## [Course Overview](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863)

### [Course Overview](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863)

[Welcome to the Kubernetes for Developers: Core Concepts course.](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=5.62) [My name's Dan Wahlin, I'm a software developer,](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=9.39) [architect, and trainer specializing in development and container technologies.](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=12.14) [Over the years, I've had the opportunity to work with containers extensively,](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=17.15) [and I'm excited to discuss how you can leverage your existing](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=21.41) [knowledge of containers while using Kubernetes.](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=24.48) [The goal of this course is to teach you about the core concepts of](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=28.24) [Kubernetes and the key resources it provides.](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=31.75) [Whether you're learning about Kubernetes for production or simply want](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=34.82) [to run it locally for testing or other scenarios,](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=38.65) [this course will provide the building blocks you need to get started.](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=41.39) [The course starts out by providing a big picture look at what Kubernetes is,](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=46.25) [what it's composed of, and different ways it can be used as a developer.](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=50.69) [One of the key resources provided by Kubernetes is Pods.](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=55.69) [You'll learn about what a Pod is and how multiple Pods can be](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=59.55) [used to host containers for an application.](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=62.96) [From there,](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=66.23) [you'll learn about how to create Pods using deployments and learn about services](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=66.7) [and how they can be used to provide networking functionality for your Pods](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=71.54) [throughout a Kubernetes cluster. As the course progresses, you'll also learn how](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=75.81) [to get configuration data into your application using config maps and handle](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=80.51) [sensitive information using secrets.](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=85) [Finally,](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=88.01) [you'll see how to put all of the concepts together to get an](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=88.74) [application up and running in a Kubernetes cluster.](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=91.99) [So let's get started by talking about what Kubernetes is and the benefits it can bring you as a developer.](https://app.pluralsight.com/course-player?clipId=d7f7ef5a-781f-47c0-83e8-4b44bbba3863&startTime=95.94)

## [Kubernetes from a Developer Perspective](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2)

### [Overview](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2)

[Let's start things off by talking about what are we](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=1.24) [going to cover in this course.](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=3.72) [So we're going to start by talking about Kubernetes,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=6.34) [but from a developer perspective.](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=8.5) [Why would you, as a developer, want to invest time learning Kubernetes?](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=11.54) [Well,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=16.24) [you might already have a good reason just based on what you're doing at work,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=16.35) [but if you don't,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=20.14) [we'll discuss several of the benefits that knowing](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=21.31) [Kubernetes can bring to you as a developer.](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=23.78) [Now, from there,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=27.44) [we're going to jump into some of the key building blocks of Kubernetes.](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=28.09) [So we're going to talk about Pods,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=31.84) [how they can be used to run containers and how they work under the covers.](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=33.44) [From there,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=36.75) [we'll talk about how we can deploy Pods and several different features that](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=37.16) [are really great when it comes to application deployment,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=40.7) [including things like zero downtime deployment.](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=44.13) [From there,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=47.84) [we're going to get into some networking concepts and](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=48.24) [talk about Kubernetes services.](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=50.45) [Many applications or containers might have storage requirements,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=53.39) [so we're going to talk about those. And if you've ever](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=56.68) [worked with Docker volumes before,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=59.43) [we're going to talk about it in the context of Kubernetes and](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=61.64) [how we can use things called persistent volumes, persistent](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=65.25) [volume claims, and much more.](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=68.45) [Now,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=71.94) [just about every application out there needs configuration data, so how](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=72.06) [does that work as you move your app into Kubernetes?](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=76.49) [Well, that's going to get us into a discussion on config maps,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=80.24) [which are key value pairs, and secrets for storing more sensitive data.](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=83.65) [Once we've covered all the building blocks,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=89.44) [then, of Kubernetes,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=91.36) [we're going to put it all together and run through an application that](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=92.48) [demonstrates how Pods and deployments and services and storage and more](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=96.13) [can all be used together in Kubernetes.](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=100.5) [And then we'll have a quick course summary to sum up](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=104.21) [everything we've done throughout the course.](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=106.82) [I want to emphasize that this course is going to be](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=109.84) [presented in the context of a developer.](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=111.85) [We're not going to get into administrator‑type concepts because](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=115.01) [there's already courses out there on Pluralsight that are designed](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=117.98) [for administrators of a Kubernetes cluster.](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=121.04) [But, if you're a developer and looking to understand](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=124.14) [the core concepts of Kubernetes, you're in the right place.](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=127.5) [This is the course for you. Now, to get the most out of this course,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=130.67) [here's what the prereqs would be.](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=134.94) [So first off,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=137.24) [you do need to be comfortable using command line](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=137.95) [tools and virtual machines, you need, of course,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=140.15) [to have a general familiarity with software development, and then an](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=143.31) [understanding of Docker containers and how they work,](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=147.18) [including things like building images and converting those](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=150) [images into running containers would definitely benefit you](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=153.39) [as you go through the course.](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=157.01) [So having introduced the agenda for the course and what](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=158.94) [you need to get the most out of it, let's go ahead and dive into this first module's introduction.](https://app.pluralsight.com/course-player?clipId=f2f9b5ea-76f4-4f3b-ac86-a4874b72d9e2&startTime=162.28)

### [Introduction](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9)

[Let's kick things off by talking about Kubernetes from a developer perspective.](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=0.94) [Now, if you're like me,](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=5.94) [you've probably heard about Kubernetes being used in production scenarios,](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=7.79) [and maybe wondered why would I even need to waste time on that?](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=11.94) [My DevOps team or someone else is going to handle that.](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=15.05) [Well, in this first module,](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=18.34) [I'm going to try to address some of those questions and talk](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=19.79) [about some scenarios where you might actually use Kubernetes](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=22.91) [in non‑production environments.](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=26.3) [So to start things off, we're going to talk about Kubernetes from a high level.](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=29.44) [I'll give you a quick overview. Then I'll provide a visual explanation](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=33.01) [of some of the key players involved with Kubernetes.](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=37.51) [From there, we're going to talk about, as a developer, what are the](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=41.14) [benefits and some of the different use cases where I might care about](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=44.3) [Kubernetes, a very important section I might add.](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=47.99) [And then we'll get into how to run Kubernetes locally, how to](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=51.74) [use a command line tool called kubectl, and then we're going to](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=55.25) [talk about how to get an extension to Kubernetes added in](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=58.96) [called the web UI dashboard,](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=62.22) [and this would give you insight visually into what's going on with Kubernetes,](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=64.55) [as well as the different containers that you're running. So let's jump in to our Kubernetes overview.](https://app.pluralsight.com/course-player?clipId=a880aa9d-547a-4737-833f-aef730fd1bf9&startTime=69.3)

### [Kubernetes Overview](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9)

[In this section, I'm going to introduce Kubernetes to you and kind of](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=0.91) [assume zero knowledge of what it is. Now first off,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=3.9) [here's how they officially define it on their website.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=8.29) [Kubernetes, or you'll see K8s as the abbreviation, is an](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=11.39) [open‑source system for automating deployment,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=15.92) [scaling, and management of containerized applications.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=18.18) [The first time I saw that,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=22.38) [it actually sounded familiar with other products I've heard out there.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=23.64) [So, let's talk a little bit more about what they mean here.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=27.65) [So first off, how are you managing your containers today?](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=32.54) [Let's say, for example,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=36.67) [that you've set up a load balancer and that goes out to some different nodes,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=38.09) [some virtual machines or maybe even physical servers, and then on those servers,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=42.6) [you have different containers running.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=47.62) [Now that would work fine, and you could get this going all by yourself,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=50.24) [actually, but what happens when one or more of these containers goes down?](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=53.83) [Now what are you going to do?](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=59.54) [Well,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=61.31) [you'd need some process that could monitor that and hopefully bring it back](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=61.46) [up, and there's a lot of issues that come into play if we talk about doing](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=65.32) [this on our own. Now take take this a little further.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=69.48) [Let's say that on your machine you were using Docker Compose to do](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=73.14) [something like the following, so you had a server which called into](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=76.64) [some APIs, that calls into some databases,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=79.4) [maybe a Redis caching‑type server, and that's the application as a whole.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=83.64) [Now, how would we manage all those containers?](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=89.49) [Well, locally, we could use Docker Compose,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=92.94) [and that would work very well, but how do we do this in production and](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=95.39) [how are we going to update this later in production? We could use](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=99.72) [Docker Compose. That would run in production.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=103.58) [It's not designed for that per se, but it would certainly work. Well,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=106.51) [what happens when we need to scale these?](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=110.98) [We need to heal these if they go down, and there's a lot of other](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=113.11) [things like networking that can come into play,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=116.37) [too.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=118.47) [So, wouldn't it be nice if we could just package up an app](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=120.44) [and let something else manage it for us?](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=124.23) [Not worry about all the management of the containers, eliminate](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=126.89) [single points of failure in our application, scale containers](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=130.91) [easily, and update containers without actually even bringing](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=135.22) [down the running application.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=138.98) [We'll talk about different ways to do that with](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=141.41) [something called deployments later.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=143.25) [And then, finally,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=145.94) [we want a robust networking infrastructure so that](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=147.21) [containers can talk to other containers,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=150.28) [even across different machines.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=152.49) [We might also need some storage options across machines as well.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=154.84) [Well, all of those things I just mentioned can be done by Kubernetes,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=159.94) [so you can think of it as a conductor of an orchestra.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=163.31) [The conductor knows the music very well.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=168.08) [It knows the different players, knows when they should start.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=170.3) [If one of the players is sick,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=173.25) [hopefully the conductor can find somebody to fill in for them.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=175.5) [And if you think of it from that standpoint,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=178.94) [Kubernetes really is the conductor of a container orchestra.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=181.83) [And that's kind of how I like to think of it as. Some of the key](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=186.18) [features that this conductor can perform are shown here.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=189.72) [First off,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=193.91) [we can discover different services that are available within our](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=195.24) [Kubernetes cluster, we're going to call it, a group of machines](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=198.97) [working together to run our different containers.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=202.44) [Load balancing can also take place within Kubernetes. Things like storage.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=205.48) [And if you've done Docker much, you've heard of Docker Volumes.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=211.27) [Think of that here. It can also be orchestrated across one](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=214.21) [or more machines in a Kubernetes cluster.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=217.91) [As we deploy our applications,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=221.24) [we can do a zero downtime deployment where a new app can be rolled](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=223.3) [out without actually taking down the previous app,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=226.91) [and that alone can be worth its weight in gold if you've thought that](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=230.66) [before in production scenarios. If a container does go down,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=233.66) [as I just described earlier,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=238.82) [there's a self‑healing feature that can automatically bring up that container.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=240.74) [How cool is that?](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=245.34) [Things like secrets,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=246.84) [configuration, and other settings that we need to store for our](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=248.36) [Kubernetes cluster that maybe our different containers need and](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=252.24) [the applications in those containers.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=255.67) [Those can be stored in a secrets area,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=257.77) [and we also have something called ConfigMaps we're going to](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=261) [discuss that can be used to store key value pairs.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=263.4) [Another thing Kubernetes can do is horizontally scale our containers. So](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=268.44) [if one particular container is kind of overloaded,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=273.34) [but the machine still has more power available such as memory and CPU,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=276.39) [we can actually horizontally scale out those.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=280.38) [Now, I pick six of the key features available.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=283.84) [There's even more it does, but from a developer standpoint,](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=287.42) [these are definitely six things that we would like to have, and](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=292.03) [they're things we're going to be talking about as we move throughout this module and others in the course.](https://app.pluralsight.com/course-player?clipId=e9d5cfca-7ed1-472e-855a-c5c422ac6da9&startTime=296.46)

### [The Big Picture](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd)

[In the previous section, we took a look at a high‑level overview of Kubernetes,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=2.14) [but let's dive into more of a visual exercise of what are](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=5.99) [the different players in Kubernetes,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=9.76) [and how do they work together to provide this orchestra for containers.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=11.78) [Now to start things off,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=17.54) [let's give a quick history of where Kubernetes came from.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=18.51) [So there was a need within Google for container and cluster management,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=21.45) [and they decided to open source their project,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=26.54) [which was used internally for over 15 years,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=29.18) [and they open sourced it to this Cloud Native Computing Foundation.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=32.51) [Well, ultimately,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=36.54) [that became the Kubernetes that we can all use today and that we can use](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=37.66) [across pretty much every major cloud platform out there.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=42.91) [Now in a nutshell,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=47.44) [Kubernetes provides a declared of way to define a cluster's state.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=48.32) [What does that mean exactly?](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=53.64) [Well, you have a scenario at work, and you have a current state.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=55.74) [Maybe one container, for example, is running.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=59.16) [But you would like to get to a desired state, and you would like two containers.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=62.34) [Well, that's exactly what Kubernetes can do.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=67.64) [You can tell it, hey, here's where I'm at.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=70.5) [Here's where I want to go.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=73.04) [And it's almost like a GPS.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=74.53) [It'll navigate to get you there.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=76.24) [Now what this means is that we're going to have to have some servers,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=79.31) [of course, for Kubernetes that can settle this up.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=82.44) [Now the way it works is you'll have one or more master nodes,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=86.74) [and think of this is the boss of the operation that knows](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=89.86) [how to manage the different employees, which we're going to call worker nodes.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=93.59) [The worker nodes can be physical servers.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=98.5) [They could be virtual machines, and most often these days,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=101.72) [they are virtual machines.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=104.44) [But together they create a cluster.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=106.04) [Now what the master will do is start something on](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=109.74) [each of these nodes called pods.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=113.35) [A pod, as you're going to see in a moment,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=116.34) [is really just a way to host a container.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=118.12) [Now a pod itself is really just the packaging,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=122.2) [the box if you will, for the product.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=125.04) [So if you go to the store and pull a box off a shelf,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=127.72) [you're not going to run the box,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=130.66) [you're going to open it and run whatever product is inside of the box.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=132.26) [That's exactly what pods do.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=136.26) [And we can have many pods if we'd like on a given machine.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=138.56) [That's where Kubernetes comes into play for horizontally scaling pods,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=142.88) [for example.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=146.67) [So you can think of a pod as kind of like a space suit for the person](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=148.42) [or the container that's inside of this space suit.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=153.53) [How do we talk to the person?](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=157.42) [Well, when they're in space, we don't talk to them directly.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=158.84) [We have to go through the pod.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=161.16) [How does that happen?](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=162.92) [Through some of the different wireless or whatever](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=164.04) [navigation techniques they have with satellites.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=166.09) [How do we know the person's vital statistics?](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=168.92) [Well, we got to go through some hardware and expose that through the pod.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=171.27) [The person doing the work obviously is inside of the space suit,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=175.42) [and that would be like the container inside of these running pods.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=179.85) [Now pods don't exist on their own.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=184.32) [There's other things that are needed to support them within Kubernetes.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=186.94) [So while you could have many pods running containers on your](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=190.92) [different nodes of a Kubernetes cluster,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=194.65) [you're going to need a way to deploy the pods.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=196.81) [So we'll be talking about something called deployments](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=199.41) [and replica sets later in the course.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=202.33) [You also need a way to enable pods to communicate possibly with the](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=205.32) [outside world or just amongst themselves within the cluster,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=209.75) [and that would be done through something called Kubernetes Services.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=214.62) [These are different types of resources that can be used to make](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=218.42) [sure that our pods are being deployed properly,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=221.86) [that they're running, that the containers within them are healthy,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=224.64) [and much more.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=228.23) [A node, as mentioned earlier,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=230.62) [is really just a virtual machine we'll say in this case,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=232.18) [and it can run one or more pods as mentioned.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=235.4) [The way that the master nodes of Kubernetes communicate](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=238.43) [to these worker nodes is shown here.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=242.135) [We're going to have something called an etcd store on our master nodes,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=245.615) [and kind of think of this is the database for](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=249.165) [everything the master node needs to track,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=251.715) [that the boss needs to track, for our cluster.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=253.62) [We're also going to have a controller manager,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=258.175) [and this will be responsible for when a request comes in,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=260.485) [the manager can act upon that request and schedule it using a scheduler.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=263.87) [Now the scheduler will determine when the nodes and the](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=269.515) [different pods running on the nodes actually come to life](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=272.855) [or go away or whatever it may be.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=275.965) [Now we as developers or DevOps and IT admin folks can interact with](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=279.515) [the master to give it instructions to go from one state to another by](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=285.085) [using a command line tool called kubectl.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=289.595) [Now I've also heard this called kubectl, kube controller.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=293.415) [It doesn't really matter.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=297.675) [Just pick whatever it is you want to call it and go with it.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=299.085) [But I'm going to be calling it kubectl as we go throughout this course.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=302.515) [And it's just a command line tool that we can use to send](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=306.805) [different requests into the master,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=309.985) [and those requests can then be scheduled to run on our](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=312.34) [different nodes within the cluster.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=315.975) [You'll see that we can send you YAML.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=318.615) [We're going to be talking about what that is later or even JSON if you wanted.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=320.765) [But these are metadata files that we can send to the API server,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=325.015) [and the API server is just a RESTful service.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=328.915) [Kubectl is just making your different types of RESTful service calls to](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=331.9) [send these before and after state requests to the master.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=336.455) [From there,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=341.715) [the master is then going to communicate using the tools I just](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=342.315) [mentioned earlier with the different nodes.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=346.035) [Now each node,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=349.815) [in addition to have the pods running, obviously needs a way to](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=350.845) [communicate back and forth to the master.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=354.265) [So it has a little agent installed that's running on each node that](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=357.515) [registers that node with the cluster and reports back and forth to](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=361.512) [the manager. That's called the kubelet.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=364.962) [We also need to container runtime, of course,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=367.572) [to run our containers within the pods.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=369.932) [And then we need networking capabilities,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=372.572) [and we have something called a kube‑proxy that can ensure](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=374.812) [that each pod gets a unique IP address,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=378.272) [and this will tie into the services that I mentioned a](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=381.122) [little bit earlier. So that's a quick overview of the](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=384.212) [different building blocks of Kubernetes.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=388.032) [Now is there more?](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=390.452) [There is always more. But these are the key things that you need](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=391.532) [to know right up front just to get started.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=394.262) [So now that we've covered some of the different](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=397.672) [building blocks and players of Kubernetes,](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=399.562) [let's jump into the benefits and use cases of Kubernetes, but from a developer perspective.](https://app.pluralsight.com/course-player?clipId=bed7e421-6189-4f1d-8a2f-59b6c14a82fd&startTime=402.172)

