,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=382.63) [I can click on our registration and run that select \* from REGISTRATION](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=382.99) [and see that I've got a couple of entries in there.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=388.66) [I've ran it a few times.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=390.62) [And then I can see that I've got ID 1 and ID 2 since I ran it twice.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=392.54) [If I click on select \* from COURSE and run it,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=398.64) [I can see that I have associated those correctly.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=403.34) [I've got ID 1 or Course 1. It says that every attendee must](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=407.71) [complete the intro, and intro is the name, and it's tied back](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=411.89) [to the registration 1. And the same thing, the second one is](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=416.02) [tied back to registration 2.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=419.55) [So I have all of my associations correct, and the one‑to‑many and the](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=421.25) [many‑to‑one mapping all synced up across my objects.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=427.09) [Now if we deleted our registration since we have that cascade set to ALL,](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=430.64) [it would actually delete the course from this table as well.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=436.07) [So we have everything synced up, our cascading set up, our](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=440.87) [generated strategy for our IDs synced up correctly. Everything is now wired up for this one‑to‑many, many‑to‑one join.](https://app.pluralsight.com/course-player?clipId=a869227e-4f20-43c5-b52e-1bc5e253aff3&startTime=444.9)

### [Fetch Types](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f)

[When using an annotation like OneToMany or one of the other join types,](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=0.04) [we can choose at what time we want to fetch that data.](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=4.58) [There are two types of fetch.](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=9.14) [There is a lazy, which queries the database when that property is called.](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=11.32) [So when I call getCourses on the registration object,](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=15.58) [it's going to then go out and populate that collection.](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=19.17) [It will wait until we actually call that getter to query the database.](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=22.74) [And then there is eager. Eager queries the database when](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=27.64) [that object was originally created,](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=31.55) [and this is one of those that does vary by implementation.](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=34.04) [Hibernate does limit you to only having two eagerly fetched](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=37.54) [collections on an object. Usually not a big deal,](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=41.67) [but it is different between implementations.](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=45.25) [So let's look at what this means for our registration object that we just](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=48.04) [created. The OneToMany annotation we had mapped by registration had a cascade](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=52.49) [type all. If we tack on fetch = fetchType.lazy,](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=58.78) [which is the default, it will wait until we call getCourses on our](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=63.42) [registration object before it queries the database.](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=68.51) [Up until now, we haven't had an example to read from the database,](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=72.34) [so we don't have any code out there yet that will demonstrate this. We're going to change that now.](https://app.pluralsight.com/course-player?clipId=ddd3ac84-9c60-4015-982e-a7f69fa7fb9f&startTime=75.96)

### [JPQL](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019)

[Up until now, everything we have been doing has just been simple inserts.](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=0.04) [We need to do a read in order to demonstrate the](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=4) [various fetch types. We will use JPQL,](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=7.42) [which is the Java persistence query language, to work with the data.](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=10.49) [I believe that JPQL syntax is the hardest part for](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=15.04) [people to learn because it's not SQL.](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=19.36) [So when dealing with JPA and the different persistence APIs, Hibernate](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=21.94) [and that, the hardest part seems to be understanding that I'm working](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=26.06) [with objects and not working with SQL.](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=29.41) [People often know what they want to do in SQL and are still trying to figure out](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=32.84) [how to do that in JPQL. So JPQL is centered around objects,](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=36.85) [and this is an example of a query using JPQL.](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=43.64) [That same query written in SQL would look like a select \*](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=48.64) [from Registration. So it looks very similar. Except since](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=53.52) [we're dealing with the object,](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=57.56) [we say Select r, and you can use whatever variable name you want there.](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=58.91) [But it is selecting from the object. Registration is referring to](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=64.04) [the Java object, and it's spelled accordingly.](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=69.28) [If you don't have that uppercase R lowercase](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=71.96) [e‑g‑i‑s‑t‑r‑a‑t‑i‑o‑n, it will look for a differently named](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=75.35) [object. So it has to be tied to the objects were trying to query on. Let's add this to our application now.](https://app.pluralsight.com/course-player?clipId=0d496397-2796-40ae-90b4-fbd451ca3019&startTime=81.31)