### [Benefits and Use Cases](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a)

[Before getting into Kubernetes, I ask the question, why do I need this?](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=2.24) [I'm a developer,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=6.71) [I don't typically deal with the production setup of](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=8.12) [networking or servers or anything like that,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=11.3) [and if I'm using the cloud,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=14.02) [there's a lot of options out there that'll run containers.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=15.9) [So why do we need Kubernetes?](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=19.24) [And I think that's a valid question to ask, actually, as a developer.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=21.65) [Now as a quick review, in my Docker for Web Developers course,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=25.49) [I talked about some of the container benefits to us as](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=29.48) [developers, and let's just review those really quickly.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=32.13) [So first off, we know that locally I can get others up to speed very quickly.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=35.34) [Could be new hires, contractors,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=40.05) [or other folks on the team because we could use something like Docker](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=42.57) [Compose to get an entire environment up and running and then even use](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=46.18) [volumes to talk back to our local filesystem.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=50.17) [We can eliminate app conflicts and run multiple versions of the same app](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=54.24) [very easily because we could have different containers.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=58.42) [A big one,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=60.95) [and this is a big stickler point of mine because I've fought](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=62.56) [this in many scenarios over the years,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=65) [is having consistent environments where my code truly does](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=67.57) [work on my machine and in production and QA and whatever](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=71.09) [other environments you may have.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=75.03) [And then, of course, we know containers just ship software faster.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=77.24) [Now all of that's great,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=81.04) [but what if your company has now decided to take it the next](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=82.6) [level, and they're going to run Kubernetes?](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=86.74) [Well,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=90.04) [that's one use case, probably the most obvious use](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=90.48) [case, of why you want to learn this.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=93.72) [But there's some others we're going to talk about in a](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=95.55) [moment. Now as far as the Kubernetes benefits,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=97.13) [especially to us as developers, here's a few things to think about.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=100.75) [It'll orchestrate our containers.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=104.47) [Okay, that's very nice.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=106.17) [We have Docker Compose, of course, but we know that's manly for local scenarios.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=108.04) [So if we want to go kind of the big time,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=112.64) [if you will, in production, then we could use Kubernetes for that.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=114.53) [A really,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=118.94) [really big one is zero‑downtime employments, and we're going to talk](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=119.6) [about this later in the deployments module of the course. But if you've](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=122.975) [ever stayed up until 2:00 in the morning,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=127.295) [4:00 in the morning,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=129.455) [or maybe just were there 24 hours straight at work for a deployment,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=130.385) [then this is pretty phenomenal, actually. It also has](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=134.895) [self‑healing powers, almost like superpowers.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=139.145) [One of the containers goes down, it's like, all right,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=141.885) [next person up, Michelle, over there, come help us out, or Jim,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=144.855) [come help us out.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=149.045) [And it can actually bring up a new container and replace](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=150.265) [the one or ones that were sick or ailing.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=154.295) [Another thing is we can scale our containers very easily horizontally.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=158.995) [So if I want to add more pods with containers on a](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=162.895) [given node, with just a simple command,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=166.155) [I can change the state of the Kubernetes cluster to add](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=169.095) [these additional pods and containers.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=172.535) [Now, as far as developer use cases,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=175.895) [why would we as developers want to learn Kubernetes?](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=178.415) [Well,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=181.375) [the most obvious one that I've already mentioned is that](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=181.685) [you need to actually work like production on your machine](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=184.595) [and test out your environment.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=188.725) [You could use Docker Compose all you want,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=189.875) [but Docker Compose doesn't have all the features of Kubernetes.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=192.595) [And so if you really want to run your app locally and try it out,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=196.275) [then this is a good reason.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=201.055) [Maybe you do nothing with production except try to](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=202.215) [emulate that environment on your machine.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=205.975) [Well, we can do that.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=208.215) [It's also a big move from Docker Compose to Kubernetes if your company is](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=210.295) [using that in production. And so we'll address why we need to learn about](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=214.505) [things like pods and containers and deployments,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=218.835) [ReplicaSets, services, and more.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=221.255) [What about creating an end‑to‑end testing environment?](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=224.595) [Let's say that you'd like to bring up the exact environment for production,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=227.215) [but now you're going to use and end‑to‑end testing](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=231.595) [tool, could be Selenium based, maybe cypress.io, or something like that.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=233.505) [We could do that with Kubernetes.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=237.995) [How do you know if your application actually is going to work, as](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=241.095) [different pods and contains are added and we scale out](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=244.285) [horizontally? Have you actually tested that?](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=247.465) [It's one thing to assume, and if your app is truly stateless,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=250.315) [it probably will work fine.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=253.875) [But it's always a good thing to actually validate that.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=255.205) [And so whether it's local in development or maybe](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=258.225) [on a staging Kubernetes cluster,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=261.035) [we would need to be able to know about that and know how it works.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=263.165) [What about secrets and configuration?](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=267.295) [Are they being loaded properly across different](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=269.215) [containers that might be in our app?](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=271.935) [Maybe we're using Kubernetes to deploy multiple microservices and we](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=273.505) [want to make sure that the different config for each of those or any](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=277.635) [secrets are being loaded appropriately.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=280.455) [Performance testing.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=283.515) [We might want to see what are the limits of our application](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=284.725) [in a Kubernetes cluster, so to do that,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=287.855) [we need to know things like how to scale out, how to scale back, and we](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=290.255) [can now run our tests against different scenarios.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=295.205) [You can even use Kubernetes for your build servers.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=298.625) [Maybe you have multiple builds across different technology products that you](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=301.545) [release, and you want to do that using Docker containers,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=305.835) [which I highly recommend as part of the CI/CD pipeline.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=309.715) [By doing that,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=314.225) [number one, I can easily swap out different containers in the](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=315.295) [future as new versions of my tech product come out.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=317.745) [But also now with Kubernetes,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=321.175) [we could have a bunch of these orchestrated so that if one of them](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=323.185) [crashes and goes down during a build process,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=327.225) [Kubernetes can just bring that up so that future requests](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=329.485) [to the pipeline keep working properly.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=332.495) [We might also want to learn how to leverage different deployment options.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=335.685) [We're going to talk about the zero‑downtime deployment I mentioned,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=339.115) [but you can do something called canary testing, A/B, or blue‑green](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=342.4) [testing, all kinds of ways to make sure your app is actually going to](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=346.735) [work properly in production.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=350.435) [And Kubernetes can make that a lot easier.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=352.175) [And then finally,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=355.075) [you might just be in that role where you have to help out DevOps or](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=356.205) [IT admin or whatever you call them at your job.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=360.775) [And as a problem comes up in production with your application,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=363.615) [you might need to help them troubleshoot what's actually going on.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=367.706) [Well, if you don't know anything about Kubernetes,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=371.616) [that's going to be a little bit challenging.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=373.246) [Later in the course,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=374.686) [as we talk about the different parts of Kubernetes,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=375.676) [you're going to understand that.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=377.45) [Plus,](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=378.796) [we're going to have a module just on troubleshooting and some](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=379.226) [different techniques you can follow to identify problems.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=382.226) [Now are there more use cases than this? Absolutely.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=386.406) [But these are some of the key ones that I've seen various companies using](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=389.806) [today or that you might need to use in the future and I think are good reasons to actually take the time to learn Kubernetes.](https://app.pluralsight.com/course-player?clipId=62b1e967-cd81-4929-a824-03366a9d610a&startTime=393.326)

### [Running Kubernetes Locally](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f)

[To use Kubernetes, we obviously need a way to run it, so we're](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=0.94) [going to take a look at several options that allow you to run](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=3.9) [Kubernetes locally on your machine.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=6.77) [And that way, you can emulate as simple as a single master and](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=9.34) [a single node, or there's even options where you could do](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=13.91) [multiple and scale out if you'd like.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=16.93) [So to install and run Kubernetes, there's different options out there.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=20.4) [Minikube has been around for a long time and provides a](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=24.14) [really easy way to get a Kubernetes cluster up and running](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=27.21) [on your development machine.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=30.36) [Now it does have some limitations like the next one I'm going to talk about,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=32.34) [which is Docker Desktop, in that you can't just scale out like a production one.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=35.52) [But it does provide the full functionality of kubectl, and you'll](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=40.64) [have your master node and worker node to work with.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=44.24) [You can get instructions at the GitHub site,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=47.28) [and it's pretty straightforward to get going. Now the one I'm going to](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=49.45) [be using throughout the course is Docker Desktop,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=53.1) [mainly because of all the ones I'll mention,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=55.93) [it's by far the easiest to get Kubernetes going on.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=58.34) [You're probably going to have Docker anyway on your machine,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=61.64) [and this is a matter of just a checkbox to get Kubernetes installed.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=64.18) [Now you do have a limitation of one master node and one worker](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=69.8) [node, but to do just normal Kubernetes, pods, and deployments,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=73.35) [and services, and things like that, this will also get the job done.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=77.58) [And as mentioned, that's what I'll be using throughout the demos in the course.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=80.87) [Now if you'd like the ability to scale out your worker nodes,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=85.6) [you can use Kubernetes in Docker.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=88.64) [This is fairly straightforward to get going actually on your machine,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=91.64) [and it's certainly an option you can explore.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=94.99) [You can get more information at the website. Now if you'd](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=97.16) [like to install the full Kubernetes, you can use kubeadm.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=101.75) [This is something that's outside the scope of this course and would be](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=105.6) [targeted more towards administrators of a Kubernetes cluster, but there are](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=108.87) [other Pluralsight courses out there that'll give you more information about](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=113.49) [how you can get started with this.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=117.36) [I put a link here to the website where you can get](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=119.23) [the step‑by‑step instructions.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=122.38) [This one definitely would take the most work out of the other](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=124.02) [three that have shown up to this point.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=127.25) [So now that we've talked about that,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=130.04) [let's discuss how on Docker Desktop we can get](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=132.05) [Kubernetes up and running very quickly.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=135.27) [So the first thing I'd have to do is get Docker Desktop](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=138.78) [installed as mentioned and get it up and running.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=141.97) [Now once that's up and running,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=145.38) [we can come to Preferences, and once the preferences dialog shows,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=146.55) [then we can check a checkbox, and we can have Kubernetes running. So](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=151.35) [I'm going to go to Kubernetes, check the Enable Kubernetes here, and](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=154.59) [then we would just hit Apply & Restart.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=159.35) [Now it will take a few moments for it to get going,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=161.74) [but eventually it should come back and be up and running,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=164.2) [and you'll see a message like this down in the left‑hand corner.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=167.06) [Now,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=170.72) [if you're on Windows, once you've installed Docker Desktop and have it running,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=171.1) [you can right‑click and go to Settings. On the Settings, you can go to](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=175.37) [Kubernetes and again check the box and apply the settings. Like with the max](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=179.17) [side of the house, you'll see that Docker is running and Kubernetes is](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=184.94) [running once you get that checkbox checked and the cluster itself has been](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=188.58) [initialized and it's up and running.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=193.53) [Now if you have any problems, because occasionally I've done](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=196.11) [Kubernetes and it just didn't ever come up,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=198.9) [it kind of stayed in an orange icon, that's where you'll want](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=201.3) [to go check some of the forms out there,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=204.79) [especially the Docker Desktop form and see what you could do.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=207.16) [One of the easiest ways I've resolved that is come to Reset,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=211.15) [and I can just Restart Docker Desktop.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=214.25) [Just keep in mind, though,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=216.41) [that's going to wipe out all your images and](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=217.39) [containers that you might have running.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=218.97) [But if you have that problem,](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=221.54) [that's one place you could at least start. And that's how you get Kubernetes up and running on Mac and Windows.](https://app.pluralsight.com/course-player?clipId=1a9fc456-5023-4eee-b54d-3693078c015f&startTime=222.75)

### [Getting Started with kubectl](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9)

[As you work with Kubernetes,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=1.94) [you'll need to get good at the kubectl command line tool,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=3.21) [and we're going to look at a few of the basic](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=6.49) [commands to help get you started here.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=8.27) [So earlier we talked about how kubectl can interact](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=11.04) [with an API on the master node,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=14.2) [and then that can cause the controller manager and the scheduler](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=16.28) [to perform different actions on the nodes.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=19.26) [Some of the key ways to get started with kubectl are going to be shown here,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=22.64) [and I'm not going to focus on them right now,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=26.53) [but I'll run a few of them to get you started.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=28.37) [So first off,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=32.04) [if you want to get the version of the Kubernetes server you're running on,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=32.66) [you can say kubectl version, one of the most basic commands you can run.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=36.28) [You can get cluster information about the DNS for the cluster and](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=41.04) [the cluster in general through this cluster‑info command. One of](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=45.21) [the more useful commands is kubectl get,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=49.43) [and this can be used to get all the resources, this would](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=52.49) [be Pods and services and deployments,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=55.31) [or you can even use it to get specific resources.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=58.64) [A quick and easy way to get a Pod up and running in a](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=62.74) [Kubernetes cluster is kubectl run.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=65.68) [This isn't something that I use often,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=69.14) [but we will use it in the next module as we talk about Pods](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=71.12) [because I want to show you how you can kind of get a hello world](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=74.62) [scenario up and running very quickly.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=77.34) [Well, this would be the tool that can get you started.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=79.25) [We can also make it so that the external world can call into a Pod.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=82.84) [By default, a Pod has what's called a cluster IP,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=87.08) [and so only the cluster and other nodes and Pods within](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=90.62) [it can talk to that particular Pod.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=93.5) [If we want to expose it to be able to hit it from,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=96.74) [say, a browser or a cURL command, then we could use kubectl port‑forward,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=99.22) [and we'll be looking at that later in the course as well.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=103.78) [We can also expose different ports through our expose command,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=106.74) [very important as you work with services,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=110.99) [and we'll be talking about different service types and the](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=114.23) [different nodes you can expose and ports there.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=116.34) [Finally, as we go to work with Pods and deployments and services,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=120.04) [you'll want to create those.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=124) [So there's really two main ways to do that.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=125.05) [You can do kubectl create, and if it's not there,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=127.41) [it'll create it, or you can do kubectl apply,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=130.62) [and it'll either create it if it's not there or it can modify it.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=134.76) [It's a great way to move from one state in the Kubernetes cluster to](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=138.89) [another state. Before jumping to a command prompt and getting started](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=142.47) [using kubectl, let me show you a little trick that will save on](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=146.27) [typing, something I use all the time.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=149.89) [First off, you can alias kubectl,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=152.21) [and so what we could do if you're on PowerShell is we could use](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=155.14) [Set‑Alias, give it a name, we're going to do k in this case,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=158.01) [and then we can give it the value of kubectl.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=162.09) [So now as you typed k, it would be like typing kubectl.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=164.43) [Now likewise,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=169.54) [if you're on Mac or Linux you can use alias and you can just](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=170.18) [say k=kubectl and then go ahead and do that.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=173.3) [Now, these would be temporary while your command shell is open, so I'll refer](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=177.64) [you to your own docs depending on what system you work on if you want to make](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=182.56) [it permanent, but this is definitely something worth looking into and I'm](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=186.02) [going to be demoing this momentarily.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=190.04) [So with that, let's jump on into a command prompt.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=191.73) [So first off,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=195.64) [you'll see that I have Kubernetes running on this](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=196.57) [machine, and so now if I just type kubectl,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=198.83) [I should get some commands back. Now this would be](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=202.74) [the same as running kubectl ‑‑help.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=205.36) [And if you've done the aliasing that I talked about,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=211.64) [you can just do k ‑‑help if you wanted,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=213.74) [and this would get you some of the key commands that you](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=217.34) [can run. Now if you go to their website,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=219.36) [they'll have even more.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=221.27) [From here,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=223.44) [we can do commands such as get version, so we can say](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=224.02) [what is the version of my Kubernetes cluster and the](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=227.79) [actual software that it's running?](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=231.79) [We can get cluster information, and there's some basic info about that.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=234.04) [We could get all the resources,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=239.64) [and right now all I have is the default Kubernetes service running, you'll](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=242.04) [see its cluster IP there, not much else is currently going.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=246.05) [I don't have any Pods or deployments or services at this point,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=249.99) [but later throughout the course we'll use the get command a lot to get](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=253.69) [things like show me all the Pods or show me all the services.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=257.44) [And then finally, one we're going to be using a lot is the create command.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=263.74) [Now this one takes a little more work.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=266.93) [That's where we'll start talking about things like YAML files.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=268.84) [But the create or the apply command are very,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=272.04) [very common when you want to create a resource or maybe](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=275.53) [change a resource or modify that resource.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=278.69) [So that's the basics of how you can get started with](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=281.64) [kubectl, and if you're using Docker Desktop,](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=284.29) [as I mentioned we're going to use throughout the course, they make it very, very easy to get started with it.](https://app.pluralsight.com/course-player?clipId=54e8e51c-3a63-4d2d-9f62-dd49a8e0c5d9&startTime=287.03)

### [Web UI Dashboard](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2)

[The final topic that we're going to take a look at in this](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=1.14) [module is something called the web UI dashboard.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=3.35) [Now the dashboard is optional,](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=7.04) [but it'll give us a chance to play with some of the](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=8.64) [kubectl commands that you saw earlier.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=11.1) [And it's kind of cool to get going actually because](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=13.81) [it provides a visual dashboard, as you see here,](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=16.36) [that allows you to inspect things like what are your nodes,](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=19.94) [what are your pods running, and the containers in those,](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=23.74) [and what's the status on your memory on those,](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=26.84) [and more details.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=29.71) [To enable the web UI dashboard you can just follow a few basic](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=31.54) [steps that you can find at this website.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=34.84) [I'm going to walk you through a few of those here and show](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=36.84) [you how we can get going with those steps.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=39.73) [So the first thing we're going to do is we're going to](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=42.64) [call kubectl apply and give it a URL that's provided by](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=44.15) [the documentation to a YAML file.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=47.86) [Now that YAML file URL has changed, I've noticed, over the years. So](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=50.44) [it may change again, but if you go to the docs you should be able to](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=54.98) [get the appropriate up‑to‑date one.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=58.07) [The next thing we're going to do is to log in](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=60.89) [locally we're going to use a token.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=63.23) [So we need to find that token so we can log in. And we're going](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=65.34) [to run this kubectl describe secret command.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=68.67) [Basically, a token's going to be added into a special area of](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=72.44) [Kubernetes, and as an administrator we can get to that token.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=75.71) [Now once we run the describe command we can then locate our token](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=79.64) [by looking for a kubernetes.io/service‑account‑token section. And](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=83.39) [I'll show you this in a moment.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=88.96) [We're going to copy that token.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=90.74) [We're then going to create a proxy so that we can open up getting to that](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=93.14) [particular application in our Kubernetes cluster through a kubectl proxy](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=97.29) [command. And then finally, we'll go to the dashboard URL provided by the](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=101.43) [documentation, and then we can log in with the token.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=105.8) [So let's take a look at how we can do this.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=109.14) [So,](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=111.54) [going to the documentation, if I scroll on down you'll](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=111.89) [notice they give us a kubectl apply command.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=115.28) [And I'm just going to copy this entire command here.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=118.14) [And this will apply that YAML to get everything set up so that we can run this.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=121.92) [Now this will take a moment.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=127.36) [We should see some output. And you can see quite a few things were done](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=128.31) [there, everything from security, to security roles, to secrets, and config](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=131.72) [maps, and services, and a lot of fun stuff,](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=136.59) [most of which we're going to talk about later in the course actually.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=139.74) [And the next thing I'm going to do is it says run kubectl proxy,](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=143.04) [but you're going to need to, first off,](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=146.74) [run this kubectl describe command that I mentioned.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=149.07) [We need to get a token if we're logging in locally.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=152.64) [So, I'm going to go ahead and paste in the command that you just saw earlier,](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=155.64) [and that returns all these accounts. Now the one we want,](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=159.41) [as it turns out, is at the very top.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=163.2) [And what I want to do is copy this full token into my clipboard.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=165.54) [All right, now that I've done that we're going to run the command it showed,](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=171.24) [which was kubectl proxy.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=175.04) [Now that makes it so we can get to this port 8001, that's going to be the](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=177.84) [port to get to our dashboard. Now going on back, they're going to give us a](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=181.58) [fairly long URL, one that you don't really want to type, so I'm just going to](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=186.15) [right‑click and Open Link in New Tab,](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=189.73) [and this should now try to get us into the dashboard.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=192.44) [So let's go ahead and we'll do Token.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=195.41) [I'm going to paste in my token and Sign in. And there we go. Now I](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=198.34) [don't have anything currently running, that's why there's no charts](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=203.1) [or graphs or anything like that, but you'll notice I can get to](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=206.29) [some security information, I can get to the Nodes, this one's](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=210.5) [called docker‑desktop.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=214.64) [If I scroll on down we can get to Pods, nothing to display](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=216.7) [here of course, and more as we move on down.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=220.1) [So this provides a nice dashboard look into the](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=224.44) [different resources that we have. And later,](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=228.04) [as we start to add pods and deployments and services and things like that,](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=231.37) [although I may not show the dashboard much moving forward, go back to the dashboard and take a look at what you see.](https://app.pluralsight.com/course-player?clipId=c0142cec-bff5-4ecf-9585-1d16e479c3a2&startTime=236.94)

### [Summary](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d)

[In this module,](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=1.49) [we started out our exploration of Kubernetes and saw that it provides](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=2.08) [container orchestration capabilities out of the box.](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=6.03) [That's really its main goal in life.](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=9.29) [While it's normally used for production,](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=12.54) [we also talked through different use cases from a developer](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=15.18) [perspective, and one of those was emulating production,](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=18.09) [but possibly locally or in just a completely separate](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=21.56) [environment, but also for things like testing,](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=24.76) [possibly building a CI/CD type process or others.](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=28.5) [We also talked about several different options that can be used to](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=33.19) [run Kubernetes locally, and although I'll be using Docker Desktop](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=35.82) [throughout the rest of the course,](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=39.48) [feel free to experiment with the other options as well.](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=40.66) [Finally,](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=44.44) [we took a look at the kubectl command available with Kubernetes so that we can](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=44.86) [interact with the API that the master nodes would provide.](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=48.6) [We saw several different commands,](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=52.74) [and we even used some of those commands to get the web UI](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=54.36) [dashboard going locally for our cluster.](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=57.74) [Now there's a lot more to cover,](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=61.64) [but at this point I hope you have a good idea about the major players.](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=63.06) [We talked about Pods, we talked about services for networking, deployments for](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=67.81) [possibly scaling out or just getting our Pods on the nodes.](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=72.7) [There's a lot more to cover there.](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=76.21) [So now we're going to dive into each of the players and](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=78.14) [describe how you can work with those, create some YAML files where appropriate, and use additional kubecL commands.](https://app.pluralsight.com/course-player?clipId=46ef6bb1-2ba1-4ad6-945d-ac3f1adb285d&startTime=81.04)

## [Creating Pods](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a)

### [Introduction](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a)

[In this module, we're going to take a look at the](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=0.84) [role that pods play in Kubernetes.](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=2.52) [And up to this point,](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=4.22) [you've already seen that they can act really as the host for our](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=5.15) [containers, but there's a lot more that we can discuss here.](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=8.9) [So we're going to start things off by talking about some core concepts](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=12.68) [related to pods and then show how we can actually create a pod.](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=15.63) [We'll do that with kubectl, and then we're also going to](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=19.84) [learn about YAML fundamentals and how we can move from](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=22.6) [more of an imperative approach,](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=26.49) [which would be kubectl to more of a declarative approach, and that](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=28.03) [would be using YAML to define a pod and then running that with](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=32.43) [kubectl. We're also going to talk about a really,](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=36.11) [really important part of pods and something that you,](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=39.64) [as a developer,](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=42.71) [definitely need to know about, and that's how a pod can](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=43.95) [define how it determines if it's sick or not,](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=47.57) [how it determines if it should be replaced with another pod that's more healthy.](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=50.79) [This is really important because the master nodes in Kubernetes,](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=55.54) [as they talk to the worker nodes and the pods on those, need to](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=60.14) [know if a pod is healthy or not.](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=63.95) [And so we're going to talk about how we can influence that.](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=65.88) [So throughout this module,](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=68.94) [we're going to focus 100% on the pods and container section that you see here,](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=70.01) [and then later on,](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=75.29) [we'll move into some of the other resources that you can use with pods in Kubernetes.](https://app.pluralsight.com/course-player?clipId=910ca0bf-2a69-4594-aa9d-547274d8183a&startTime=76.25)

### [Pod Core Concepts](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d)

[All right,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=1.94) [well let's jump into a little bit more about Pods and some of](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=2.54) [the core concepts that you need to know.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=5.33) [So first off, Kubernetes defines a Pod this way.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=7.44) [A Pod is the basic execution unit of a Kubernetes application,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=10.44) [the smallest and simplest unit in the Kubernetes](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=14.33) [object model that you create or deploy.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=16.73) [So, it's the basic building block, if you think of Kubernetes as a](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=19.79) [bunch of Legos, we're going to put those together, and kind of at](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=22.94) [the foundation of all this is Pods.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=26.45) [Pods, as we've already seen up to this point, run containers.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=29.94) [And we're going to talk about,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=32.83) [it is possible for them to have more than one container,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=34.31) [but we'll get to that in just a moment.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=37.18) [So let's back up a little and start with,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=39.14) [we know Pods at this point are the smallest object in Kubernetes,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=41.32) [Pods act as an environment for containers,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=45.54) [and it's really important then to think of Pods as a way to](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=48.43) [organize the different parts of your application.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=51.89) [And as a developer,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=55) [this absolutely can influence how you might write your Dockerfiles that](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=56.69) [generate the containers and what type of code you put in those.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=60.98) [Normally we have a single process per container,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=64.34) [and oftentimes we'll have a single container per Pod.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=67.34) [And that would mean if you had a web server,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=71.52) [caching server, maybe multiple APIs,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=73.99) [and you could be even containerizing your databases,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=76.24) [then each one of those parts would be a separate Pod,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=79.33) [and that would be important to plan for, of course.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=82.21) [Now, a Pod has an IP address, memory, volumes,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=85.02) [and all of that can be shared across multiple](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=89.66) [containers within the Pod if needed.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=92.48) [We can scale Pods out horizontally with a node.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=94.84) [And Pods live and die, but they never come back to life.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=98.37) [So if Kubernetes sees a Pod that's unhealthy or sick,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=101.68) [it can automatically remove that and then replace it.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=105.17) [And we're going to talk more about Pod health towards](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=108.01) [the end of this module, actually.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=110.01) [So if we break it down,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=112.02) [we've already talked about how a master node is](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=113.93) [going to schedule Pods on a node, and we call that node a worker node.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=116.99) [Now if we kind of zoom into that,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=122.208) [we know now that our Pods can be horizontally scaled as well,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=123.848) [and so we can create what's called replicas,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=128.548) [and these replicas, they're really just copies or clones of the Pods,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=131.408) [and then Kubernetes can load balance between those.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=135.708) [Now, if one of these Pods gets sick,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=138.768) [Kubernetes will monitor that and can automatically take it out and](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=140.97) [then put something back that's a healthy Pod.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=145.388) [Now, as I mentioned a moment ago, it's not bringing back to life the Pod.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=148) [The Pod that was sick is removed from the node,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=151.99) [and then a new one is brought to life, and that keeps everything healthy.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=155.768) [Now, Pods within a node are going to have a unique IP address,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=159.908) [and this, by default, will be a cluster IP address it's called,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=163.178) [and then the containers within Pods can then have their own unique ports.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=166.978) [So Pod containers share the same network namespace, they share the same IP.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=171.008) [Now, they are going to use the same loopback network interface within a Pod,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=175.63) [that's localhost, so if one needs to talk to another,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=179.318) [that's going to be very simple in just using that local loopback.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=181.67) [Now containers processed within the same Pod need to have a different port.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=186.208) [The Pod itself gets a unique IP address, but the ports,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=191.658) [if you had multiple containers within a Pod,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=195.518) [need to be unique.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=197.688) [Now in this example you can see off to the right that we have two Pods.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=199.308) [Each container then has a port 80,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=202.968) [and that's okay because they're in separate Pods,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=205.408) [we have different IP addresses, and it's okay to have 80 and 80.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=207.72) [Now, if you needed to have multiple containers within a Pod,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=212.408) [which is more rare, but it is possible,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=216.368) [the example would be if you have a container and then](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=218.74) [another one is very tightly coupled,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=222.338) [it needs to be scheduled at exactly the same time because they work](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=224.508) [together, we call that oftentimes a sidecar container, then in that](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=227.608) [type of scenario each of those containers within that single Pod](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=232.178) [would need their own unique port.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=236.048) [Throughout this course,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=238.908) [we're going to go with the typical one container per Pod approach,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=239.878) [but it is absolutely possible, as mentioned,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=244.364) [to have multiple containers in a Pod, but you need to plan for that accordingly.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=246.854) [Now, ports can be reused, as I've already mentioned,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=252.924) [between containers in separate Pods, and that's not a problem at all.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=255.384) [One thing that relates to IP addresses and Pods and](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=258.884) [containers is that Pods never span nodes,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=261.674) [they're always on a single node, and they can't do something like this.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=265.37) [That would be a little difficult, especially with IP address management and more.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=270.304) [So,](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=274.044) [that doesn't happen within Kubernetes and isn't something](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=274.29) [you really ever have to worry about.](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=277.194) [So that's a quick look at some of the core concepts. Now let's jump into how do we work with creating a Pod?](https://app.pluralsight.com/course-player?clipId=a5abe737-0bf0-4a78-98a5-f8bed6e4845d&startTime=279.464)

### [Creating a Pod](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a)

[So how do you get a Pod up and running in Kubernetes?](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=1.14) [Well, there's actually several different techniques that you can follow,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=4.54) [and we're going to look at a few of those here.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=7.44) [So one thing you can do to run a Pod is to run kubectl run.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=10.44) [This is a quick and easy way to get it going,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=14.99) [but it's more of what we call an imperative way.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=17.34) [Later I'll show you how we can use YAML to actually define an official](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=20.23) [file and then use kubectl to move that deployment with the YAML to](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=23.62) [Kubernetes in more of a declarative way.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=29.17) [That way you can check it into source control and things like that,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=31.34) [whereas the kubectl run, that's just an imperative command.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=33.98) [Now,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=38.44) [the other one we're going to look at with the YAML file is going](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=38.65) [to be the create or apply commands of kubectl,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=41.11) [and we'll get to that a little bit later in the course.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=44.4) [Going back to the kubectl run command that you can see here,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=47.24) [you'll notice that we can give it a Pod name,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=50.9) [and this can be any valid name,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=54.03) [and then we can give it the image of what we want to run.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=56) [Now there's other command line switches as well,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=59.94) [but these are the main things you need to know just to get](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=62.1) [started if you wanted to start up this Pod and then run this](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=64.93) [nginx:alpine container inside of it.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=69.07) [Once you have one or more Pods running, you can then use kubectl get pods.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=72.54) [A very simple command.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=76.82) [And if you want to display all resources,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=78.64) [you could use kubectl get all, which we talked about earlier in the course.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=80.68) [As a Pod is brought to life,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=85.44) [it's going to get a cluster IP address. Now a cluster IP address is](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=87.19) [only exposed to the nodes and the Pods within a given cluster, and](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=91.3) [it's not accessible outside of the cluster.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=96.26) [So what do we do if we brought up NGINX,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=99.94) [for example,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=102.15) [or ASP.NET Core or Java, or whatever you're doing, and](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=103.07) [now you actually want to test that locally maybe from](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=106.58) [your machine into Kubernetes on, say, Docker Desktop or minikube? Well,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=109.54) [we need to expose the Pod port to be able to get to it.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=115.09) [And in order to do that we can run a kubectl port‑forward command,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=119.44) [give it that Pod name that you just saw earlier,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=124.74) [and then we can give it ports. Now, the ports here are very](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=127.64) [similar to how you work with ports in Docker.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=132.02) [The 8080 would be the external port, what you would hit if](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=135.54) [you wanted to call this from a browser,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=139.56) [for example, and the 80 would be the internal port, and that would be the port](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=141.14) [that the container is actually running on inside of the Pod.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=146.53) [But what it does is it exposes that port through the node so that we can then](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=150.64) [call into it, and this is kind of the most basic way that you can do this port](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=155.44) [forwarding they call it. Now once a Pod is running,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=160.12) [if you'd like to delete it,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=163.57) [you can call kubectl delete, list the type of the resource,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=164.91) [which is Pod, and then the name of the Pod.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=169.3) [Now,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=172.94) [what's interesting here is while the Pod will be deleted, if](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=173.14) [you go do a get all or get pod on kubectl,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=177.91) [all of a sudden the Pod comes back to life.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=181.39) [And if you didn't know about it the first time you do this,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=183.74) [you kind of think, oh, the delete didn't work.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=186.24) [But if you look closely at the IDs that are issued to the](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=188.84) [Pods, you'll see it did indeed change.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=191.74) [Kubernetes just saw the deletion and automatically replaced it because,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=195.04) [remember, it wants to keep you at the current state you're at.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=198.93) [If you want to officially delete Pods and not have to come back,](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=202.94) [you'd have to delete the deployment that originally scheduled the Pod.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=206.82) [Now we haven't covered deployments yet, that'll be upcoming in](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=212.24) [a later module in the course, but we could run kubectl delete](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=215.41) [deployment, that's the name of the resource, and then list the](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=218.75) [name of the deployment.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=221.97) [So now that we've covered some of the basic commands, let's see if we can get a Pod up and running quickly with kubectl.](https://app.pluralsight.com/course-player?clipId=1d36cb99-2aab-4466-809c-3232fb83453a&startTime=224.04)