### [JPQL Demo](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556)

[I've gone ahead and closed all of the open files that we had so we](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=0.24) [can just focus on a couple of specific things here.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=3.57) [I decided to incorporate two smaller examples into one here,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=6.64) [thus demonstrating the fetch types,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=12.24) [but also creating another RESTful service so you didn't have to write a](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=14.6) [bunch of JSP and HTML code to illustrate this demo.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=18.64) [I'm going to start out by opening up Registration,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=23.34) [and the first thing we're going to do is go down](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=26.24) [here and add a fetch type in here.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=28.15) [So we'll say fetch and FetchType because there's an enum for this is LAZY.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=30.06) [Now before we leave out of here though, I do want to add one other annotation.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=36.34) [And this is just because we chose to do this as a RESTful service.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=39.95) [I want to say @JsonManagedReference.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=44.01) [And all this does, very simple, is it just says,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=46.95) [hey, when you go to export this as JSON,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=51.35) [don't cascade and keep trying to repopulate the whole tree.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=53.97) [Grab it at one level and return.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=57.76) [If that doesn't make any sense to you, don't worry about it.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=60.16) [Just know that if you omit this, you will get an error.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=62.66) [The next thing we need to do is open up Course,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=65.64) [and on our many‑to‑one above that,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=68.74) [we need to do an @JsonBackReference and save it.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=71.83) [That's all we had to do to these objects.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=78.54) [Easy enough.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=80.84) [Now to create that RESTful service,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=81.82) [I want to point out two things here because I don't want you to](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=84.89) [be caught off guard when you go to use this.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=87.53) [We try to make these courses toward it's real world and real‑life scenario.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=89.36) [If you open up our UserController,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=93.18) [you'll notice that it's annotated at the top as a RestController.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=97.79) [That means that every method you call inside of here](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=101.82) [returns the body as a response body.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=104.49) [If you look at our RegistrationController, it's just a standard controller.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=107.64) [It's not a big deal,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=112.87) [but it doesn't annotate every return type as a response body.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=114.43) [Now as we go to create this, it'll make more sense.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=119.84) [I'm actually going to make this easier on myself and](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=122.74) [copy this method and paste it.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=125.29) [Change this URL to registrations and getRegistrations.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=130.64) [This is where it starts to change.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=135.23) [I'm going to say @ResponseBody,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=137.06) [and it's going to return a list of Registration objects.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=140.22) [Then we can get rid of this ModelAttribute in here because](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=150.54) [we're not trying to return that anymore.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=153.56) [And we'll return this line down.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=157.65) [And the next thing we want to do is say List](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=162.94) [Registration registrations is equal to, and we haven't created this method yet,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=166.94) [registrationService.findAll.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=176.28) [And we'll get a red error for this.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=179.19) [We'll change our return type to registrations.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=184.73) [So that ResponseBody annotation just said,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=190.84) [hey, whatever I return, I want you to turn that into JSON,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=193.25) [and that's why we had to add that ResponseBody annotation is](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=198.06) [because this is a standard controller and add that Json reference](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=201.14) [and BackManage reference in our two objects.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=205.2) [Now let's create this method inside of our registrationService.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=209.54) [And if I hover over it and choose the quickfix of Create](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=213.92) [method findAll in the RegistrationService,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=221.15) [I can save this.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=223.84) [When I open up my RegistrationServiceImpl,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=225.84) [it'll ask me if I want to create that entity there,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=229.94) [and I'll say Yes.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=235.11) [Click OK.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=238.14) [And we're going to pass this right through to our repository.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=239.94) [So we'll say return registrationRepository.findAll.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=242.86) [And we haven't created this method yet either.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=249.74) [Now why are we duplicating these methods?](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=252.84) [Well,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=255.55) [because there may be some business logic that we want to incorporate in here.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=255.98) [And again, that's where we would do this is in our service tier.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=259.05) [That business logic may be things like pagination or sorting or a](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=261.74) [select number of rows that we return per user,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=267.07) [or we implement some security.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=270.38) [All of that stuff would happen inside of this method here in our service tier,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=272.11) [not in our repository.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=278.23) [So let's save this,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=280.04) [and then we'll choose the quickfix on this error and do the same exact thing.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=282.14) [We'll say Create method findall in that RegistrationRepository.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=285.97) [So we'll save this, open up our RegistrationRepository,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=291.6) [and this is where we're going to go through and create that query using JPQL.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=296.03) [So we'll say Implement methods, OK,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=304.54) [and this, we'll leave it returning null for a second.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=309.44) [We'll say List Registration registrations = entityManager.createQuery.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=313.95) [And inside of here, we'll say Select r from Registration r .getResultList.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=331.04) [And don't forget our semicolon on the end there.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=349.54) [Now again,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=352.16) [I can't stress enough that that Select r from](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=353.29) [Registration is referring to the object.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=356.35) [And that's why it has to be spelled out exactly like our class name,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=358.84) [Registration.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=362.88) [Those two are exactly the same.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=364.01) [So there's our select statement.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=366.74) [We'll change this return to return registrations, and our code is actually done.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=367.97) [We're going to go through and grab this. Now why is this a unique example?](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=375.45) [Well, a couple of things.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=379.19) [One, we're going to use a RESTful service to do the get on it.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=380.11) [It's currently going to do this lazy.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=384.24) [It is also going to show how you cascade a list inside of an object](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=387.44) [through a RESTful service because that's an error that catches a lot](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=394.05) [of people off guard. And we're using JPQL.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=396.76) [We've got all of that rolled up into one example here.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=399.75) [So let's start our server, and then I'm going to switch](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=402.7) [over to Postman. And I've gone ahead and deleted our entire](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=408.67) [history that I had in Postman.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=412.16) [I'm going to create a new request here. And for the URL, I'm going](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=414.44) [to do localhost:8080/conference/registrations and click the Send](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=418.32) [link. And you can see it returned our object for us, and the parent](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=433.45) [object is our registration, and inside of that is our course.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=440.73) [And it displayed all of that.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=446.74) [So that was all done going out to our query.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=448.11) [If we switch back to our IDE, we can see the SQL that was ran here,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=450.93) [and it looks like it was around more than once.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=461.15) [It actually wasn't.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=462.63) [It's because we have the debug statements turned up to show all that.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=463.45) [But you can see where it grabs our registration.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=468.06) [And then, as we call or cascade through our object,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=470.56) [it calls the lazy load to also display the courses when we see that.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=474.05) [If you want to mess around with that some more,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=479.26) [you can go into your registration object and change this to eager](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=482.34) [and run it again to see that it's pulled the very first time it](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=489.44) [comes back from the database. So you can put some log statements in](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=492.21) [and walk through all of that,](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=495.78) [but you can see the difference between lazy and eager. And](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=497.38) [we grabbed all of that using a RESTful service call that just went out and did a get.](https://app.pluralsight.com/course-player?clipId=d4f57806-34a4-4513-bfec-c1eda208b556&startTime=501.1)

### [Projection](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1)

[It's not often that we want to go through like our report and display](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=0.74) [every filled and every element to the end user.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=4.57) [In fact,](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=7.94) [some people will subscribe to the notion of never showing](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=8.45) [an ID to the end user for them to see.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=11.33) [There's a really great way using a technique called projection](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=14.44) [that we can select the fields that we want to and build an](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=18.3) [object based off of that request.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=21.84) [We can do complex joins and things like that.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=24.09) [So we're going to actually do two things here in one](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=27) [example to show you how this works.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=29.57) [Projection is a great way to present objects to the UI. We have an object](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=31.94) [that represents exactly what we want to show to the UI.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=36.96) [Objects are added using JPQL syntax.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=40.64) [So we go through and build our query using JPQL, and I'll show you how that](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=44.19) [works and what that looks like here in just a second.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=49.24) [And then projection objects can be JPA entities,](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=52.24) [but they don't have to be a JPA entity.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=55.33) [This is the other reason I like this,](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=58.64) [and I'll talk through that design issue here with you in a second.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=60.56) [You can do this using a constructor for the projection.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=64.14) [So what happens is your JPQL ends up looking like this code up above](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=68.84) [here. You have a Select new, and I've created an object that we don't](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=72.91) [even have here yet called RegistrationReport.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=77.97) [That takes three parameters in it, three arguments. We've got](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=81.24) [name, the course name, and the description.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=84.49) [You can also look and see that we're selecting from](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=87.94) [registration and course where the id equal to the r](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=91.01) [.registration id in the course object.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=96.96) [So I've joined these two together and done that query. Got the information back.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=100.14) [This is actually a lot more efficient query than what we were doing](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=105.21) [before where we had a collection of registrations and then a collection](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=108.5) [of course objects that we were going down into.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=112.46) [If I had three or four or five registrations,](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=116.54) [it was going to run through that query five, six, or seven times.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=119.86) [And they actually call that an N + 1 select problem. Using projection,](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=122.81) [I can go get what I need in one query and one join in the database.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=128.7) [It's a lot more efficient database operation, and it's only showing the fields I want to to the UI.](https://app.pluralsight.com/course-player?clipId=0290e727-2120-49f0-8107-37b03fee98c1&startTime=132.4)

### [Projection Demo](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1)

[I've gone ahead and shut down my server and closed all the](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=0.14) [open files that we had just so we can focus on implementing](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=3.02) [projection inside of our application.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=6.14) [Let's right‑click on our model package, so com.pluralsight.conference,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=8.64) [model, and create a new Java class.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=12.67) [We're going to call this RegistrationReport and hit Enter.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=16.54) [I'm going to add three member variables at the top here.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=23.25) [We'll say private String name, private String courseName,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=26.74) [and the last one we'll do private String courseDescription.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=37.14) [And then we're going to give ourselves some white space below those,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=47.74) [and we can right‑click and say Generate,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=50.1) [Constructor.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=54.34) [We'll choose all three of those.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=56.34) [Hit OK.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=58.56) [And then we will right‑click below that and go to Generate again and choose](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=61.94) [Getter and Setter and choose all three of them again.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=67.65) [So we've created our basic object,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=72.44) [just a simple POJO for our RegistrationReport that contains our name,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=75.55) [courseName,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=79.47) [and courseDescription and the constructor we're going to use for projection.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=79.8) [So let's save this.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=84.64) [Let's open up our RegistrationController,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=86.34) [and I'm going to grab our registrations method that we created in](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=88.77) [the previous demo and just copy it and paste this.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=96.14) [I'm going to change the GetMapping to registration‑reports and](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=103.44) [change this to a list of RegistrationReports.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=110.42) [We'll call this getRegistrationReports.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=115.84) [And the same thing down here, we'll change the list type and the return.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=118.74) [And finally, we'll change the method that it calls to findAllReports.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=132.13) [We haven't created this yet.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=138.46) [We're about to.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=140.01) [So I'll save this class,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=141.08) [and let's do the quickfix on it and go to Create method findAllReports,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=144.54) [and it'll take us to our RegistrationService interface.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=151.09) [I can save this.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=155.54) [And when I open up our RegistrationServiceImpl,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=156.52) [it'll tell us that we're missing a method.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=159.44) [And if we do the hot fix for it,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=161.85) [we can say Implement methods, choose that, click OK. It'll give us a space at](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=164.34) [the bottom here. We're going to do the same exact thing.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=170.36) [And again, I realize that we're copying and pasting this for the course.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=173.03) [You could put some query logic inside of here for](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=176.16) [pagination or those types of things, filtering.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=179.38) [This will work for the example that we have though. Say](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=183.34) [findAllReports. And if we do the hot fix on it,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=187.34) [say Create method and save it and open up our](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=194.94) [RegistrationRepositoryImpl, we're going to run into the same exact](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=198.88) [thing of it telling us that we need to implement this method.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=203.58) [So we'll choose that, and I'm going to grab this method that we had here](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=208.29) [up above and use the body of it to help us create this.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=217.2) [So we're going to return a list of RegistrationReports,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=221.98) [RegistrationReports. Because we're starting to scroll off the screen](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=229.04) [here, I'm going to create a string and just call it jpql. Set that](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=238.17) [equal to this and grab the body out of this method here, jpql. And](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=245.17) [we'll define what that is up above here.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=255.81) [So we're going to set up the class name where we call Select new. And](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=258.94) [we do have to fully qualify the package in here.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=265.41) [That's one thing that is a little bit confusing.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=267.73) [So we'll say com.pluralsight.conference.model.RegistrationReport.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=270.55) [And from here,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=288.34) [we actually get to specify in the constructor](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=289.56) [arguments. So we're going to say r.name,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=294.09) [c.name, c.description. And then let's return that down to a new line.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=300.94) [We're going to pull all of that from registration r, Course c where r.id =](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=313.88) [c.registration.id. And then let's put our semicolon on the end of that. I'm](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=336.15) [going to give you a second to look and see how I have that typed in. And](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=347.51) [notice that at the end of each of these lines,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=352.9) [I do have some white space.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=355.84) [So there is a space at the end of r.name, c.name, description in](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=357.61) [between that and that closing parenthesis and the same at the end](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=362.5) [of our from clause because if not,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=365.98) [it would be all bunched together and actually wouldn't query correctly.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=367.96) [So make sure you have that typed in there.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=372.16) [You can also opt to grab this query out of the exercise files or the GitHub](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=373.99) [repo where I've got this all typed out for you as well,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=380.62) [just in case you're having any problems with it.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=384.27) [So I'm going to say this. I'm going to fire up my server. And](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=386.12) [as this loads, I'm going to open up Postman and do a query on](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=393.93) [that new URL that we typed in here.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=399.74) [Okay, picking up where we left off in Postman, I'm going to change](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=403.84) [this to registration‑reports and just hit the Send button. And](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=408.05) [you'll notice the structure that we had before where we were pulling](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=415.63) [back a collection and then it had a collection inside of it, that's](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=420.02) [going to flatten out.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=423.12) [So when I click Send on this now, you'll notice that we're just one layer deep.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=424.1) [So it's a lot more performant of a query.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=428.43) [It just gets back the fields that we want if we wanted to leave the](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=431.34) [course name out or the description out. Notice the IDs aren't showing up](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=433.9) [here, any of those things. So it allowed us to create a much more](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=437.54) [specific object for what we wanted to return.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=442.78) [I should also note to you that this is a common technique used for searching.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=445.99) [So one thing that people often don't realize in web](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=452.64) [applications is that your search is an object,](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=455.06) [and that's how you can save search history for people as well.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=459.88) [So searching oftentimes is a JPA entity, and the report back or the results back can be done very well with projection.](https://app.pluralsight.com/course-player?clipId=92e1f09f-fd16-4668-a933-c8ad7fa845b1&startTime=463.65)