### [kubectl and Pods](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167)

[Now let's take a look at how we can use some of these](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=1.14) [kubectl commands to get a Pod up and running.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=2.87) [Then I'll also show you how we can delete it and a](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=5.98) [few other commands along the way.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=8.38) [So I've opened up a PowerShell window,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=11.64) [and the first thing I'm going to do is let's make sure](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=13.67) [Kubernetes is running appropriately.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=16) [So I'm going to say kubectl, Enter.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=17.85) [Let me scroll back to the top of the commands here.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=20.44) [This will give you all the different commands,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=22.71) [at least the key commands you can run.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=24.24) [One of those is run.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=26.74) [We're going to do that momentarily.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=28.05) [If I scroll on down, you'll see delete.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=30.24) [We're also going to delete a Pod.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=32.28) [And then if we come on down a little further,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=34) [you'll see port‑forward,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=38.04) [and we're going to do a port forward as well so that we can actually load](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=39.63) [up an app in a browser that's running in Kubernetes.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=42.97) [So, the first thing we can do is we can type kubectl,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=47.34) [or if we use the alias like I talked about earlier,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=51.28) [we can just say k, I've already configured that,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=54.01) [and we can say get all.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=57.24) [And right now there's really nothing going on.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=59.04) [We have a cluster IP you'll see,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=61.32) [we'll be talking about services a little later in the course,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=63.64) [but really nothing going on as far as Pods go.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=66.65) [So, what do we do to get a Pod going?](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=70.54) [Well, that's where we can use kubectl run.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=73.74) [So I'm going to go ahead and type that, kubectl,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=77.24) [or k, either way, and then we're going to go ahead and give it a name.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=80.11) [I'm just going to call it nginx, or maybe my‑nginx, doesn't really matter.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=84.2) [And then I'm going to say what is the image that we want to run?](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=89.24) [Well, I'm going to say ‑‑image, so we're going to give it a flag there,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=92.1) [==nginx:alpine.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=95.82) [That's the specific Docker image that I want to run inside of this Pod.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=99.04) [So let's go ahead and hit Enter.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=102.68) [All right, now it says that Pod is being created, so let's verify that.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=105.04) [We can do k get pods, and notice that we have my‑nginx,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=108.48) [1/1 is running, 0 restarts, we're kind of good to go.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=113.71) [Now,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=118.24) [I want to emphasize this is a command that's a quick and easy](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=118.53) [way to get a container running in a Pod.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=121.73) [It's not something that more than likely you're going to use a lot,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=124.68) [especially once we learn more about YAML and some other options.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=128.36) [But if you just want to get something running, it's great for that.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=132.34) [Now,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=136.44) [let me go ahead and switch over to a browser and let's try to hit it on](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=136.66) [localhost because NGINX runs on port 80 inside the container,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=140.51) [and let's just hit Enter and it's spinning,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=144.39) [but it's not looking so good,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=147.34) [and that's because it doesn't know how to get to this Pod because](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=149.34) [we've never exposed an external port at all.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=152.98) [If we go on back here, and if we just do k get services,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=156.24) [then you'll notice we have a cluster IP,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=163.54) [but cluster IPs are internal only.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=165.55) [You can't get to them externally, so we need to kind of poke a hole,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=168.02) [if you will, in Kubernetes to expose a port that we can call in the browser,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=172.27) [which then calls into our NGINX container in the Pod.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=177.52) [We know that the Pod name is my‑nginx,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=181.84) [so what we can do is a little port‑forward command.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=184.55) [So I'm going to type k port‑forward, and then give it the Pod name,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=188) [which is my‑nginx,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=193.22) [and the next thing I want to do is very much along the lines](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=195.44) [of what you do in Docker where you have an external port and](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=197.7) [then the port for the container.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=200.46) [So the external port is 8080, let's say,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=202.23) [and it can be any available port on your machine,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=204.74) [but we know that NGINX runs on 80 inside of the Pod in that](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=207.84) [Pods container. So I'm going to go ahead,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=212.09) [hit Enter, and notice it sets up this 40 now from 8080 to 80.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=214.25) [And let's change this now instead of trying to hit 80, let's](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=219.64) [go to 8080, and there we go.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=222.96) [We obviously have NGINX running and we can access it directly through the](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=225.93) [browser, but that wouldn't have worked without the port‑forward. Because the IP](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=229.43) [address that the Pod is being assigned inside of Kubernetes is not accessible,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=234.99) [but the port‑forward makes that possible.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=239.57) [All right, so that's nice to get started.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=242.24) [So let's go on back, and you'll notice it locks up the console.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=244.44) [So, if I wanted to see my Pods or see what's happening,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=248.1) [I'd have to actually open another console or I'd have to kill the port](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=251.58) [forwarding. So I'm going to do a Ctrl+C here to kill that.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=255.35) [And then, the last thing we want to do is let's just get rid of the Pod.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=259.34) [We know it's running, so we'll clear this real quick.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=262.35) [Let's do k get pods again.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=266.24) [There it is.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=268.48) [We've already seen that.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=269.64) [Now, the next thing I can do is delete the Pod. So, I can say kubectl, or k,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=270.68) [delete pod, and then give it the name, my‑nginx. Let's go ahead and delete it.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=276.24) [All right, now that's deleted.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=284.04) [Let's do the get pods command, no resource are found.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=285.48) [Let's verify that.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=289.56) [We'll just go ahead and hit Enter here, and notice it's spinning and](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=292.54) [it will give it a few seconds here, but it'll fail,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=296.4) [and there we go.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=299.02) [Connection is refused because there's nothing listening on 8080.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=299.8) [So that's a few of the basic commands to get you started.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=304.84) [Let's review these commands really quickly here.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=308.38) [So first off, we did kubectl run, we gave it the name of the Pod,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=311.24) [whatever you want to call that Pod,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=315.77) [and then we gave it the image that we want to use for the container](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=317.57) [that's running inside of that Pod. From there,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=320.99) [we did kubectl get pods.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=323.92) [We saw we had our Pod running, everything was good there.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=325.89) [But, we saw that we couldn't access it directly because there was no IP](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=328.8) [and port that was exposed externally on our machine.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=333.27) [So we fixed that with kubectl port‑forward, gave it the name of the Pod,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=336.64) [my‑nginx in the example we just did, and then an external port,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=341.25) [which is 8080, and an internal port, which is 80.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=345.31) [And the last one we did was kubectl delete, we give it pod.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=349.44) [Now you do have to put pod here because there's other resources that we're](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=353.69) [going to learn about throughout the course that you can also delete, so we](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=357.07) [have to be very specific that we want to delete a Pod,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=360.13) [and then we gave it the name of the Pod,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=362.76) [my‑nginx, in our demonstration.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=364.21) [So those are some basic commands to get you started.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=366.94) [And while you may not use kubectl run every day, it is good to know about it](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=370.64) [because it's a quick and easy way to get a Pod running.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=375.83) [Now to wrap this up, I do want to mention one more thing.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=378.93) [If you're on Kubernetes 1.18 or higher,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=381.3) [then kubectl run will do exactly what I just showed you here.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=385.34) [If you're on an older version,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=389.74) [it will actually create other resources, like a deployment,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=391.78) [and we're going to be talking about deployments coming up, so](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=395.94) [just kind of know that older versions of Kubernetes, this](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=399.2) [command was a little bit different.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=401.8) [So if you're on, you know, 1.17 or something like that,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=403.74) [you may actually see additional information](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=407.16) [generated, additional resources generated,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=410.08) [whereas if you're on 1.18 or higher, a newer version of Kubernetes,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=412.9) [it only creates the Pod, and that's it.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=416.74) [So that's a few of the key commands to get started with.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=419.64) [And while those are good,](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=422.78) [there is another way we can work with Pods, and so let's talk about YAML a little bit and how that plays into all of this.](https://app.pluralsight.com/course-player?clipId=2cd31230-3268-4327-b119-ed91a8de0167&startTime=424.11)

### [YAML Fundamentals](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c)

[Up to this point,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=0.94) [you've seen a more command‑centric approach to](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=1.7) [creating pods in a Kubernetes cluster,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=4.25) [and that's more of what we call imperative.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=6.59) [What if you want to move to a more declarative approach,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=9.44) [where we could actually use some type of a language to define](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=12.62) [our pods and other aspects of Kubernetes?](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=16.16) [Well, that gets us into something called YAML.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=19.64) [Originally, this stood for Yet Another Markup Language,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=22.84) [but nowadays it's called YAML Ain't Markup Language.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=25.6) [That's the official terminology.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=28.72) [Now YAML is nothing more than a text file that's composed](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=30.94) [of something called maps and lists.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=34.72) [In fact, you'll see that YAML ties in very nicely to JSON,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=36.96) [except for in JSON you would have things like brackets and commas.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=41.69) [You don't have that in YAML, as you'll see in a moment,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=45.54) [but the concept of a key and a value and then a sequence of items, an](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=48.33) [array, is very similar here to a map and a list.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=52.84) [Now indentation is going to matter here,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=57.44) [and you're going to need to use spaces for the indentation.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=59.7) [There's no brackets,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=63.2) [so there's no kind of I'm‑done‑with‑this‑section like](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=64.24) [we're used to in other languages. In YAML,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=67.19) [you simply indent things, and that determines when a section ends and when](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=70.57) [another one starts. Now you can have key‑value pairs, we refer to those as](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=74.34) [maps, and maps can even contain other maps if you'd like to create more](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=79.23) [complex data structures. You can also have a sequence of items and that](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=83.27) [would be called a list.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=87.43) [And then you could have a sequence of maps actually, in a list.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=89.19) [So here's what YAML looks like from a high level. You'll notice first](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=93.14) [off, at the very top we have a key followed by a value.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=96.41) [So this could be a firstName:dan, and that would be called a map.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=99.45) [You can also have complex maps,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=106.44) [and here would be an example of one called complexMap that has key1 and key2.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=108.7) [Key1 is just a simple property, if you will,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=113.49) [and then key2, you'll notice, has a sub, which is subKey and its value.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=116.04) [Next thing we can have is a sequence of items,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=122.04) [much like an array, and you put the dash in front of each item. And then finally,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=124.52) [a list could be used to actually create a sequence of maps.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=129.68) [In this case,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=133.87) [I have a map1 with different properties and a map2 with different properties.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=134.39) [Now I want to call your attention to the note at the bottom there, because,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=139.99) [as I mentioned already, indentation really, really matters.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=142.88) [This is probably the number one thing that will throw you](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=146.43) [off if you're new to YAML. And use spaces,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=148.36) [not tabs, and once you pick how many spaces you want to go with,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=151.71) [for instance, maybe I use two spaces,](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=155.07) [then make sure you're consistent at each level of your nesting.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=157.6) [So now that we've covered the basics of YAML, let's see how we can use it to actually describe a pod.](https://app.pluralsight.com/course-player?clipId=ecea08d1-b001-4106-ba0b-8b8b1e38421c&startTime=161.89)

### [Defining a Pod with YAML](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c)

[Okay, so we've seen the basics of YAML,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=1.04) [so let's put this into practice and apply it towards defining a pod.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=3.16) [So the first thing we'll do is we'll create a YAML file for our pod,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=8.74) [and I'm going to show you the format of that file in just a moment.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=12.88) [But then we can run that through kubectl,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=15.94) [run a specific command or commands,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=19.14) [and then that will generate a pod running in our cluster.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=21.74) [Now,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=25.54) [I want to emphasize that what I'm going to show you here is](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=25.76) [certainly a viable way to create a pod, however,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=28.34) [later, as we move into deployments and replica sets,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=31.62) [I'm going to show you a different technique that's actually more commonly used.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=35.15) [But since we haven't covered those yet, this is good to know,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=39.24) [and it will give us some experience with YAML.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=42.27) [Now, this would be a look at a very simple YAML file for an nginx pod.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=46.04) [You'll notice I called the file nginx.pod.yml.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=50.55) [The extension, by the way, can be y‑a‑m‑l or y‑m‑l; either one works.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=52.86) [It's really just a text file anyway,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=59.9) [but certain editors will give you better IntelliSense or code help](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=61.87) [or encode coloring based on that file extension.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=65.88) [Now, in this example, you'll notice I have a map, apiVersion and v1.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=69.7) [Now this is something that is defined in the Kubernetes documentation,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=75.59) [so you would need to go dig into that to learn about all these different maps](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=79.33) [and the different lists that I'm going to show later as well.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=83.5) [The kind is really important.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=86.98) [What kind of resource are we trying to create in Kubernetes?](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=88.56) [Well, obviously we're creating a pod, so that's what we put in this case.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=91.6) [Now we have a complex map called metadata,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=96.49) [and we're going to name this my‑nginx.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=99.84) [That will become the name of the pod.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=102.15) [Next thing we're going to do is have what's called the spec.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=105.34) [This is the specification, if you will, for what's going to go in this pod.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=107.67) [Think of it as a blueprint.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=112.22) [And in this case, we're going to have containers,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=113.61) [just one, and it's going to be called my‑enginx as well,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=116.89) [and the image is going to be nginx:alpine.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=120.59) [So that would be a very basic definition for a pod,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=123.64) [and you can see that it contains the major aspects.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=126.92) [It has the names we need,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=129.85) [as well as the image for the container that's going to run inside of that pod.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=131.26) [From here, we can take that YAML file and use a kubectl create command,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=137.44) [as you'll see here, but what we need to do is use either a ‑‑filename switch,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=142.7) [or I just use the shortcut, ‑f switch.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=148.68) [So in this case we're going to say ‑f, name of the file,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=152.84) [.pod.yml, and then we can actually do some validation of the YAML.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=156.56) [Now, this kind of is the default,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=161.52) [where if you try to run some YAML that's invalid,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=163.16) [it will actually give you some errors.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=165.47) [But you can set ‑‑validate to false if you'd like,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=168.84) [in cases where maybe you don't want to validate the YAML.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=172.17) [I normally leave everything on as the defaults.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=174.74) [Now, the dry‑run that you see will actually perform kind of a trial,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=178.08) [if you will.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=182.15) [So instead of actually affecting the cluster,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=182.71) [you can try the command and see what it would generate in the output,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=185.62) [see if it's valid,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=190.12) [and then from there you could go ahead and run it if you'd like.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=191.44) [So as mentioned, it'll validate by default,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=195.44) [but I put this in here so you know how to turn that to false](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=197.76) [if you ever needed to for some reason.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=200.55) [Once you're ready to actually run the command for real,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=202.93) [then you can just remove the dry‑run and the validate,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=206.6) [and do a create ‑f, give it the file name.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=209.22) [What that will do is now take that YAML,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=213.2) [send it up to the API service of our master node.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=215.34) [Ultimately it gets converted, and then that will be stored inside of the master,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=219.19) [and that will start the scheduling process via the controller.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=224.76) [What happens, though,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=228.44) [if you run kubectl create and that particular pod already exists?](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=229.51) [Well, in that case, you'll get an error.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=234.04) [There is another option, though,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=236.4) [which we're going to talk about in just a moment,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=237.81) [and that will allow us to do the same type of thing but](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=239.92) [simply override the pod if it's already there,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=242.89) [but a create will give you an error if that pod already exists.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=245.46) [So an alternative to running kubectl create is kubectl apply,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=250.04) [and then we can still use the same ‑f and give it the file name.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=255.39) [I prefer this almost always, because this allows me to do two things.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=259.94) [I can first off create the resource using this,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=265.34) [but I can also update an existing resource using apply.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=268.73) [Now in order for the update part to work,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=273.1) [if somebody would have used to create that resource in the first](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=276.32) [place and they have that pod up and running,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=279.39) [you would want to add ‑‑save‑config.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=282.24) [And what this will do is create some annotations,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=285.92) [which I'll show you next, so that when we do apply later,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=288.88) [it will take whatever we're trying to apply,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=293.21) [compare it to what was there in the first place,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=295.4) [and then we can override specific settings,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=298.4) [so a very important thing you'll want to do if you ever use create.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=300.61) [As mentioned, I typically will just go with apply anyway when I create,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=304.84) [but either technique works, and everybody has an opinion on this,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=308.96) [of course.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=312.58) [Now, if you do the create with the save‑config,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=313.48) [what that will do is add some annotations which will have all the](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=317.44) [information about the YAML file that was last run.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=320.69) [That way once that pod gets up and running for that](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=324.99) [first time we have the initial state.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=327.31) [Then if you do an apply later, it can override that initial state,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=330.14) [and it kind of knows what that state was.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=335.08) [So that's an example of the save configuration,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=337.69) [and then, as I mentioned,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=339.81) [having this in place makes it easy to then work with this.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=341.59) [Now there are other options here.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=345.69) [There is a kubectl edit.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=347.49) [This will actually let you edit the file for your resource,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=349.25) [a pod, a deployment, a service, whatever it may be,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=352.46) [right in the console.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=356.34) [You can also do kubectl patch if you'd like to patch a particular property.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=358.41) [Maybe you don't want to make multiple changes,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=363.65) [you just want to update a very small subset of things,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=365.73) [then kubectl patch could be used for that.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=368.37) [Now we looked at how to delete a pod earlier,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=372.54) [and you can do kubectl delete, give it the pod and the pod name,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=375.06) [but if you did YAML, you could also do it this way.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=379.33) [You could use kubectl delete,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=382.44) [and then use the ‑f switch to give it that YAML file,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=384.39) [and that would be an alternative way of deleting it if you don't](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=388.44) [want to worry about giving the name of the pod.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=391.96) [So now that we've looked at how you can use YAML to create pods,](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=395.94) [let's look at a quick demonstration of taking a YAML file and applying it into our cluster using kubectl.](https://app.pluralsight.com/course-player?clipId=f83e747c-e1b1-49fd-a632-d98c64718d3c&startTime=399.35)

### [kubectl and YAML](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919)

[We've seen how to create a pod YAML file and some of the](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=0.94) [commands, so let's experiment with those commands and a few](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=4.29) [others and see how we can get that YAML into the Kubernetes](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=6.7) [cluster so we can get a pod up and running.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=9.87) [So I have a pod YAML file here for nginx already set up very](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=12.94) [similar to what you saw earlier, and notice the API version, the](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=16.58) [kind. I have some metadata, and then down below, I have specs, and](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=20.43) [I have my nginx:alpine container.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=25.12) [Now the only thing that's really new here is I've](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=27.84) [added a labels in the metadata.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=30.51) [Now right now, these labels aren't doing anything,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=32.84) [but I want to bring it up because later they will. Once we get to things like](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=35.26) [deployments or services or even other resources in Kubernetes,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=40.15) [we can link resources to each other through labels,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=44.74) [so a deployment or a service could reference this label,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=48.54) [and that would tie those two together.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=52.6) [So later on,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=54.84) [once we get to those topics, I'll go more into labels and how](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=55.51) [those are going to be used, but for now,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=58.66) [I've just made up two labels, app and rel and given them values.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=60.21) [Now the other thing is, I've defined ports here.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=64.94) [Now the default port for nginx is 80, so this is kind of](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=67.2) [overkill, but I wanted to show that you can define the container](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=70.2) [port here as well. Now to get this running,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=73.9) [we know that we can run our create command, and so we can come down and say](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=77.3) [kubectl create, and then we could run that if we'd like.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=81.28) [So let's go ahead and do that.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=85) [Now I'm going to abbreviate it, though,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=86.2) [to just k create, and then we'll give it the path.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=87.58) [Now, in this case, I'm kind of a little deeper,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=90.68) [so I'd have to say samples/pods and then our file name.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=93.74) [Now, I'm also going to add a ‑‑save‑config,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=99.24) [and I'm going to show you why I'm doing that in just a](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=102.49) [moment, and we'll come back to that, though,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=104.67) [so let's go ahead and do this, and we should now create a](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=107.18) [pod. Let's do k get pods, and there we go.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=109.75) [We have the pod.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=114.38) [We can't get to it right now, but you now know the port forward command](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=115.61) [with kubectl, so we could certainly make it accessible.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=118.97) [Now the next thing I'm going to do before we go into the describe I'm going to](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=123.24) [show you is let's do a get again on the name of the pod,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=126.3) [which I called my‑nginx, and, again, you'll see that](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=130.91) [name right up here, so we'll do that.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=134.43) [But I'm going to add an output of yaml, or I could do json.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=138.04) [Now,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=142.46) [I think the yaml is actually a lot easier to read, in this case, so I'm](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=142.7) [going to output that. And notice, I get kind of a big output here. And](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=147.04) [at the very top, there's these annotations.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=151.45) [Well,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=155.29) [that's what the ‑‑save‑config did right here, was it added the current version](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=155.67) [of the YAML, converts it to JSON internally, but that way,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=162.07) [if I ever make modifications, it knows the starting point.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=166.5) [And so we could come in and, for instance,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=170.52) [change the image, maybe to a different version of the image,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=172.41) [and then we could apply those changes.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=176.34) [It would then compare the image it currently has,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=177.74) [which is just the current version of nginx‑alpine,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=179.81) [and then override that and get a new pod and container up and running.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=182.94) [Now another way I can get inside into our pods is](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=187.04) [through something called describe.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=190.22) [So we could say kubectl describe pod, and this will give me a dump of](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=192.24) [information again and get all kinds of information about it, what node](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=199.39) [it's on, when it was started, and get things like the IP address of it,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=202.87) [Docker Image, Container, more.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=208.14) [But if we scroll on down to the bottom, you're going to notice some events.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=211.24) [I'll give you a little hint.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=214.37) [We're going to have a troubleshooting section at the very end of the course,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=215.26) [but this is a really good one to look at because different failures that](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=217.85) [occur can also show up, and let's look at ours.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=222.05) [We first off assigned this pod to the docker‑desktop cluster.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=225.04) [It didn't need to pull the image, nginx‑alpine, because](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=230.04) [it's already present on the machine.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=233.37) [It created the container inside of the pod,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=235.38) [and then it started the container,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=237.41) [and every little change we make to this will be tracked here.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=239.24) [So describe is great for getting information, not only](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=243.24) [about the pod, and the container, and image,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=246.2) [but also about the events that have occurred.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=248.63) [So I use this quite a bit when I want to look at what's going on. Now,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=251.24) [let's say that we did come in and we changed the image. I'm](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=255.29) [actually not going to here, but we could run this apply](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=258.47) [command. So I could say k apply file,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=261.97) [and this could be used to either create the resource,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=265.42) [create the pod, or to apply changes to that. Works either way.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=267.81) [So in this case,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=274.19) [I'm just going to go ahead, and we'll pretend that we made some](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=274.87) [changes. And now give it the same path, and we'll go ahead and run](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=277.16) [that, and notice it said it was configured,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=281.44) [not created.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=283.69) [Now what's nice about applies, if it wasn't there, it would create the resource.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=285.84) [If it is there, it'll apply any changes to the resource.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=289.87) [Pretty nice, actually.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=293.94) [Now there are limits on what you can change.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=295.44) [There are some things like ports.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=297.84) [That's a different story, and you'll get an error if you try some of that.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=299.85) [But you could definitely change things like the container image,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=303.24) [and there's other settings as well you could change. Now moving on](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=306.14) [down, let's say we now have this pod running.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=310.07) [If we do k get pods, we've already confirmed that.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=312.68) [And now let's say that we'd like to get into the container of that pod.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=316.24) [Now in Docker,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=320.26) [you can use a docker exec command to do that. In Kubernetes, we do the](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=321.55) [same thing. We can say exec into the name of the pod,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=325.23) [my‑nginx. I'm then going to use the interactive tty. This is](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=328.32) [basically a way to say I'd like to shell into it with an sh](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=332.86) [shell. And now, I am in there. And we could jump down in nginx to](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=335.61) [where the home page is loaded,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=341.27) [for example. So we could say go to usr/nginx/html I believe it is,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=342.36) [and then we could do an ls, and there we go.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=349.4) [There's our index.html, and we could even modify that just to play around, but](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=351.64) [normally, you would redeploy the image in the container,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=356.49) [of course.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=358.72) [So let's exit out of there. Now we could even do an edit here if we](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=359.33) [wanted, and I'll show you what this command does.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=362.87) [So k edit, we'll give it our path again, and you'll notice](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=365.11) [this actually popped open my editor.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=370.62) [So I can now do an edit here live if I'd like.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=374.64) [And, of course,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=377.27) [what it opens will be different based on if you're on Mac, Linux, or Windows.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=377.79) [But, in this case, I'm on Mac.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=382.04) [So if I hit Ctrl+C, it would kind of tell me what I](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=383.55) [need to type to get out of Vim.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=386.03) [So we can do this qa!,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=388.14) [and now I'm out, but I could actually save it local and make changes.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=391.04) [Now, the final thing is, we've already seen this, but if I do get pods again,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=394.94) [we have our one, and if I want to delete it, this time](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=400.34) [because we don't have a deployment, it will delete the pod.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=402.79) [Now I can actually delete it by the name, or I can give](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=406.44) [it the full path to the YAML again.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=409.65) [I'm going to go ahead and do that just so you can see it works.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=412.16) [And now you'll notice if I do a get pods, it's gone.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=415.73) [We'll do a get all, and you can see I'm just back](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=419.14) [to my normal Kubernetes service.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=422.85) [So to do a quick review, we talked about kubectl](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=425.44) [create, we'll create the resource,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=428.32) [and then you can save the initial state of that with ‑‑save‑config.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=429.98) [That way you can apply changes later if you'd like.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=434.01) [Create is optional.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=436.74) [You can also use apply,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=437.91) [as I mentioned. Now kubectl describe, very important if you want](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=439.09) [to dive kind of deeper into what is the pod?](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=443.68) [What IP address does it have? What image did it use? What container ID](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=447.01) [does it have? And things like that, plus it has the events that I showed.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=450.58) [Apply can be used to create or apply changes.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=454.3) [Now if you're applying changes and somebody used create,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=458.44) [you'll want to make sure they did the ‑‑save‑config again.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=462.14) [We can exec or shell into a pod container.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=465.64) [Very,](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=470.14) [very useful sometimes, especially if we want to debug or tweak something](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=470.58) [just for testing purposes. I showed you the live edit if you want to write](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=474.09) [in the console and make an edit to your YAML. And we know we can call](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=478.41) [kubectl delete and either give it the pod, or we can give it the YAML file](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=483.3) [that originally created it.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=487.63) [So that's an example of several of the different pod commands that you can run.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=489.64) [We'll be seeing more and more as we move along, but this](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=493.18) [will kind of start to build up your knowledge of different ways you can use kubectl.](https://app.pluralsight.com/course-player?clipId=74f94692-afac-434f-b66e-e5eadf70a919&startTime=495.82)

### [Pod Health](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5)

[The final topic we're going to cover is related to pod health,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=0.74) [and this really can tie into you as a developer.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=3.62) [Kubernetes relies on something called probes to determine](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=7.54) [the health of a pod container, and a probe is just a](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=11.65) [diagnostic performed periodically.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=15.69) [Now why would we as developers care?](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=18.34) [Well,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=20.64) [because obviously, we're going to know the most about](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=20.9) [the code running in that container.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=23.29) [And therefore, we could help either write the probes or we could help maybe](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=25.34) [an administrator who's writing the YAML, if they are doing it, add the probe](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=29.63) [that is appropriate for that pod and container.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=33.25) [Now there's two types of probes. You have what's called a liveness probe.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=36.74) [Basically, is it alive?](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=40.4) [How's it doing?](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=42.33) [And then you have something called a readiness probe.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=43.84) [Now a liveness probe, as mentioned, is used to determine the health of the pod.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=47.34) [Is it sick?](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=51.28) [Is it healthy?](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=52.13) [A readiness probe, on the other hand,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=53.44) [helps Kubernetes determine when it should start sending requests, so](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=55.34) [when is it started, so that we can actually start talking to this. As](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=58.99) [mentioned a few times up to this point, if a pod itself is deleted and](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=64.42) [has a deployment behind it,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=68.59) [then it can be automatically recreated and the containers recreated.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=69.9) [Now, if the container in the pod, though,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=73.94) [fails one of these health checks, then it can be restarted.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=76.45) [And there's a restart policy that defaults to always.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=80) [You can override that,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=82.78) [but that would allow you to control if that](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=84.44) [container restarts or if it just fails.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=86.17) [Now, what types of probes do we have?](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=89.64) [So let's imagine we have these containers, as you see here, running in the pods.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=91.5) [How do we know what's going on there, when it's ready, if it's healthy,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=96.6) [if it's sick, things like that? Well, of course,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=100.92) [it really depends on the software running in the container.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=103.47) [If you'd like,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=107.11) [you can actually execute a direct action in the](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=108) [container. So you could run a command, for example,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=111.45) [and as long as it returns zero, then that's successful. You could](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=114.11) [perform a TCP type of check on the IP address of a port and see if](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=117.63) [that's successful, or if it's an HTTP‑type pod and container, then you](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=122.6) [could perform some type of HTTP request.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=128.07) [Now probes only have the following results, they can be successful,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=131.1) [they can fail, or we can have an unknown response.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=134.62) [Now let's take a look at how in YAML you would](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=138.74) [actually define some of these probes.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=141.16) [So let's first take a look at a liveness probe. A liveness probe,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=144.04) [as you see here, is used to check how are we doing health wise? Well,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=147.72) [if it was an HTTP server,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=152.89) [maybe it's an API, could be nginx just serving up static](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=154.92) [files, the only way you can really know is to call into that](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=157.89) [and get some expected response.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=161.59) [Now, as a developer,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=163.37) [this is where we might actually write a health API of some type](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=165.24) [that the kubelet could actually call into.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=169.64) [Now this could be an API, it could be a health check](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=172.84) [built into your target framework.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=175.27) [It really depends, but in this case,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=177.25) [you'll see we're going to define a liveness probe that's going](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=179.65) [to be an HTTP GET type of liveness probe.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=182.58) [Now we're going to say you need to check index.html on port 80. And as](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=186.1) [long as that returns within the status code range that I mentioned](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=190.99) [earlier, that would be considered successful. Now,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=194.28) [we're going to wait 15 seconds for that because it may take a](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=198.06) [second for this pod to come up in the container.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=201.11) [We're going to have a timeout after 2 seconds, and we're going to check every 5](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=204.24) [seconds, and then allow 1 failure before failing the pod.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=208.85) [So by working with these different settings,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=214.34) [this is really,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=216.51) [really good for us as developers, and your admins are going to love you as](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=217.47) [well because now there's a way where you can control what determines if](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=221.04) [we're healthy or not, and that's really up to you.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=226.27) [Now if you're not writing the YAML at work,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=229.7) [you still probably are responsible for whatever the health check is that](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=232.46) [the YAML and the kubelet would actually call into.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=237.09) [And that's where I think we as developers can play a big role.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=240.34) [Now let's take a look at another example of this. Now this is](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=243.84) [pretty much straight from the documentation.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=246.69) [Let's say that we're going to define some args that](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=249.32) [are going to run in a container.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=252.6) [We're going to shell in,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=253.95) [do a command, and we're going to touch something called healthy.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=255.19) [Now we're going to sleep 30 seconds after that's created,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=259.51) [and then we're going to do a rimraf,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=262.44) [which is a remove if you're unfamiliar with that command of that healthy.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=263.71) [Now what the liveness probe is going to do is it's](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=267.39) [actually going to try to get to the healthy.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=270.12) [We're going to run a cat command on healthy,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=272.46) [and that'll determine if we're alive or not.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=275.64) [Now what'll happen is it'll be alive for the first little bit,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=278.46) [then healthy would be deleted, and then it would fail.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=282.14) [What would happen there is in this case,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=285.74) [we would automatically bring up a new container after it fails.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=288.48) [And, of course,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=292.74) [we can have an initial delay and a period of seconds on when it checks.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=293.33) [So these are the types of things you can do to](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=297.54) [actually work with liveness probes.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=300.26) [And there's others, of course you can do,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=301.96) [but the bottom line is you can exec a command.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=303.4) [You can run a TCP/IP type of request to that container in](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=306.39) [the pod, or you could do an HTTP GET‑type of request. Now](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=309.96) [when it comes to readiness probes,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=314.37) [this determines, again, when should traffic start being](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=316.14) [routed to a pod and its associated container? Because if we](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=319.83) [start sending traffic too soon, it may not be ready yet.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=323.9) [So in this case,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=328.08) [we're going to see if an nginx container is ready in a pod](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=328.72) [by doing the same thing we saw earlier.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=331.64) [We're going to do a get to index.html. If that returns a good status code,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=333.19) [then we're good to go, and we're going to wait 2 seconds, though,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=338.11) [and then we're going to check every 5 seconds until it's up and running.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=341.83) [So to summarize these,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=346.74) [a readiness probe is when should a container start receiving traffic?](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=348.16) [Whereas a liveness probe is when should a container restart because it's](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=352.24) [either not alive or it has some health issues? Very,](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=356.71) [very important to know as you're not only programming your app, but also as you're defining the YAML for your different pods.](https://app.pluralsight.com/course-player?clipId=0e8805b4-f8cf-4722-8def-7331e9253cf5&startTime=360.64)

### [Pod Health in Action](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe)

[Let's take a look at pod health in action and see what](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=0.88) [happens with our pods and containers.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=3.69) [So I have a similar file open to what we saw earlier in this](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=6.14) [module that's related to nginx and the pod YAML.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=8.77) [You'll notice we have a liveness probe, and we're doing it in httpGet to the](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=12.74) [index.html home page on port 80, and then we have some timing here for initial](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=17.19) [delay, how often to check, and things like that.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=22.07) [I also have a readiness probe that really does the same thing.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=25.74) [Now what I'm going to do is mess with the index.html a little bit.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=29.84) [Now let's go ahead and apply this, so we'll do the apply‑f, and we'll do](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=33.72) [.yml, and we'll get that going. So it should be done by now.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=39.27) [And alright, there we go.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=43.94) [Now, the name of this particular pod you'll see, let's run that one more](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=45.69) [time, is my‑nginx again. So let's go ahead and describe it with describe](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=49.4) [pod my‑nginx. And you'll notice down here that we successfully assigned](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=54.41) [the images present, and we created the container, so not a whole lot of](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=61.68) [bad stuff at this point.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=65.61) [Now let's go ahead and exec into this, and we'll do our ‑it sh.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=68.03) [Alright, and now I'm going to go down into some sub folders here. And from here,](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=73.59) [if we do an ls, you'll notice I have an index.html.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=81.29) [What if we were to come in and let's say part of our program remove](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=84.94) [that file, so we'll do an ls, and it's gone now.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=90.08) [Now notice the command terminated here, and we're back, actually, out.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=93.21) [Well, let's see what happens.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=96.85) [So, we'll go to k get pods.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=98.05) [You'll notice it's running.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=101.34) [Let's now go to k describe pod, and look at that,](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=103.34) [Container my‑nginx failed liveness probe.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=109.76) [Well, that's exactly what we'd expect.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=113.34) [Now, let's go back and exec in one more time.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=115.49) [And let's see, are we on the same thing?](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=118.58) [Are we on something different?](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=120.19) [What do we have?](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=121.41) [So we'll go in and we'll go to usr/share/nginx/html.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=123.54) [Alright, well, we must have a new one because look at that.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=130.24) [Our index.html is back, so our container is back,](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=132.62) [and that means it was restarted. And that would be an example of how these work.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=136.34) [Now let me go ahead, and we'll get rid of this one.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=142.64) [And the next one I'm going to run is similar to what you saw earlier.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=147.04) [And this has some args in it that are going to touch this healthy file,](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=151.1) [sleep 30 seconds, remove it, and then sleep longer.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=156.4) [And then what we're going to do for our liveness probe](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=160.46) [here is actually do a cat on healthy.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=162.56) [And obviously, if that doesn't work, we have a problem.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=165.66) [So let's see what happens here, and we'll get this going.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=168.2) [Alright,](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=172.37) [so let's make sure it's running. Okay, it looks like it's still getting ready.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=172.8) [Notice the status, by the way, is ContainerCreating. Okay,](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=177.54) [so we're going to let it wait a little while here,](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=182.08) [and while it's kind of running,](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=185.1) [let's go actually back because I didn't grab the name. Let](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=186.82) [me copy this, and let's describe it.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=190.03) [So we'll do a k describe on that pod, and you'll notice](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=192.03) [everything's looking good here, Started container liveness, Created](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=197.71) [container liveness, everything's pretty good.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=200.53) [Now we're going to wait just a little bit, and let's](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=202.41) [see what happens because, again, behind the scenes,](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=205.19) [after about 30 seconds,](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=208.12) [we should be doing a delete, and then we're going to sleep a while.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=209.46) [So I think we're getting pretty close to that.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=213.34) [So let's do a k get pods.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=215.25) [Alright, so everything looks good there.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=217.8) [Let's run back to our describe, and there we go, Container](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=220.99) [liveness failed liveness probe, will be restarted.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=225.67) [And so that container is now being taken care of by Kubernetes.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=229.27) [And I happen to think that's pretty cool.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=233.2) [I don't know about you, but it's pretty exciting stuff,](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=234.99) [actually. And we should be all set.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=237.35) [So that's an example of how we can work with a](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=240.38) [liveness probe and a readiness probe,](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=243.66) [and you can see how powerful this is because it'll ensure that your](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=246.44) [container within the pod is restarted as necessary, but that's an example of how we can work with our different probes.](https://app.pluralsight.com/course-player?clipId=01fa2aa1-56bc-4fac-a2a1-ec5db20271fe&startTime=249.48)

### [Summary](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b)

[Let's wrap things up with a quick review. So we know that](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b&startTime=1.62) [pods are the smallest unit of Kubernetes,](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b&startTime=4.23) [and containers are then going to be hosted within pods.](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b&startTime=7.24) [And if you had multiple containers in a single pod,](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b&startTime=10.88) [they would share that pod's memory,](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b&startTime=14.04) [the IP, volumes, and really anything else that's part of the pod.](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b&startTime=15.99) [Now pods can be started using different kubectl commands.](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b&startTime=21.44) [We saw kubectl run,](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b&startTime=24.84) [and we also saw how we can use YAML and combine that](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b&startTime=27.31) [with kubectl create or kubectl apply.](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b&startTime=30.58) [Now health checks are a really,](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b&startTime=34.84) [really important part of this because if you end up running](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b&startTime=36.62) [a lot of containers up in Kubernetes,](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b&startTime=39.42) [we'd want to know if they're healthy and when they're](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b&startTime=42.2) [available to accept traffic and things.](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b&startTime=44.3) [So we also talked about how you can do pod health checks and](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b&startTime=46.5) [add in those probes so that you know when a pod and its container is actually healthy or not.](https://app.pluralsight.com/course-player?clipId=b4a5ba54-0c05-4026-9215-e64e7169be8b&startTime=50.29)