### [Named Queries](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb)

[There's one last part we want to talk about before wrapping up some of the](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=0.24) [things that we've done with JPA annotations, and that's named queries. We've](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=3.5) [kind of gone through and shown you all of the best practices while going](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=8.09) [through and introducing you to these annotations.](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=11.66) [You'd rather learn it the right way than go through and learn](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=13.8) [how to do it and then find out there's a much better way after](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=16.62) [the fact. With named queries,](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=19.1) [we can clean up some of the ad‑hoc SQL that's in our repository fields.](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=21.34) [One of the nice things about this is we can use named](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=25.84) [parameters and things like that as well.](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=28.73) [So it's a lot cleaner than ad‑hoc JPQL or what looks](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=31.1) [like SQL inside of our objects.](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=35.66) [It's not required,](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=38.24) [but it focuses on the domain. So we can put these named queries wherever](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=39.76) [we want, but usually we store them in our domain objects. And we can use](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=43.96) [named parameters. If we're going to be substituting anything in query](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=48.58) [strings or search parameters, things of that nature, we can have named](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=52.55) [parameters that we're doing those substitution is with. It's a lot](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=56.36) [cleaner approach.](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=60.51) [How this works is we take and define our named query at the top of our object.](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=62.14) [In this example I've got here, we're in the registration object.](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=65.95) [And we take that JPQL out of our repository and add it as a named query inside of our registration object.](https://app.pluralsight.com/course-player?clipId=3fa47088-56e2-4473-8d2b-e67c98fda4cb&startTime=69.18)

### [Named Queries Demo](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f)

[To convert our object over to using a named query,](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=0.04) [let's start by creating a couple of static final strings](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=2.68) [inside of our registration object.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=5.96) [So at the top of the class, but below the class designation,](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=8.74) [we'll say public static final String,](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=12.17) [and we'll call this first one REGISTRATION\_REPORT and](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=19.09) [set that equal to registrationReport.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=29.79) [And the name of this actually doesn't matter, but it does have to be unique.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=38.24) [You can't use registrationReport for another named query.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=41.58) [It's tied to this specific one.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=44.56) [And then the second string you want to do is the](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=47.24) [actual JPQL that we're going to create.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=50.29) [So we'll say public static final String,](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=52.78) [and we'll call this one REGISTRATION\_REPORT\_JPQL.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=60.74) [We'll set that equal to a string.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=73.04) [We're going to go grab that right now.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=75.84) [So let's grab that code from our RegistrationRepositoryImpl](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=78.14) [and scroll to the bottom, and we're going to cut this JPQL](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=83.9) [out of here. So we'll grab that.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=89.83) [I'm going to switch back to my registration object quick so I don't](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=95.24) [lose that out of my buffer and paste that in here and get rid of](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=97.99) [that jpql string. And just so it's more readable, I'm going to bring](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=103.85) [this down to the next line.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=111.19) [So we've got our string inside of here and moved that out of](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=115.04) [our object that was in our repository.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=119.37) [We're going to fix that here in a second because it's broken right now.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=122.84) [But first,](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=126.34) [let's create our named query. So we'll add an annotation up at the](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=126.93) [top here that's NamedQueries, the plural version.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=129.9) [And we want to add a curly brace inside of there because we do](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=135.44) [an array of these. We'll then have @NamedQuery. And inside the](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=140.78) [NamedQuery, there's two parameters.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=146) [There's name, and the name is going to be](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=147.35) [Registration.REGISTRATION\_REPORT. And the query is going](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=150.1) [to be Registration.REGISTRATION\_REPORT\_JPQL.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=159.62) [We can save that.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=165.14) [So we've got our named query created inside of here.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=166.94) [We have the NamedQueries array.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=171.44) [If you have more than one,](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=173.82) [you just comma‑separate these and do another @NamedQuery annotation.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=175.09) [We have our name,](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=178.97) [which is REGISTRATION\_REPORT and then the actual JPQL inside of here.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=180.78) [Now switching back over to our repository,](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=185.34) [we go inside of here and just create a named query and change the name](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=190.14) [equal to Registration.REGISTRATION\_REPORT and save that. Bring it down to](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=198.32) [another line so you guys can see it better.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=207.76) [That's what we had to do to switch this over to a named query.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=211.14) [It is compiled.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=215.54) [It's checked and validated at the time of us creating our object so we](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=217.02) [can actually find errors earlier than if we just try and run it and](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=222.01) [have it fail. Let's fire up our server.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=226.87) [And once this starts up, I'll switch over to Postman.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=232.54) [And now I can just rerun the same query that we had](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=238.94) [before for registration reports,](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=242.96) [and it switched over to a named query. Really easy to do.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=247.04) [At first glance, it may not seem like it's buying you a whole bunch,](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=251.44) [except all of these can now be passed around through static](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=254.46) [names rather than us making them up on the fly.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=259.9) [And it keeps everything contained in our domain object. That's beneficial for](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=263.64) [one reason that I'm going to show you here. Inside our domain object, I can](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=267.95) [see the fields that we're doing our query on.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=273.03) [So looking at this,](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=275.12) [I know that I have registration.name, I have registration courses, and](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=276.65) [I can walk through and tie that to the actual fields inside the](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=280.96) [object. So it takes a little getting used to.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=285.6) [As I mentioned at the beginning of this,](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=288.64) [JPQL is working with objects, not working with SQL. And so you have to think of this in terms of the object graph.](https://app.pluralsight.com/course-player?clipId=c74069fc-08d2-4a45-8c1e-71117ac7cb7f&startTime=290.27)

### [Summary](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422)

[So this was a big module.](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422&startTime=1.14) [We covered a lot of things in here and had a lot of demos.](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422&startTime=2.92) [We went over the most common and default annotations using JPA.](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422&startTime=5.86) [We looked at how to override the defaults and what they implement for you.](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422&startTime=10.74) [We went through the service and repository tier from Spring,](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422&startTime=15.64) [and we also looked at joins and using one‑to‑many and many‑to‑one. We](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422&startTime=19.2) [also demoed fetch types, eager versus lazy, and showed you some of the](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422&startTime=24.57) [limits or exceptions you might face with that.](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422&startTime=29) [And then we went over projection, one of the most powerful, but](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422&startTime=31.64) [often overlooked usages of JPA in my opinion.](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422&startTime=34.79) [And lastly, we cleaned up some of our code using named queries.](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422&startTime=39.44) [We have one more module left,](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422&startTime=43.46) [and we're going to dive into the actual Spring Data portion of](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422&startTime=45.38) [using JPA and some of their convenience interfaces that they have](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422&startTime=49.67) [and how that can reduce even more of the boilerplate code that we](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422&startTime=53.32) [have inside of our applications.](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422&startTime=56.77) [So some of that copy and pasting we've been doing, you're going to see a lot of that go away in this next module.](https://app.pluralsight.com/course-player?clipId=7dc7a3a8-764e-47e4-9e0e-ff7f9bbd5422&startTime=58.13)

## [How to Configure and Use Spring Data JPA](https://app.pluralsight.com/course-player?clipId=6b0ccdf5-3bdc-4428-bcb6-ec60815283de)

### [Introduction](https://app.pluralsight.com/course-player?clipId=6b0ccdf5-3bdc-4428-bcb6-ec60815283de)

[Welcome back.](https://app.pluralsight.com/course-player?clipId=6b0ccdf5-3bdc-4428-bcb6-ec60815283de&startTime=0.54) [This is Bryan Hansen from Pluralsight, and in this module we are going to discuss Spring Data JPA.](https://app.pluralsight.com/course-player?clipId=6b0ccdf5-3bdc-4428-bcb6-ec60815283de&startTime=1.66)

### [Create vs. Update](https://app.pluralsight.com/course-player?clipId=0f9bf8fe-8d81-48f5-9f3d-b228c5347d95)

[In the last module, we had a lot of boilerplate copy and paste type code.](https://app.pluralsight.com/course-player?clipId=0f9bf8fe-8d81-48f5-9f3d-b228c5347d95&startTime=0.83) [Spring Data JPA is a framework to help eliminate](https://app.pluralsight.com/course-player?clipId=0f9bf8fe-8d81-48f5-9f3d-b228c5347d95&startTime=6.73) [boilerplate code with regards to the DAO layer.](https://app.pluralsight.com/course-player?clipId=0f9bf8fe-8d81-48f5-9f3d-b228c5347d95&startTime=10.17) [Spring Data JPA has taken concepts learned from Ruby on Rails or](https://app.pluralsight.com/course-player?clipId=0f9bf8fe-8d81-48f5-9f3d-b228c5347d95&startTime=13.84) [Groovy on Grails and other rapid application development tools and frameworks to help simplify development.](https://app.pluralsight.com/course-player?clipId=0f9bf8fe-8d81-48f5-9f3d-b228c5347d95&startTime=18.27)

### [Registration Repository Demo](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e)

[In the previous module,](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=0.64) [we used the persist method of the EntityManager to](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=2.08) [create records in the database, but we never did an update.](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=6.32) [The persist method is used only for inserts,](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=11.24) [though, and we use a merge method instead for updating a record.](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=15.1) [When we created our method we purposely called it save because we were going to](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=19.54) [override this method to handle creates, as well as updates.](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=24.36) [Now,](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=29.34) [this is one of those things that we have to do in all of our repository](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=29.74) [classes, our implementations, that just is copy and paste code.](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=35.69) [Now, some people get a little creative and create an abstract parent](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=40.53) [class and move this code up into that parent class,](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=46.21) [well let's show you what that looks like.](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=49.51) [This is an example of what our goal method will look like after](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=52.44) [updating it to support creates, as well as updates.](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=56.1) [A few things to notice about this.](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=60.14) [First, we will look to see if it has an Id, so the getId equal to null,](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=62.17) [and we can determine from that whether or not it is a create versus update.](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=68.2) [Second,](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=73.9) [one other thing that's a little confusing is we don't have to](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=74.6) [flush because the merge is handled differently.](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=77.4) [Third, and lastly,](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=80.94) [the merge does return an updated object where the persist is void.](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=82.52) [This is because the problem I mentioned earlier about the](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=88.51) [various Id generated value methods when defining what Id](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=91.12) [type we have on our entity.](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=96.26) [Some of the types of Id,](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=100.04) [specifically the Identity column, aren't chosen until](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=102.12) [after the object has been saved.](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=106.14) [So this snippet of code,](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=108.72) [this image here, shows what we would update our goal repository Impl to for the save method.](https://app.pluralsight.com/course-player?clipId=22d6ce4c-feca-464b-b353-fa7214d81c1e&startTime=110.94)

### [Registration Service Demo](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3)

[The next piece that we want to update is to open up our](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=0.04) [RegistrationServiceImpl, and we're going to do almost the same thing.](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=3.97) [And, I am making a really deep example or a harder example out of this to prove](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=9.14) [a point, and that's why we're going to use Spring Data JPA.](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=16.17) [The actual Spring Data portion is what we've been dealing with,](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=19.72) [but the JPA combined with Spring Data we haven't delved into yet.](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=23.23) [But this example is going to help illustrate that and show](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=28.04) [you why we want to upgrade these things.](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=31.91) [We're going to do the same thing here.](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=35.04) [We're going to wrap this course with an if statement.](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=36.29) [Say if(registration.getId() ==null,](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=40.47) [then let's go ahead and add that course to it and save that,](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=52.24) [if not, we're going to just skip that.](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=59.47) [We don't need to add that default attendee course to the](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=61.39) [registration on an update, we're only going to do that as](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=66.42) [part of the creation portion of this.](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=70.1) [So, illustrating where we're putting our business logic at inside the](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=73.83) [ServiceImpl, we have overridden our save method,](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=78.12) [and there is a tiny bit of business logic in there that's](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=83.09) [going to get replaced with Spring Data JPA. Let's save this now though and we'll move on to the UI portion.](https://app.pluralsight.com/course-player?clipId=a0418400-ada6-4f5b-a844-5f4a89bf2dd3&startTime=85.78)