## [Creating Deployments](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb)

### [Introduction](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb)

[In this module, we're going to take a look at deployments and replica sets.](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=0.84) [Now up to this point, we've seen a lot about pods and containers,](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=5.04) [but we've also seen that if you just have a pod on its own,](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=8.67) [that if that pod goes down or is deleted for some reason,](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=12.46) [that nothing's going to magically bring it back to life.](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=15.89) [Now containers can come back to life in a pod, and](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=18.94) [we saw that in the last module,](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=21.28) [but if the pod itself is deleted and there's nothing behind it,](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=24.14) [then it would just go away. Now, earlier in the course,](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=27.67) [we ran kubectl run, and we saw not only did that generate a pod,](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=31.49) [but it generated something called a deployment.](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=36.33) [So we're going to talk more about that and the role deployments](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=38.9) [play. So we'll start off talking about the core concepts of](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=41.23) [deployments, move into how do we create a deployment in the YAML,](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=45.22) [then we'll learn about some different kubectl commands, many of](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=49.5) [these you've actually already seen, so a lot of that knowledge can be applied,](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=52.8) [and then we'll talk about different deployment options.](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=56.84) [Now as far as where are we in the overall Kubernetes infrastructure, well,](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=61.14) [we just covered pods and containers,](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=65.15) [so we're now obviously going to focus on deployments, and the role that they play in making sure that our pods stay up and running.](https://app.pluralsight.com/course-player?clipId=14ff775b-4dd7-40a1-bc4c-e9eef05cc9fb&startTime=67.27)

### [Deployments Core Concepts](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609)

[Earlier in the course,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=0.94) [we used the kubectl run command to actually get a pod up and running,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=1.77) [but it did more than just that.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=5.54) [It also created a deployment and a ReplicaSet.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=7.64) [So in this section,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=11.18) [we're going to focus from a higher level on what](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=11.85) [exactly are deployments and ReplicaSets.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=14.71) [A ReplicaSet is nothing more than a declarative way to manage the pods.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=18.64) [Think of it as kind of the boss of the pods that sits behind the](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=24.24) [scenes to make sure that they're working efficiently,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=27.29) [and if one of them gets sick, we can get that replaced.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=29.94) [Now a deployment sits up at a higher level.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=34.94) [It kind of wraps a ReplicaSet.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=37.92) [It's also a declarative way to manage pods,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=40.59) [but it uses ReplicaSets under the covers.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=43.64) [So, in the evolution of Kubernetes, ReplicaSets came before deployments.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=46.94) [Then deployments came out,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=52.14) [and they kind of wrapped and simplified the overall functionality.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=53.51) [From a pod perspective,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=57.51) [we know that pods represent the most basic resource in Kubernetes,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=60.64) [and they can be created and destroyed, but are never recreated.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=64.23) [So what happens if a pod is destroyed?](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=68.44) [That's where deployments and ReplicaSets are there to ensure that we](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=71.4) [have the correct number of pods that are running.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=75.31) [We talked early on in the course how Kubernetes is about](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=78.34) [you give it the state that you want, I want 5 pods,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=81.98) [I want 10 pods, whatever it may be, and it just magically makes it happen.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=85.26) [Deployments and ReplicaSets play a big role in that,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=89.94) [and if a pod does go down, that's where these are going to step in.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=93.29) [Now let's first talk about ReplicaSets.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=97.54) [So, looking at the image here to the left,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=100.04) [you can see that a ReplicaSet is going to really control the pods.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=102.71) [A ReplicaSet's job is, first off, it can act as a self‑healing mechanism,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=107.88) [and we've seen that if you delete a pod with a](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=112.78) [ReplicaSet or deployment behind it,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=116.09) [that it can just magically bring it back to life.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=118.26) [And I use the term magically a lot because having worked](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=121.48) [with applications a lot over the years, and I'm sure you have as well,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=124.77) [what happens normally when something goes down?](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=128.74) [You're kind of out of business.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=131.39) [You probably have some logging hopefully, and you have to go figure it out.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=134.29) [Well, that's kind of the beauty of Kubernetes with ReplicaSets,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=137.96) [deployments, and pods is we get some help here when things do go down.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=141.41) [Now another thing ReplicaSets do is they make sure that](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=146.94) [that state we're trying to achieve is met.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=149.67) [If we want five pods, it wants to make sure there's five pods.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=152.66) [It also provides fault tolerance that ties into the self healing,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=156.94) [actually, and ReplicaSets can be used to scale our pods horizontally.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=160.49) [So if you currently had two and you want to move that out to four,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=165.49) [then you could do that with just a simple command,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=168.8) [actually.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=170.86) [Now it does rely on a pod template,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=171.75) [and we're going to be seeing that in a moment,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=175.1) [and you're going to see it relates to what we covered in the](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=177.06) [previous module when we talked about YAML.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=179.34) [So as a result of this, there's no need to create pods directly.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=182.04) [We're going to use deployments and ReplicaSets to do that.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=185.64) [And as I mentioned, ReplicaSets are actually used by deployments.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=189.44) [Now the way this works with a ReplicaSet is once you have one created,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=194.28) [it will ensure that the desired number of pods are created.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=198.01) [So in this case, two pods.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=201.34) [Now you'll notice on this ReplicaSet that our desired was 2,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=203.54) [our current number of pods is 2, and we have two that are ready.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=206.94) [So we're obviously in an optimal situation.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=211.49) [This is what we'd want.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=213.45) [When it comes to using these, and maybe a pod goes down,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=215.26) [gets replaced, ReplicaSets will make sure that we stay at that desired level.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=219.07) [Now how do deployments fit into this process?](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=224.94) [Well, they're really just a higher‑level wrapper around ReplicaSets.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=227.84) [ReplicaSets ultimately use controllers to control the pods.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=232.94) [Deployments make that process even easier.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=236.54) [So a deployment is responsible for managing the ReplicaSets,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=239.14) [and it will use those to scale the pods,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=244.34) [as I mentioned earlier.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=246.69) [Now one of the most powerful things about deployments and ReplicaSets](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=248.74) [is this zero‑downtime updating of your applications.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=252.16) [Normally, if we update an app,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=256.04) [unless you have a separate environment that you switch over to,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=258.24) [then the original app might be down for a little bit while we do that update.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=261.23) [Well,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=265.24) [I'll show you there's several ways we can do deployments in Kubernetes](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=265.59) [where we don't have to take the application down,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=268.45) [and there's other benefits we'll talk through as well.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=271.27) [Now another thing that supports is rollback functionality.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=274.74) [Let's say you rolled out an app and deployed it using a](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=277.77) [deployment and ReplicaSet and something went wrong?](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=280.44) [Well, you can actually roll back to the previous one if you'd like.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=283.6) [Earlier, when we talked about pods and YAML,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=287.14) [I briefly introduced the concept of labels and I mentioned we're](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=289.51) [gonna use these later with things like deployments,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=292.74) [services, and other resources in Kubernetes.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=295.99) [So we're going to see how labels actually can kind of hook,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=299.21) [if you will, or join a deployment with a pod template.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=302.65) [And then finally, the YAML for deployment looks very,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=307.64) [very similar to a ReplicaSet.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=310.97) [One of the big differences is the kind that's defined.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=313.84) [What's nice there is if you saw a ReplicaSet](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=317.74) [demonstration out on the web somewhere,](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=320.64) [you could actually just take that and quickly move it](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=322.83) [into a deployment if you'd like, very easy to work with.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=325.34) [So now that we've taken a high‑level look at deployments and ReplicaSets, let's see how we can officially create a deployment using YAML.](https://app.pluralsight.com/course-player?clipId=e73acd54-1d49-497f-8d12-3831e4936609&startTime=329.39)

### [Creating a Deployment](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4)

[Deployments are really where a lot of the fun of Kubernetes](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=0.84) [started for me when I first learned it years ago,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=3.66) [and that's because of the really powerful features that they offer,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=6.57) [from the making sure the pods stay up and running, to rollbacks,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=10.09) [to different types of deployments.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=13.77) [But before we get into all that, how do we create a deployment?](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=15.74) [Well, we're going to use YAML again to declaratively do that.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=19.74) [So the nice thing about deployments is you don't have to create the](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=23.21) [replica sets that are going to run behind the scenes that handle making](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=26.87) [sure we have the required number of pods.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=30.75) [Deployments are a higher‑level wrapper, as mentioned,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=33.34) [and they'll take care of that for us.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=35.84) [To create a deployment, we're going to write a YAML file,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=37.62) [very similar in structure to what you've seen up to this point,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=40.66) [and then we're going to use kubectl to either create or apply that YAML file,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=43.79) [to get that deployment and the underlying replica set going.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=49.26) [Here's what a deployment YAML file looks like from a high level.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=53.54) [First off, you'll notice we have an API version; in this case, it's apps/v1.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=57.44) [One of the things I struggled with when I first got into](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=63.04) [YAML was how do you know what to put there?](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=65.53) [And the answer is you go to the docs and you look it up,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=67.45) [or you just find a good sample out there.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=69.9) [Now the next thing you'll notice is the kind is a deployment.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=72.48) [Well, earlier when we did pod YAML, we said kind: pod.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=76.34) [If we did a replica set, it would be kind: replica set,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=80.37) [but because deployments wrap replica sets and create those under the covers,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=83.78) [we could just say kind is a deployment.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=87.72) [And we can also have metadata; what's the name of this,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=90.68) [does it have any labels, things like that.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=93.13) [And then we get to some stuff that we've seen somewhat up](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=96.14) [to this point from the pods module.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=99.66) [We have a spec, and if you look down a little lower, another spec,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=101.63) [What we're doing here is we're defining the overall deployment spec,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=107.54) [and the selector that you see is going to select the template to use.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=111.64) [Now the template normally is going to be right below,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=116.74) [although it could be in a separate file. For the demos I'm](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=119.34) [going to be showing, and in real life,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=122.81) [I like to keep those together, to kind of minimize](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=125.1) [the number of files that I have.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=127.96) [So I'll show you the selector coming up shortly on kind of](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=130.04) [how that's used, but ultimately that's going to select the](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=132.55) [template that has the pods spec.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=135.97) [That's the other spec that you're going to see right down here.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=139.28) [Now notice, this is what we covered earlier in the](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=142.64) [pods module when we looked at YAML.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=145.31) [We have the containers, we have the name that we want,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=147.64) [we have runtime of the container,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=150.74) [and we have the actual image, in this case, nginx‑alpine..](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=152.33) [Now that you've seen kind of the high‑level,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=156.89) [10,000‑foot view, we'll say, let's jump on into a little more detailed one.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=158.98) [So we have our API version and our kind. You'll](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=164.54) [notice that we also have our metadata.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=167.8) [Now this metadata has a name for the deployment, but it also has labels.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=170.05) [Now the labels again, first off,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=175.14) [can be used when you're querying multiple resources. You could say,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=177.29) [hey,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=180.43) [go find everything that has this label, but labels can also be used](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=180.6) [to tie things together, and you're going to see that shortly with](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=185.45) [our selector that we're going to get to in just a second here. So](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=188.98) [let's jump on down to that.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=192.18) [Looking at this, you'll see how the selector property has a matchLabels.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=194.04) [Now I only mashed on one label,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=200.04) [and the key or the name of that label is tier, and the value is](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=202.19) [frontend, you can see. What that's going to do is if you look down](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=206.18) [a little bit lower, notice that in the metadata for the template,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=210.05) [we have labels, tier, frontend.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=214.31) [So the template and the template spec that you see right below it is now](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=217.44) [going to be hooked to the selector for this deployment.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=221.89) [In fact,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=225.84) [any label out there of tier: frontend, in a pod template](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=226.67) [even, would be hooked to this deployment.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=230.5) [Now many people, as I mentioned earlier,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=233.74) [including myself,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=235.44) [like to put the template right in the deployment, because it keeps it very](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=236.5) [easy to manage, but if you wanted to separate it out,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=239.66) [you could do that, because the way Kubernetes works is when it](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=243.33) [sees a label of foo, and then over here we have label of foo,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=246.72) [then it links those together.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=251.24) [And that's done through this selector.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=253.3) [So now when we go to run this deployment,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=255.94) [it automatically selects the frontend, tier: frontend, that](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=258.5) [goes down to the template that you see, and then that would](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=262.53) [start up our nginx:alpine container.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=265.25) [And it would make sure we get the self‑healing, we can scale, we can do](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=268.14) [all that stuff that we talked about. Now to show even further that this](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=272.33) [really is similar to a pod template, we could even put our probes into](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=276.84) [here for our pod health checks.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=281.71) [So earlier in the pods module,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=284.24) [we talked about probes, and here's an example of a](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=286.53) [liveness probe that has that httpGet.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=289.82) [So while this is in the deployment,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=293.24) [you'll notice that we're defining the entire pod template in](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=295.54) [this template map, and the corresponding spec and containers,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=299.39) [and everything that you see here.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=303.46) [So all that type of thing can be done to do our checks,](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=305.24) [and in this case, look for index.html on port 80.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=309.23) [So that's a quick look at some of the YAML you would define for a deployment. So now let's take a look at how we can put deployments to use with kubectl.](https://app.pluralsight.com/course-player?clipId=fe79269c-b8e9-4cef-bb3c-db68ab0d6df4&startTime=313.54)

### [kubectl and Deployments](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd)

[It's time to move on to the next exciting step.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=0.94) [We've looked at YAML,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=3.33) [and now we want to take that YAML and use kubectl to start up our deployment.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=4.73) [Now the easiest way to do this is to use the kubectl create command](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=11.94) [that we've already talked about up to this point.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=15.97) [And that would create that resource and get the deployment,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=18.44) [the underlying replica set,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=21.71) [and whatever pods are supposed to be running going on your Kubernetes cluster.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=23.25) [Now recall that we could also use kubectl apply, though, to create.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=28.74) [I've mentioned I'm a big fan of this one because while we can](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=34.04) [also create we can also use it to apply changes.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=36.76) [Now, as a reminder,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=40.59) [remember that if you're using it to apply changes and if](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=41.92) [you didn't create the initial deployment,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=45.05) [someone else did,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=46.72) [and if they use kubectl create you'd want to make sure](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=47.94) [that everybody's using ‑‑save‑config.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=51.42) [For me personally,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=54.54) [I pretty much just always go with kubectl apply whether](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=55.59) [I'm creating or applying changes,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=58.45) [but it really depends because the nice thing about create is that that](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=61.04) [resource is already there and if you didn't mean to override it and](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=64.42) [apply those changes you would get an error.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=67.93) [Whereas with kubectl apply,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=70.38) [assuming they've done ‑‑save‑config if they did the create,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=72.92) [then it would apply the changes, and you may or may not want that.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=76.14) [So it's important to understand kind of the differences](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=79.15) [there and what you can do with these.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=81.05) [To get deployments we can simply run kubectl get deployment or deployments,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=84.3) [by the way.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=89.27) [A lot of these commands you can use a shortcut version of the name.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=90.24) [You don't have to type the whole thing.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=93.06) [Now if you want to show all the labels for the deployments](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=95.39) [as well then you can do ‑‑show‑labels.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=98.78) [And we started talking about labels in this particular section.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=101.59) [Now labels, as you recall,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=105.8) [can be used to tie things together like a deployment to a pod template,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=107.23) [but they can also just be used to organize things.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=111.44) [You saw earlier I had a label tier: frontend.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=114.64) [I might have tier: backend.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=117.51) [And I made up those names.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=119.94) [The names and the values don't really matter.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=121.98) [What matters is that when you're planning this you sit down](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=124.18) [and discuss this either with your team, your Kubernetes administrators,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=127.89) [whoever it is,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=131.86) [so that you can organize this in a way that's going to be](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=133.23) [maintainable and easy to find things down the road.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=135.28) [And that's why I think, as a developer,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=138.01) [it's really important to know at least the core concepts of](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=140.34) [Kubernetes at a minimum so that you can help out.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=143.44) [Because, let's face it, who knows your app better than you?](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=146.66) [If you wanted to get deployments with a specific label, because](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=150.74) [oftentimes you'll have many deployments in a cluster,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=154.57) [then you can use this ‑l for label,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=157.86) [and that would then allow you to list the name and then the](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=161) [value of the label, in this case app=nginx.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=164.35) [Very, very nice because now again if I had,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=168.04) [say, tier: frontend or tier: backend as a label I could say,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=171.08) [hey,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=175.1) [give me all the deployments for my back end, and it would list all those](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=175.27) [and filter. To delete a deployment is the same as what we've seen up to](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=178.97) [this point with something like a pod. We can just say kubectl delete, say](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=183.56) [deployment, and then the deployment name.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=188.44) [Very simple.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=190.75) [Alternatively, we can also say ‑f and give the path to the YAML file.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=191.86) [Now another thing we can do is we can scale.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=198.54) [And this is something I mentioned earlier in this module when we introduced](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=201.49) [replica sets and deployments. And this is a great feature.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=204.79) [So first off,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=208.89) [there's a kubectl scale command, and what we can do is](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=210.38) [say I'd like to scale a deployment, give it a deployment name,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=213.9) [and then what do I want for that pod template? Well,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=218.24) [I want five replicas, in other words I want five pods. And that](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=221.17) [will automatically scale that out to five pods.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=225.39) [If you had a YAML file and you wanted to do it that way,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=229.94) [you can also do ‑f again and give it that. And then we could scale it out.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=233.44) [You can also put the replicas that when it starts you would like into the YAML.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=238.74) [And so there's many different ways that we can scale out our pods. Very,](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=244.64) [very useful in the case of one of the pods getting a lot of traffic](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=249.37) [and you want to scale that out on a given node.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=254.14) [And that's how easy it would be to do that.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=257.49) [And we're going to play with that coming up here momentarily.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=259.38) [So that's a quick look at some of the kubectl commands. Some of these](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=262.61) [we've already seen such as kubectl create and apply.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=266.08) [We've also seen delete. But you also saw a new one here which is scale.](https://app.pluralsight.com/course-player?clipId=adb71264-c2a3-4bb3-b9f8-111a19c7dbdd&startTime=270.56)