### [Registration Controller](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207)

[For the UI portion,](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=0.24) [let's open up our RegistrationController, and we'll go to the](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=1.31) [bottom of here and we'll create a new PostMapping.](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=5.71) [And the URL that we want to hit with that is registration/update. We'll](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=12.54) [follow the CRUD conventions of a RESTful service,](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=20.58) [and we're going to add in here public@ResponseBody and we](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=26.14) [will return the Registration object.](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=32.05) [We'll call this method updateRegistration.](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=36.74) [We can pass in here an @Valid @ModelAttribute,](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=41.94) [and the ModelAttribute we'll name registration, and](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=51.64) [we'll tie that to a registration object.](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=58.28) [And I'm going to give myself a little space down here to break that on](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=61.63) [the next line. So we'll say Registration registration.](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=66.38) [And for error handling,](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=71.74) [we're not going to do anything with it for this basic](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=73.36) [example, but we could catch any errors in a binding result](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=75.34) [and, if we needed to, work on those.](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=79.89) [We have everything tied in here.](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=84.84) [Now we can go ahead and call our registrationService,](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=86.58) [and we'll still call addRegistration and pass in our registration object.](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=94.34) [And now we have this new method in here that we'll](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=101.64) [call our same addRegistration,](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=104.27) [but our addRegistration got smart and can determine whether or not](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=105.69) [we are creating a new one or updating an existing one and then](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=109.51) [passing that through to our repository tier,](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=113.03) [which also got a little bit of intelligence around there doing the same thing.](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=116.06) [Let's start our server up in case you've shut yours down and](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=121.44) [let that automatically deploy to our server, and I'm going to switch over to Postman to run this example.](https://app.pluralsight.com/course-player?clipId=4f44ae70-ecef-4d32-b1e1-c39c82d87207&startTime=125.97)

### [Postman Registration Call Demo](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba)

[We've used the conference/registrations URL already to retrieve](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=0.44) [all of the listed registrations in our system.](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=5.95) [Let's go ahead and call that again using a simple GET,](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=9.54) [and you'll see it returns a course and the associated](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=14.16) [registration with those courses from our query here.](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=20.01) [Now that we know we have a course with an Id of 1 and the name of Bob,](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=24.14) [I want to do a POST on a new URL.](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=28.44) [That's the one we just created.](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=32.02) [So I'm going to switch this to POST and go to registration/update.](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=33.09) [I'm going to put in a name value pair down here,](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=38.64) [and the first one's going to be id and the value is](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=40.59) [going to be 1. And the key is the name,](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=42.93) [and it can be to whatever you want to change it to.](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=47.84) [I had Bob in here, maybe I'll change it back to Bryan.](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=50.28) [Let's click Send.](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=53.74) [And it says that it went through clear to our database.](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=56.14) [Let's go back to our previous example here,](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=59.84) [which using Postman I already have it stored over here, I](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=63.21) [can click on this and call registrations again, and you'll](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=65.88) [see it switched it to Bryan.](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=69.5) [So all we had to do there was type in a new POST and go to](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=72.44) [registration/update, and you can actually put everything on the URL there.](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=78.66) [I didn't put it in the body, I just did it as request parameters.](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=83.2) [You can do it a bunch of different ways, but this works for this basic example,](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=85.84) [but it shows that we're updating rather than creating a new one each time.](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=89.19) [And that's the example I wanted to illustrate with this.](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=94.94) [Now we're going to talk about using Spring Data JPA to clean up](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=98.16) [a lot of this boilerplate code that we've been copying and pasting throughout our application.](https://app.pluralsight.com/course-player?clipId=5100b722-dab3-4bcc-8e41-5988b89a83ba&startTime=103.62)

### [Spring Data JPA](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6)

[Spring Data is a wrapper for JPA.](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6&startTime=0.04) [You actually need to know JPA before you can start using Spring Data JPA.](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6&startTime=3.94) [It essentially replaces our repository tier unless](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6&startTime=9.34) [you need some custom functionality.](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6&startTime=12.76) [It's extremely powerful and eliminates a lot of our boilerplate code.](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6&startTime=15.34) [That's one of the things you'll start seeing more and more common as](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6&startTime=20.34) [we build more of these repository tier objects,](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6&startTime=23.4) [and it's the same if you're using Hibernate.](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6&startTime=26.02) [This isn't a problem that's unique to JPA. If you're using](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6&startTime=28.74) [standalone Hibernate or any of these frameworks,](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6&startTime=31.68) [the same copy and paste code smell, as it were,](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6&startTime=34.22) [exists across all these repository tiers or DAO objects.](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6&startTime=37.95) [It's the same pattern.](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6&startTime=42.84) [Spring Data will help clean up a lot of this,](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6&startTime=44.54) [and it can be extended for additional complex functionality.](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6&startTime=47.35) [Sometimes when people look at it, they go well that's great for simple cases,](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6&startTime=51.21) [but it doesn't do anything for complex functionality. No, it can be extended very easily, and it actually isn't very complex to do so.](https://app.pluralsight.com/course-player?clipId=e52314ef-ce3b-4d37-a879-c7b8c4f479e6&startTime=54.93)

### [Maven Dependencies](https://app.pluralsight.com/course-player?clipId=488e3165-059e-47bb-b510-27d9a66503c2)

[We've actually already added this dependency to our project,](https://app.pluralsight.com/course-player?clipId=488e3165-059e-47bb-b510-27d9a66503c2&startTime=0.04) [but I want to point out that this is all you had to](https://app.pluralsight.com/course-player?clipId=488e3165-059e-47bb-b510-27d9a66503c2&startTime=3.56) [do to begin using Spring Data JPA.](https://app.pluralsight.com/course-player?clipId=488e3165-059e-47bb-b510-27d9a66503c2&startTime=5.86) [We have the spring‑data‑jpa‑boot‑starter jar added to our project,](https://app.pluralsight.com/course-player?clipId=488e3165-059e-47bb-b510-27d9a66503c2&startTime=9.04) [and it's just added through Maven.](https://app.pluralsight.com/course-player?clipId=488e3165-059e-47bb-b510-27d9a66503c2&startTime=15.05) [The other nice thing is that any incompatible transitive](https://app.pluralsight.com/course-player?clipId=488e3165-059e-47bb-b510-27d9a66503c2&startTime=17.3) [dependencies are already excluded by using their version.](https://app.pluralsight.com/course-player?clipId=488e3165-059e-47bb-b510-27d9a66503c2&startTime=20.69) [So if we add this dependency to our project using their dependency management,](https://app.pluralsight.com/course-player?clipId=488e3165-059e-47bb-b510-27d9a66503c2&startTime=24.99) [it's handled any of the inconsistencies or problems that we](https://app.pluralsight.com/course-player?clipId=488e3165-059e-47bb-b510-27d9a66503c2&startTime=30.42) [wouldn't want to import into our project.](https://app.pluralsight.com/course-player?clipId=488e3165-059e-47bb-b510-27d9a66503c2&startTime=35.1) [Everything is set up, and we're ready to go from the downloading or inclusion of library aspect.](https://app.pluralsight.com/course-player?clipId=488e3165-059e-47bb-b510-27d9a66503c2&startTime=37.54)