### [kubectl Deployments in Action](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107)

[In the previous section,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=1.94) [you saw some of the different kubectl commands that we can use,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=2.79) [so let's put those to practice and actually use them for real.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=5.74) [So, back in VS Code, I have an nginx.deployment.yml file.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=10.74) [Now I have all the normal suspects here.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=16.04) [We talked about the apiVersion, the kind,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=18.11) [metadata, the spec, but the big thing I want to jump to is the selector,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=21) [and you'll notice that I'm matching labels called app: my‑nginx.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=26.74) [Now we also have an app: my‑nginx, that's going to be for the](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=32) [deployment itself, but if we look down,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=35.33) [you'll notice that we have a label in the template called app: my‑nginx,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=38.34) [and that will tie the deployment to this template.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=42.15) [Now, inside of that, we also have our spec,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=45.94) [which is our pod template, and then we have our container information.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=48.45) [Now,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=52.44) [I've got a bonus feature here that I mentioned a](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=52.55) [little bit earlier in the course, but we haven't looked at yet,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=54.8) [but it's definitely something you want to plan for. And you can see](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=57.74) [the property here is called resources. Now this allows you to](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=60.89) [basically constrain what a given container is allowed to run inside of](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=64.8) [a pod when it comes to memory usage, CPU, and things like that.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=69.84) [In this case,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=74.94) [I'm constraining the memory to be 128 MB max and the CPU to be 20% of the CPU.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=75.59) [Adding these resource constraints is very important, because I've seen](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=81.99) [several companies out there who have deployed to Kubernetes, not put](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=85.26) [these, and then they had kind of a runaway train,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=89.86) [you could say, and that container ended up bringing down the entire node.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=92.52) [So putting these constraints in place are important, because that](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=97.44) [way it can automatically restart that container if it needs to, as](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=101.59) [that constraint might be hit on those resources. So that's a](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=105.41) [little bit of a bonus piece.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=108.48) [Let's go ahead and you've seen the deployment, let's go ahead and run it.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=109.8) [And we've already talked about how easy this is.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=113.84) [So we could do kubectl, or in my case,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=115.91) [k, since I've aliased it. And we're going to do a create.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=118.19) [Now I'm going to do a ‑‑save‑config. Alright, so that](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=123.07) [deployment has now been created, so let's do a get all.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=127.21) [And there we go.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=130.82) [You'll notice that we have our my‑nginx pod,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=131.78) [which is up and running, we have a deployment called my‑nginx](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=134.79) [that equates to the name that you saw up here, and then we also](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=139.19) [have a replicaset called my‑nginx.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=142.95) [Now notice it has a value here that actually ties up to here,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=146.06) [and that's how they can associate the replicaset with the pod or pods](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=151.02) [that are actually running. Some other things we can do that we talked](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=155.98) [about a little bit earlier in a previous section, if we wanted to go](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=159.53) [in now and describe the pod,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=163.29) [we could do that. So we could go in and describe pod, but we can also](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=166.72) [go in and describe the replicaset or the deployment.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=170.75) [Now let's do the deployment, since that's what we're working with here.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=174.37) [And it was called my‑nginx. And you'll notice that I can get some](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=177.92) [information, there's some of my resource limits.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=182.76) [You can see right there the image,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=185.42) [the port, here's my annotations from the save‑config that](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=187.54) [we did, and you get the general idea. Down at the bottom,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=191.11) [you can see we scaled up to 1.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=194.99) [And we can also get our deployments through a kubectl get deploy, and you'll](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=198.42) [notice this actually works, or deployment, or deployments.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=204.67) [You can kind of take your pick.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=210.87) [Now, if you feel better about it, you can type it all the way out, either way.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=212.82) [But we can also do this, we could say show labels for the deployment.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=215.67) [And you'll notice off to the right the app=my‑nginx shows up,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=221.02) [and that was our label up here from our yml.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=224.75) [Now,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=229.02) [if I wanted to filter, then we could do ‑l, show me the label](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=229.27) [app=my‑nginx. And notice It brings back that one.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=234.93) [Now,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=239.24) [that's of course the only one I have right now, but if](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=239.35) [we had many deployments out there, then we could do something like this.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=242.635) [Let's go back to everything again, so we'll do k get all,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=247.095) [and notice that we have 1 of 1 desired.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=250.025) [If you recall, we talked about there's a scale command.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=253.715) [I'm going to show you two ways we can do this.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=257.055) [First off,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=259.765) [we can do kubectl scale, and then I'm going to give it my yml file again.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=260.385) [And then we could say, how many replicas do we want?](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=266.105) [Well, let's do we want 4 replicas here.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=268.785) [Alright, so it says it's scaled.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=272.895) [Now let's do get all.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=275.215) [And there we go, we now have four of those my‑nginx pods up and running,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=277.415) [so we've scaled horizontally.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=281.965) [You'll notice if you look down at the replicaset that we](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=283.915) [desired 4, we currently have 4, and 4 are ready.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=287.385) [Now, let's go ahead and delete this deployment.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=292.315) [Alright, it says it's deleted now, and watch what happened, though.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=296.785) [See, all these are now terminated.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=301.815) [Now, once this is done,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=305.015) [let me recreate the deployment and we'll scale it, but](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=306.095) [I'm going to show you a different way.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=308.535) [Now everything's gone you'll notice.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=309.675) [So I'm going to come into the yml this time and say replicas is](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=312.115) [4. Save, and this time let's do an apply.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=315.975) [Alright, so my‑nginx has been created.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=322.475) [Let's do get all, and there we go. Notice I get the same](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=324.535) [effect as running the kubectl scale command.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=328.145) [Let's say we just want 2 now. So I'm going to run the apply again.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=331.815) [There we go, it's been configured, and then we'll do get all.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=337.215) [Alright now one is terminating, the other one already has](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=341.215) [apparently, and notice we have 2 running, desired is 2.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=343.595) [So in just a moment, in fact it's probably done at this point, there we go.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=347.615) [Now we're down to our two pods, and you can see I did that without](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=352.215) [running the kubectl scale. So you can drive it through the yml, you](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=356.905) [can do it imperatively through the scale command, it really depends](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=360.375) [on what you want to do.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=363.805) [Now again,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=364.485) [with things like production you want to be a little more](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=365.065) [careful. If I was using Kubernetes for maybe testing or just](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=367.735) [simulating a production environment,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=371.825) [it's probably easier just to use the kubectl scale command.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=373.945) [Very simple, we can run that right from our console like I'm doing here.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=377.045) [So that's an example of how we can work with deployments using kubectl. So,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=381.495) [as a quick review, we did kubectl create, gave it the path to our yml,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=385.225) [and did save‑config so they get the annotations for updates.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=389.535) [We can also describe a pod or a deployment with the describe command.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=393.895) [We can either create or update resources using apply.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=398.095) [And then we saw a few ways we can work with labels.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=402.595) [I showed the ‑‑show‑labels,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=404.915) [but we could also grab a specific label, and if we had multiple deployments](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=406.945) [or pods, or really any resource that you choose, then we could just pull](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=411.085) [those labels. From there, we did the kubectl scale,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=415.055) [and we gave it the number of replicas that we wanted.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=418.845) [We also showed how we could apply those changes with](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=421.415) [kubectl apply by adding the replicas map,](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=424.555) [the property, and the value into the yml. So that's how you can get started with deployments and kubectl.](https://app.pluralsight.com/course-player?clipId=e9440cf2-0935-45f6-b3f8-533855254107&startTime=428.045)

### [Deployment Options](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4)

[While deployments help you get your pods up and running within your cluster,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=0.94) [there's a lot of other things you can do with them as well.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=4.62) [So we're going to talk about a few of those here.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=7.22) [So let's say that you've currently rolled out a specific version of an image](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=10.24) [that's right inside of a pod such as this nginx:1:14.2‑alpine, and you'd like](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=14.19) [to move that forward to 1.15.9‑alpine. Well,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=19.56) [normally, kind of in the old days,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=23.46) [you'd have to stop the old container and then bring up the new one,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=25.25) [and there might be a slight downtime between those.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=28.32) [So what deployments allow us to do is a zero‑downtime deployment,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=31.84) [and this allows your updates to be performed without actually](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=36.72) [bringing down the older version of your application.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=40.52) [Obviously, this is a very good thing.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=44.64) [Now this is a big topic, and we're actually planning additional](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=47.34) [courses just on deployments because there's a lot we could go into,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=50.57) [but let's talk about some of the deployment options that are out](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=54.77) [there and how they can help us,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=58.07) [especially as developers. So as mentioned, one of the strengths that](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=59.81) [Kubernetes offers is this zero‑downtime deployment.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=64.67) [I'm going to show you how that works in a moment, but in essence,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=68.42) [it could bring up new pods, and once those are running,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=71.24) [kill off the old pods and reroute the network traffic and do all that for you.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=74.19) [It'll update those pods without impacting the end users, which means](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=79.43) [you don't necessarily have to do this in the middle of the night, and](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=83.59) [there's several different options available, actually. The default is](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=87.14) [called a rolling update, and we're going to talk about that more in this section.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=90.95) [But you can also do things like blue‑green deployments,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=95.54) [or you might hear A/B deployments,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=98.92) [canary deployments, and you can even roll back.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=101.64) [Now blue‑green is where you're going to have multiple](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=105.72) [environments running at exactly the same time, and then once](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=108.66) [you've proven that the new one is good,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=112.29) [you'll switch all the traffic over to the new one.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=114.52) [Canary would be where a very small amount of traffic goes to a new deployment,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=117.84) [and then once that's proven out by the user's hitting it,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=123.13) [you could switch all the traffic over to that one. And then](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=126.3) [rollbacks would be we've tried it, and it didn't work, let's](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=129.63) [go back to the previous version,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=132.87) [and that's actually something that's also possible. Now, as mentioned,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=134.99) [we could go on for quite a while on these different options just right here.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=139.15) [I'm going to focus in this core concepts course on rolling updates. I'm](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=144.67) [going to show you a little bit visually on how that works.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=149.62) [So let's say that we have this scenario here.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=153.34) [We have three pods all running v1 of some application.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=156.24) [Now what'll happen when you do a deployment with a rolling update](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=160.94) [is the new version of the pod would roll out to the production, but](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=164.78) [the old ones are going to still stay running. Now once that new one](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=170.25) [is ready, and remember,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=174.43) [we have readiness probes and things like that we can use,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=175.9) [then one of the older pods can be deleted.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=178.82) [Now it just keeps proceeding from here. Now another pod can](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=182.7) [be created for v2. Once that's ready,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=185.81) [it can get rid of the older one until it gets all the new ones in place, as](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=189.75) [you can see here. That's how a ruling deployment works,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=196.05) [and that's why we can get a zero‑downtime deployment going. Now the](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=202.29) [beauty of this is just by using kubectl apply and then giving it your](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=207.25) [updated YAML, this automatically happens.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=212.31) [It'll do this in the background,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=215.8) [and it's something you really don't have to worry about a lot.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=217.46) [Now in just a moment,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=221.24) [I'm going to show you an example of this, but from a development standpoint,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=222.07) [the nice thing here is you don't have to write your code in any](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=226.91) [different way, shape or form to make this happen. It's just a](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=230.13) [built‑in part of how Kubernetes can do deployments. Again,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=233.09) [there's other options you can do,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=237.77) [and that's something you'd have to coordinate with an](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=239.81) [administrator if it's a production deployment.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=241.74) [But even just playing around with a local cluster,](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=244.84) [you might even use some of these other options like an A/B or](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=248.64) [blue‑green or canary or things like that.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=251.37) [So now that we've talked through what a rolling deployment looks like](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=254.84) [and how we can do these zero‑downtime deployments, let's take a look at them in action.](https://app.pluralsight.com/course-player?clipId=c9559b14-eeeb-4066-bdda-9394855c75e4&startTime=258.08)

### [Zero Downtime Deployments in Action](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223)

[Now we've talked a little bit about zero‑downtime deployments,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=2.14) [let's take a look at them in action.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=4.65) [So I have a project here for a Node app open,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=7.24) [and there's three versions of this app.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=9.78) [Now it's a very, very simple app.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=11.63) [It simply writes out the version of the app to the web page and](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=13.32) [also shows the pod that's it's running inside of.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=16.88) [Now in order to run these, I first needed to create the images.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=19.37) [I have the Docker extension for VS Code installed so I can just](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=23.54) [right‑click and go to the build image here.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=26.58) [And then it needs to be named node‑app 1.0,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=29.44) [and then 2.0 and 3.0 for these different images.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=32.96) [Now I've already done that, and so I have those images available.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=37.24) [The next thing is, I have three deployment files, you'll notice.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=40.62) [They all have the same name for the deployment,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=43.22) [and they all have the same overall template.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=46.24) [Now they do change the replicas and do some things there,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=48.35) [but you'll notice on the image we're targeting node‑app:1.0.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=52.39) [Obviously the v2 would target 2.0 and then 3.0.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=57.24) [Now, there's one little bonus feature I want to talk about before we run this,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=61.84) [and that is this minReadySeconds.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=65.18) [This is a way to say we would like to wait for the pod to make sure](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=67.94) [that the container hasn't crashed for 10 seconds.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=72.31) [And this could be useful in cases where when a pod first starts up,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=75.64) [a container might crash, and you would want it to be rescheduled.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=79.13) [Well, in this case,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=82.94) [we're going to wait 10 seconds to make sure the container doesn't crash,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=83.85) [and then we can start to get traffic.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=87.62) [Now, if it does, then it can be rescheduled.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=89.32) [So that's kind of a bonus property to mention that we can](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=91.94) [put in our deployments and our YAML.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=94.29) [Now other than that,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=96.79) [we have this selector we've talked about that](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=97.87) [matches the selector on our template, and we're kind of ready to go.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=100.26) [So what I'm going to do is come on into node‑app in the terminal,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=104.84) [and we're going to get this deployment going.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=109.84) [Now if we do a kubectl get all,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=112.22) [you're going to see I don't have anything except for one additional service.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=116.04) [Now we're going to talk about services a little bit later in the course,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=119.9) [but I've already created a service for this so that we](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=122.925) [can get to it through the browser.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=124.995) [Very similar to the port forward we did, but a little more official.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=126.56) [And we'll talk more about it later.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=130.05) [Just kind of know that's working behind the scenes.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=132.175) [From here we want to go ahead and use this node‑app‑v1 deployment,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=134.34) [so let's go ahead and get that deployed.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=138.46) [All right, so that's been created.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=142.945) [Let's do a k get all again,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=144.455) [and you'll notice that the containers are being created as we speak.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=147.305) [Now we'll give that a moment and everything should be good.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=150.135) [So let's clear it, and let's try again, and it looks like they're now running.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=152.825) [So I'm going to come over to the web page here,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=158.125) [and because I've set up this service,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=160.375) [it'll point to the pods and it'll actually load balance across the pods.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=162.695) [So we'll go ahead and refresh, and you can see Node v1.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=166.11) [Now an interesting thing here‑‑‑I'm going to refresh one more time.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=169.535) [Notice the ID ends in l4, and notice it stays on that.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=172.15) [Well,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=178.325) [the reason is load balancing does happen behind the scenes and](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=178.625) [we'll talk about that more with services,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=182.215) [but because it's based on the connection to the server,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=184.545) [well, browsers create a single connection.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=188.71) [And so it's being smart enough to keep us on that same pod](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=191.35) [because we're using the same connection.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=195.545) [So I just wanted to point that out,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=197.125) [something we'll see again as we talk about services.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=198.57) [Now, let's go on in.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=201.64) [We have our v1 running.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=203.235) [Let's go ahead and deploy v2,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=205.195) [and then we're going to kind of refresh the browser as we're doing](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=207.915) [this to see what happens during the deployment.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=210.695) [All right, we'll let that run.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=214.445) [I'm going to refresh.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=215.705) [Notice v1 is still running, and we'll give it a sec here,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=216.48) [because eventually, once these are up,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=220.955) [let's do a k get all and see where we're at.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=223.055) [All right, so it's still terminating some of these.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=226.145) [But we should now, there we go.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=228.645) [V2 is now running.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=230.645) [Okay, and then likewise, let's do it again, and we'll go to v3.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=233.215) [All right, and let's refresh again, and this will take just a moment,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=240.345) [but we'll give it a sec, and you'll see v3 pop up.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=243.145) [All right, and you can see now it's still](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=247.897) [terminating, trying to run some other ones.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=249.247) [And there we go.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=252.737) [We now have our v3.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=253.457) [So what's so great about this is Kubernetes is automatically](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=255.237) [taking care of bringing up the new pods,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=258.737) [as I showed a little bit earlier,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=260.737) [but keeping the old pods running as long as](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=262.537) [necessary. Until that new pod is ready,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=264.777) [then it can switch the traffic over to that new pod,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=267.967) [and that's exactly what's going on.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=270.997) [So even though it's doing some cleanup in the background right now,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=272.437) [you'll see there was no disruption to the application because it will](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=275.827) [just replace the different pods as it needs to.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=279.377) [Now the v3 version of this, let's go open that real quick.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=282.937) [Looks like this one had three replicas.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=287.437) [All right, so when we're done here,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=290.087) [let's see if everything has stabilized now, and there we go.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=292.487) [There's our 3, and then we should still be on v3,](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=296.557) [obviously, over here in the browser.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=299.367) [So that's an example of what a zero‑downtime deployment looks like, and you can see why this is such a powerful concept.](https://app.pluralsight.com/course-player?clipId=32f4f873-30d1-4a70-9cf0-510a899d2223&startTime=301.637)

### [Summary](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897)

[In this module, we've seen how pods are deployed,](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=1.64) [managed, and scaled using deployments and ReplicaSets.](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=4) [Now deployments are these higher‑level resources that](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=8.13) [define one or more pod templates,](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=11.15) [and we know that they use ReplicaSets behind the scenes to](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=13.25) [actually manage those pods that are running.](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=16.86) [We also talked about several kubectl commands such as create,](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=20.34) [apply, and scale. You've seen create and apply quite a bit because](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=23.81) [they're used in many scenarios, and then learned how we can use](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=28.05) [those commands to actually get a YAML file,](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=31.42) [which defines a deployment out there and running, so](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=34.22) [that our pods are up and running.](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=37.35) [And then we wrapped up by talking about zero‑downtime deployments,](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=39.34) [discussed different alternatives there that are available and supported in](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=42.93) [Kubernetes, and even walked through a demonstration of switching between](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=46.37) [multiple versions of an app and showed how that app actually stays up as the](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=50.41) [different pods are going up and down.](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=55) [So now we're going to move on to some other topics related to this and get into services and networking.](https://app.pluralsight.com/course-player?clipId=d0765200-95a1-437e-9000-b674460bc897&startTime=58.24)