### [UserRepository](https://app.pluralsight.com/course-player?clipId=0af91dbf-2f8a-4cea-ab26-7eca856eaf8e)

[Now that we've briefly chatted about some of the neat functionality that we get](https://app.pluralsight.com/course-player?clipId=0af91dbf-2f8a-4cea-ab26-7eca856eaf8e&startTime=0.04) [out of Spring Data JPA, let's actually see it do something.](https://app.pluralsight.com/course-player?clipId=0af91dbf-2f8a-4cea-ab26-7eca856eaf8e&startTime=3.69) [The first thing we're going to do is delete our](https://app.pluralsight.com/course-player?clipId=0af91dbf-2f8a-4cea-ab26-7eca856eaf8e&startTime=7.15) [implementation class for the UserRepository.](https://app.pluralsight.com/course-player?clipId=0af91dbf-2f8a-4cea-ab26-7eca856eaf8e&startTime=10.19) [The implementation class is only required if we need to](https://app.pluralsight.com/course-player?clipId=0af91dbf-2f8a-4cea-ab26-7eca856eaf8e&startTime=13.84) [override functionality. Our interface actually becomes our](https://app.pluralsight.com/course-player?clipId=0af91dbf-2f8a-4cea-ab26-7eca856eaf8e&startTime=16.64) [fully functional user interface.](https://app.pluralsight.com/course-player?clipId=0af91dbf-2f8a-4cea-ab26-7eca856eaf8e&startTime=20.4) [We're going to change our interface to extend the JPA interface.](https://app.pluralsight.com/course-player?clipId=0af91dbf-2f8a-4cea-ab26-7eca856eaf8e&startTime=24.14) [And then it just needs to know the class it services and its ID type.](https://app.pluralsight.com/course-player?clipId=0af91dbf-2f8a-4cea-ab26-7eca856eaf8e&startTime=28.69) [This is what our UserRepository interface becomes now, nothing more.](https://app.pluralsight.com/course-player?clipId=0af91dbf-2f8a-4cea-ab26-7eca856eaf8e&startTime=34.14) [It extends JpaRepository, the class that it's representing as User, and the ID type as Long.](https://app.pluralsight.com/course-player?clipId=0af91dbf-2f8a-4cea-ab26-7eca856eaf8e&startTime=38.94)

### [UserRepository with Spring Data Demo](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099)

[Let's update our UserRepository to now be a JpaRepository.](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=0.14) [To do so,](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=4.94) [we just open up the interface and say that it extends JpaRepository, and](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=5.43) [it's used to service the User class, and its id is a Long. From here, we](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=12.99) [can actually delete this method because it's going to inherit methods](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=22.11) [from the JpaRepository interface.](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=26.26) [The other thing that we can do is go in our](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=29.34) [UserRepositoryImpl, right‑click, and delete it.](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=30.85) [Click OK.](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=37.94) [And our application already knows that this is a JpaRepository](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=39.84) [because we have extended that interface.](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=43.8) [But I am going to give it the annotation of @Repository up here, and this](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=45.88) [is how you also would override the name if you want to give it some other](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=51.52) [registered bean name. This will work for us.](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=55.07) [We can save this. If you open up your UserServiceImpl, you can see that we don't](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=58.09) [have any compile errors because that method save is already implemented for us](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=63.57) [in the JpaRepository interface that we extended.](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=69.34) [That's it.](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=73.84) [We have no other functionality here.](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=74.39) [We will add functionality to one once to show you how to customize this. But the default CRUD implementations are already here for us.](https://app.pluralsight.com/course-player?clipId=92c255a2-c8cf-405a-803a-154a9c325099&startTime=76.08)

### [RegistrationRepository](https://app.pluralsight.com/course-player?clipId=b5506801-6955-467a-9a52-4ac040af283d)

[The RegistrationRepository is very similar to the UserRepository in what we](https://app.pluralsight.com/course-player?clipId=b5506801-6955-467a-9a52-4ac040af283d&startTime=0.04) [need to do to make it available to use Spring Data JPA.](https://app.pluralsight.com/course-player?clipId=b5506801-6955-467a-9a52-4ac040af283d&startTime=4.6) [One thing to note though is in the previous version of this course,](https://app.pluralsight.com/course-player?clipId=b5506801-6955-467a-9a52-4ac040af283d&startTime=7.94) [there was no support for projections or using named queries the way that](https://app.pluralsight.com/course-player?clipId=b5506801-6955-467a-9a52-4ac040af283d&startTime=11.36) [we have inside of our RegistrationRepository right now.](https://app.pluralsight.com/course-player?clipId=b5506801-6955-467a-9a52-4ac040af283d&startTime=16.2) [Both projections and named queries have since been added to this functionality,](https://app.pluralsight.com/course-player?clipId=b5506801-6955-467a-9a52-4ac040af283d&startTime=20.15) [and that's why I did this object next is because we're going](https://app.pluralsight.com/course-player?clipId=b5506801-6955-467a-9a52-4ac040af283d&startTime=25.74) [to add all of that functionality in there. All the customize stuff we did, we're going to convert over to Spring Data JPA.](https://app.pluralsight.com/course-player?clipId=b5506801-6955-467a-9a52-4ac040af283d&startTime=30.43)

### [RegistrationRepository with Spring Data Demo](https://app.pluralsight.com/course-player?clipId=8852a6cb-01fb-4627-b4ab-b12d9a5feace)

[Let's open up our RegistrationRepository.](https://app.pluralsight.com/course-player?clipId=8852a6cb-01fb-4627-b4ab-b12d9a5feace&startTime=0.04) [We'll start off by extending the JpaRepository interface,](https://app.pluralsight.com/course-player?clipId=8852a6cb-01fb-4627-b4ab-b12d9a5feace&startTime=3.94) [and that's going to use the registration object that it](https://app.pluralsight.com/course-player?clipId=8852a6cb-01fb-4627-b4ab-b12d9a5feace&startTime=11.74) [represents, and its id is Long as well.](https://app.pluralsight.com/course-player?clipId=8852a6cb-01fb-4627-b4ab-b12d9a5feace&startTime=15.37) [And we'll save this functionality.](https://app.pluralsight.com/course-player?clipId=8852a6cb-01fb-4627-b4ab-b12d9a5feace&startTime=20.96) [We can already get rid of this save method because we already have](https://app.pluralsight.com/course-player?clipId=8852a6cb-01fb-4627-b4ab-b12d9a5feace&startTime=22.81) [that through inheritance on the JpaRepository interface. And we](https://app.pluralsight.com/course-player?clipId=8852a6cb-01fb-4627-b4ab-b12d9a5feace&startTime=26.76) [actually have the findAll method as well.](https://app.pluralsight.com/course-player?clipId=8852a6cb-01fb-4627-b4ab-b12d9a5feace&startTime=33.2) [What we don't have is this findAllReports. Let's convert](https://app.pluralsight.com/course-player?clipId=8852a6cb-01fb-4627-b4ab-b12d9a5feace&startTime=37.04) [this over to using that named query that we created now and replicate that functionality.](https://app.pluralsight.com/course-player?clipId=8852a6cb-01fb-4627-b4ab-b12d9a5feace&startTime=42.12)

### [NamedQueries with Spring Data Demo](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac)

[Switching this over to use the named query and the projections that the named](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=0.04) [query is utilizing is actually easier than you may think.](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=4.64) [There is one little caveat though. We have to go to our registration object](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=8.04) [and change the name of our named query. You'll remember we used this public](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=11.79) [static final String to name our named query in this definition of above. All](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=17.85) [we have to do is come in here and specify the domain. So we'll say](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=22.48) [Registration.registrationReport.](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=24.75) [Now since we're in this RegistrationRepository interface, that](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=31.64) [literally becomes the name of the method now,](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=39.01) [RegistrationReport. We'll save this, and that's actually our named query.](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=41.93) [So the rest of the functionality that we had inside of our](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=47.16) [RegistrationRepository, the save, findAll, and findAllReports can](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=50.51) [actually all go away. I'm going to delete the implementation,](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=56.71) [click OK, and our RegistrationRepository has a call from](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=63.44) [the RegistrationService that will now just be](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=71.5) [registrationReport, and we can save that.](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=74.74) [We have all of our code switched over to now using the JpaRepository interfaces,](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=78.94) [and this is the extent of what our repository tier looks like](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=86.44) [now. Let's fire up our server and see what this looks like from the user interface side of it.](https://app.pluralsight.com/course-player?clipId=e5ba5c20-b0e4-4d6b-b802-331e3aa2adac&startTime=90.66)

### [Spring Data JPA Recap](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd)

[Switching back over to Postman, if we run our getter on the](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=0.04) [registrations URL again, you can see that it still works](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=4.65) [correctly, returns that one course that we expected to be in there](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=8.45) [tied to that one registration object.](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=11.85) [If we go to our request for the registrations reports that used the](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=14.44) [named query and the projection and click Send on that,](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=20.76) [you can see that we get the projection model back of just the name,](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=25.13) [courseName, and courseDescription without the id, but](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=30.75) [this was also using that named query.](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=34.41) [We can verify that our post is working correctly as well by going back](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=37.34) [in here, and we can change that back over to Bob or whatever you want](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=41.22) [to and click Send. If we switch back over to our registrations and get](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=45.26) [those again, it's updated. So all of that functionality is working now](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=53.31) [how we expected it to. Looking back at our IDE, our UserRepository is](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=57.58) [empty.](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=64.04) [All of the basic CRUD functions and the basic searching functions are](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=64.6) [available to us by just extending this interface.](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=68.38) [Same thing with our RegistrationRepository.](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=71.57) [That logic surrounding whether the ID was there or not and how to](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=74.54) [do those things, even the use of the named query, we named our](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=78.54) [method the name of the named query.](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=83.49) [We just had to specify the domain.](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=86.08) [You remember, if we look at our registration,](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=87.69) [we had to say registration., which just said registration needs](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=89.94) [this domain assigned to this named query.](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=94.34) [We have cleaned up all of that code,](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=98.04) [eliminated two classes, and condensed it all in one,](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=99.83) [still using injection to auto wire it and deployed our entire app](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=103.84) [without having to do anything more than add one line to one interface inside of our repository tier.](https://app.pluralsight.com/course-player?clipId=f8bee995-61bb-45ff-97ab-ed1ae6690cfd&startTime=108.77)

### [Summary](https://app.pluralsight.com/course-player?clipId=febdb300-e63d-4c76-9202-64df9ca55440)

[In this module,](https://app.pluralsight.com/course-player?clipId=febdb300-e63d-4c76-9202-64df9ca55440&startTime=1.14) [we finished up our configuration by enabling Spring JPA and going through](https://app.pluralsight.com/course-player?clipId=febdb300-e63d-4c76-9202-64df9ca55440&startTime=1.78) [and having all of the configuration set up to run that in conjunction with](https://app.pluralsight.com/course-player?clipId=febdb300-e63d-4c76-9202-64df9ca55440&startTime=7.42) [Hibernate . We finished out are examples of the update to round out all of](https://app.pluralsight.com/course-player?clipId=febdb300-e63d-4c76-9202-64df9ca55440&startTime=13.41) [that development, as well as converted our UserRepository and our](https://app.pluralsight.com/course-player?clipId=febdb300-e63d-4c76-9202-64df9ca55440&startTime=18.41) [RegistrationRepository to fully utilize the JpaRepository interface provided](https://app.pluralsight.com/course-player?clipId=febdb300-e63d-4c76-9202-64df9ca55440&startTime=23.19) [to us by Spring Data JPA.](https://app.pluralsight.com/course-player?clipId=febdb300-e63d-4c76-9202-64df9ca55440&startTime=29.12) [This actually concludes our course, and I want to thank you,](https://app.pluralsight.com/course-player?clipId=febdb300-e63d-4c76-9202-64df9ca55440&startTime=31.94) [and I hope you appreciated this update.](https://app.pluralsight.com/course-player?clipId=febdb300-e63d-4c76-9202-64df9ca55440&startTime=35.27) [And I thank you for sticking with us clear through. Thank you.](https://app.pluralsight.com/course-player?clipId=febdb300-e63d-4c76-9202-64df9ca55440&startTime=37.55)