## [Creating Services](https://app.pluralsight.com/course-player?clipId=fd234505-4df3-48e1-a516-def88d7dd90c)

### [Introduction](https://app.pluralsight.com/course-player?clipId=fd234505-4df3-48e1-a516-def88d7dd90c)

[Networking is an important part of Kubernetes because as](https://app.pluralsight.com/course-player?clipId=fd234505-4df3-48e1-a516-def88d7dd90c&startTime=0.94) [we deploy our pods to our clusters,](https://app.pluralsight.com/course-player?clipId=fd234505-4df3-48e1-a516-def88d7dd90c&startTime=4.02) [we obviously need to talk between the pods potentially and we need to](https://app.pluralsight.com/course-player?clipId=fd234505-4df3-48e1-a516-def88d7dd90c&startTime=6.21) [talk from the outside world into some of those pods.](https://app.pluralsight.com/course-player?clipId=fd234505-4df3-48e1-a516-def88d7dd90c&startTime=9.72) [So in this module, we're going to take a look at services,](https://app.pluralsight.com/course-player?clipId=fd234505-4df3-48e1-a516-def88d7dd90c&startTime=13.14) [and that's what they're all about.](https://app.pluralsight.com/course-player?clipId=fd234505-4df3-48e1-a516-def88d7dd90c&startTime=15.5) [So we're going to start off with the core concepts of](https://app.pluralsight.com/course-player?clipId=fd234505-4df3-48e1-a516-def88d7dd90c&startTime=18.34) [services and what they're used for,](https://app.pluralsight.com/course-player?clipId=fd234505-4df3-48e1-a516-def88d7dd90c&startTime=20.64) [we'll talk about several different service types](https://app.pluralsight.com/course-player?clipId=fd234505-4df3-48e1-a516-def88d7dd90c&startTime=23.04) [that are available in Kubernetes,](https://app.pluralsight.com/course-player?clipId=fd234505-4df3-48e1-a516-def88d7dd90c&startTime=25.01) [learn how to create a service with kubectl, and then we're going](https://app.pluralsight.com/course-player?clipId=fd234505-4df3-48e1-a516-def88d7dd90c&startTime=27.34) [to create a service with YAML, and we'll show how to then deploy](https://app.pluralsight.com/course-player?clipId=fd234505-4df3-48e1-a516-def88d7dd90c&startTime=31.35) [that with kubectl as well. So as far as where are we in the](https://app.pluralsight.com/course-player?clipId=fd234505-4df3-48e1-a516-def88d7dd90c&startTime=35.13) [overall infrastructure here, well, we're obviously down now in the services area.](https://app.pluralsight.com/course-player?clipId=fd234505-4df3-48e1-a516-def88d7dd90c&startTime=39.87) [We're going to be talking all about how pods get their IP addresses and can communicate and do much more.](https://app.pluralsight.com/course-player?clipId=fd234505-4df3-48e1-a516-def88d7dd90c&startTime=44.79)

### [Services Core Concepts](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0)

[So let's talk about some of the core concepts related to services.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=0.94) [So Kubernetes defines a service this way.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=4.52) [A service provides a single point of entry for accessing one or more pods.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=7.39) [Now to dive into this more, let's ask a question then.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=12.34) [Since pods live and die, can you rely on their IP address?](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=15.17) [So let's say that we have an external caller,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=19.92) [and that calls into a frontend pod with an IP address and a container,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=21.97) [and then that calls some backend pod.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=25.98) [Well,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=28.44) [what if one of those IP addresses changes because the pod](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=28.84) [actually goes down and has to be replaced.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=32.24) [So the answer, of course, to this question is no,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=34.74) [we can't rely on an IP address of a pod.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=37.55) [That's why we need services.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=40.8) [IP addresses change a lot as pods change.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=42.28) [So when it comes to the life of a pod, we know that pods are mortal,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=46.74) [if you will, and they may only live a short time,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=50.22) [they're ephemeral, we could say.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=52.88) [Now, of course, that depends on the pod.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=54.99) [You could have pods that stay around for a long time, but you just never know.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=56.59) [So you can't rely on a pod IP address staying the same, because if](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=61.44) [that pod gets rescheduled and comes up as a new pod,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=65.93) [it's going to get a different IP address more than likely. We also know](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=69.35) [that pods can be horizontally scaled, so as that happens,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=73.54) [of course, a new IP address would have to be issued to that new pod.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=77.46) [And another important thing to know about IP addresses and pods](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=81.81) [is that a pod only gets its IP address after it has been](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=84.71) [scheduled, so there wouldn't be a way for a client to know about](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=88.54) [that IP address in advance.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=92.67) [Therefore, we need a better way to work with these, and that answer,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=94.89) [of course,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=98.21) [is services. The goal in life of a service is to abstract](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=98.67) [that pod IP address from consumers.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=103.15) [So if you take a look at the left‑hand image here, we have](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=105.95) [the service at a fixed IP, but then it's going to know how](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=109.45) [to talk to the pods behind it.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=112.84) [Now you'll notice the yellow labels there, my‑app.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=115.17) [We talked about labels a little bit earlier in a few other](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=118.64) [modules of the course. Labels are really,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=120.97) [really important here because they're going to be used](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=123.72) [to associate pods with a service.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=126.51) [Now, as that service comes up, we can rely on that IP address,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=130.24) [but the behind‑the‑scenes workings of the IPs of the pods,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=134.34) [that's going to be handled by the service. So if a pod](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=138.08) [dies and a new one comes up,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=140.73) [the service will know that IP, and it's going to know how](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=142.77) [to load balance between those pods, which is a built‑in feature.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=146.19) [Now, as mentioned, it does rely on labels to hook up the service and the pods,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=150.34) [so we're going to see that again as we move along.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=154.88) [And earlier in the course, when we talked about the big picture of Kubernetes,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=157.34) [we saw that worker nodes have a kube‑proxy,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=161.23) [and that's what creates a virtual IP for the different](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=164.05) [services that are running. Now this uses layer 4, which is](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=166.97) [TCP/IP. Services are not ephemeral,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=171.02) [meaning they're not short‑lived, they stick around. Pods can be ephemeral,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=174.66) [but services we need to have them sticking around, because that](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=179.14) [is the thing that a client on the outside world or another](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=183.49) [machine, a worker node, would know about.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=187.33) [Now what services do behind the scenes is create something called endpoints,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=191.64) [and that's what sits between that service and the actual running pod.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=195.6) [So to look at this a little more visually, if we had an](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=200.48) [external caller that's calling into Kubernetes,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=203.61) [then we would need to have some type of service they can call. Now that](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=206.95) [service would know about the pods that are behind it,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=211.25) [and it would deal with the IP addresses for those pods.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=213.56) [Notice that the service and the two pods here have frontend as their label.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=218.04) [That's kind of the magic that hooks all this together.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=224.44) [Now these pods might talk to some other set of pods,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=227.99) [and that would be done through a service, and in this case,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=232.44) [we have backend as our label that would be tying the service to the pod](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=235.71) [that you see. You can see that services play a really,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=240.03) [really important role with Kubernetes.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=243.13) [I mentioned that services do pod load balancing. So if a service is tied to](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=245.68) [multiple pods that have been replicated, then that service can load balance](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=250.25) [between these based upon the connection that's coming in.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=254.73) [So, for example, if an external caller calls in,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=258.64) [then the first pod here might get it; then another call comes](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=261.61) [in, the second pod might get; and so on, and so forth, and this](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=265.65) [is what it'll do behind the scenes for you. Now with browsers](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=270.29) [it's a little bit unique,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=273.31) [and I actually showed you a sneak peek of this when we talked about deployments.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=274.74) [What'll happen with browsers is because they use the same connection over](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=279.64) [and over and over for the request to the server, that will be respected](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=283.65) [by Kubernetes, and that one connection would keep hitting the same pod.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=287.62) [Of course, if that pod goes away,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=291.73) [then that can be rescheduled and the service can then deal with that.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=294.12) [Now let's wrap up this core concept discussion with a little caveat.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=299.14) [There's a lot to networking in Kubernetes. We're going to touch](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=303.04) [just on the core concepts, because as a developer,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=306.64) [you definitely need to know these basics.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=309.68) [So the goal of this module is to kind of break in gently to how services work,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=312.28) [how you can create them, different service types.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=318.18) [But keep in mind,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=320.74) [there's a lot more, and there's some other courses](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=321.55) [on Pluralsight that dive much, much deeper into networking.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=324.21) [Now, having said that,](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=328.64) [let's keep moving on and let's talk about the different service types that are available in Kubernetes.](https://app.pluralsight.com/course-player?clipId=83e2f388-0532-4b16-90e8-4553236e87b0&startTime=329.59)

### [Service Types](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af)

[To work with services in Kubernetes,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=0.77) [you need to know about the different service types,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=2.29) [and that's we're going to talk about in this section.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=5.12) [So when it comes to service types, there's four main types.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=8.09) [We have the default type, which is called a ClusterIP,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=11.44) [and this makes it so that a service can talk to internal IP](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=13.94) [addresses and set those up for your pods.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=18.38) [We also have one called NodePort,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=21.64) [and this is where we'll have the IP address for a node and then set up](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=23.35) [a static port on that note that we can call into.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=27.27) [We can also have a load balancer.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=30.81) [Now this would sit in front of our different nodes and then provision](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=32.54) [an external IP to act as that load balancer to call into the nodes](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=36.95) [and then ultimately call into the pods.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=41.64) [And finally,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=44.64) [we can have an ExternalName service that maps a](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=45.19) [service to a DNS name or IP address.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=47.47) [So let's dive into a little more detail about these different types of services.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=50.94) [So the first one, ClusterIP, is the default as mentioned,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=55.2) [and this exposes an IP address internally within the cluster.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=59.37) [Now what this will do is you'll have a service that's set up,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=64.04) [and we know that service can then talk to the different pods.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=67.1) [But the service itself is just going to be used internally within the cluster,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=71.54) [so only pods within the cluster can talk to that service,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=76.29) [but it does allow pods to talk to other pods.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=80.41) [So, for example, in our cluster, we might have a service with these two pods,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=83.48) [and those pods now need to talk to this other service you see.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=88.74) [A ClusterIP would enable this type of scenario.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=92.83) [And so this is very common, of course,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=95.97) [because the external world often times only needs to](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=98.07) [talk to maybe one or two services, let's say,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=101.22) [but behind the scenes,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=104.44) [we might have a ton of services with their associated pods that we then talk to.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=105.36) [Now the next type of service is a NodePort service.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=111.04) [This exposes the service at the worker node's IP,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=113.79) [and it's going to have a static port assigned.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=116.77) [Now this will automatically allocate a port by default,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=120.08) [although you can override that, and you can see the range here.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=123.06) [And what'll happen is that service will then make it so that we can](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=126.46) [proxy through that node into the pods behind the scenes,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=130.79) [so it looks like this.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=135.04) [Let's say we have a node,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=137.49) [and we've exposed a NodePort service on port 30100 that you can see here.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=138.66) [Now, behind the scenes, we also have these pods that we want to talk to.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=144.94) [So with the NodePort service,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=148.12) [an external caller can now call into the IP address of the node and that port,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=150.17) [30100, in this case,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=156.19) [then that can talk to the behind‑the‑scenes services that are set up,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=158.74) [and the pods, and everything else that we might have.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=163.42) [And that's what a NodePort service does.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=166.13) [So this one's actually very, very useful for a few reasons.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=168.11) [Number one, we could set this up so an external caller could call in,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=171.84) [and that's useful, but as a developer, oftentimes,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=175.27) [we might want to run some type of an external call for a](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=179.04) [debugging purpose or maybe performance reasons.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=182.37) [So knowing how we can proxy into a given pod using a](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=185.54) [NodePort service is actually really, really valuable,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=189.95) [and we'll see more of this as we move along throughout this module.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=193.09) [Now the last one is a load balancer.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=197.5) [Now you probably heard of or maybe even implemented](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=199.57) [load balancers at your company.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=203.08) [Load balancers, of course, are important because,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=205.54) [as a call comes in, some nodes are busier than others,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=207.52) [and we might want to route to different nodes based on the traffic.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=210.92) [So a load balancer service exposes the service externally,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=215.54) [and it's really useful when combined with a cloud provider's load balancer.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=218.88) [So whether you're going to Azure or GCP or AWS or some other cloud,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=223.64) [they will definitely have their own type of load balancer.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=227.98) [And then Kubernetes has its own type as well.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=231.62) [In fact, it has several you could use.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=234.69) [There's an nginx one, there's the default one that I'll show you,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=236.24) [and others, even, that are available.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=239.67) [So what will happen here, then, is behind the scenes,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=242.14) [we'll have node ports on the nodes that would be set](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=245.47) [up for us by this type of service, and then internally on those nodes,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=247.98) [we know we have ClusterIP services as well.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=251.91) [So that would allow the outside world to call in.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=255.06) [Each node, then, once it gets called,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=259.94) [is going to proxy that into the internal ClusterIP services.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=262.51) [Now if a new request comes in,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=267.29) [that might load balance to a different worker node,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=269.34) [and then that would call into other services behind the scenes.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=272.04) [So you can see it's kind of a combination of all of these.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=276.04) [We still have Cluster IP services behind the scenes,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=278.16) [but then we also have a NodePort‑type service on the nodes that are set up,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=281.34) [and then the load balancer service itself will know how to talk to those.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=285.54) [Now the final type of service we're going to look at](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=289.94) [is called an ExternalName service.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=291.92) [So this sets up a service that really is just an alias.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=294.49) [So we know a service sticks around, and we can count on the service's IP address.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=298.34) [But what if, really, what we're after is we want to call some other domain,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=302.74) [maybe within the company, maybe outside of the company,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=306.57) [who knows, or IP address.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=309.44) [But let's say that domain or IP keeps changing on us,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=312.14) [and we now have to keep updating the containers in](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=316.54) [the pods that want to talk to it.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=319.42) [Well,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=321.54) [this would allow us to define a service once that can then](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=321.69) [proxy requests to this external service,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=326) [and that way if the external service DNS or IP address changes,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=328.96) [we could just update this service.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=333.06) [That way our clients stay unaffected.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=335.54) [So in essence,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=337.94) [the external service is just hiding the details from the actual cluster](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=338.94) [of what we're actually calling out to externally.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=343.04) [So it looks like this, we might have a service internally,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=346.5) [which is maybe just a Cluster IP service,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=349.61) [but then these pods might call an ExternalName service.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=351.98) [Now, of course,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=356.01) [that acts as really just a proxy between some external service out there.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=356.54) [As mentioned, if that external service changes,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=361.75) [we just update the ExternalName service,](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=364.91) [and we don't have to impact all the other pods and](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=367.69) [internals that are calling that service.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=370.47) [So that's a look at the main types of Kubernetes services. So now let's take a look at how we can actually work with services and kubectl.](https://app.pluralsight.com/course-player?clipId=580f186d-27ad-40a7-884a-1d2127a330af&startTime=373.64)

### [Creating a Service with kubectl](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1)

[Kubectl provides a port forwarding command that we](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=0.59) [did look at earlier in the course,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=3.35) [but now we're going to dive into a little bit deeper and see what's](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=4.9) [going on with it and what it does behind the scenes.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=8.48) [So if I were to ask the question,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=12.44) [how can you access a pod from outside of Kubernetes, the](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=14.19) [initial answer would be, you can't, because, by default,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=17.88) [everything is set up as a ClusterIP. But with port forwarding,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=21.59) [we, of course, can do this.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=26.36) [Earlier we saw this kubectl port‑forward command that can be used to](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=28.8) [forward a local port to a pod port, and it looks like this.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=33.21) [We can say port‑forward, and give it the pod,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=37.01) [the pod name, and then we had the external port and the internal port.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=40.26) [Now, you can also, though, use this with a deployment.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=45.04) [So if we had a name deployment there, then we could say, alright,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=48.7) [let's go into that deployment, and in this case,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=52.43) [I'm going to use 8080 for everything.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=55) [In addition to that, we could port‑forward to a service,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=57.9) [actually,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=60.74) [and expose that on port 8080 so that it calls into the](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=61.47) [services pods doing it this way.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=66.19) [So let's take a look at how we can use this in a few different ways.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=68.92) [Earlier in the course, we looked at an nginx deployment,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=73.14) [and this had nginx:alpine,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=76.35) [and it runs on container port of 80 internally, and in this case has](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=78.54) [two replicas. So let's go ahead and deploy this.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=82.86) [Alright, so now that that's been created,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=89.04) [let's take a look at what's happened so far.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=91.06) [So we'll do a kubectl get all, and we have our two pods](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=92.89) [running. And notice we have a ClusterIP here,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=97.43) [and you'd think you might be able to pull up a browser and](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=101.14) [just use that, but that one won't work.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=103.26) [So, right now the only thing we have is a ClusterIP set up](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=106.24) [for our different services. In fact,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=110.58) [our pods here don't really have a great way to talk to them at this point.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=112.84) [So what we can do is we can use the kubectl](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=118.54) [port‑forward command to work with this.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=121.34) [So let's say that if we do a get pods, we wanted to go to this pod right](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=123.2) [here, then we could come in and we could do a port‑forward, and then](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=128.4) [we're going to do the pod here, and we'll do,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=133.38) [let's say, 8080, and then we know that nginx is running](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=136.82) [on 80, so we'll go ahead and do that.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=139.89) [Now that kind of locks this up.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=142.14) [Now let's run off to the browser. And you can see if I add port 8080 to my](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=143.6) [localhost, notice I can hit nginx. Now what that's doing, again, is opening up](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=148.45) [port 8080 on the node that then proxies into the pod,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=153.89) [and now we're able to talk to that pod directly.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=158.99) [Otherwise, if we turn this off, watch what happens here.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=161.49) [So let's go back.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=164.26) [I'm going to go ahead and we'll stop this, and now that is off.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=165.71) [So let's go back to the browser now,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=170.16) [and let's refresh. And you'll notice the site can't be reached because now](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=172.74) [what's happening is we're trying to hit localhost 8080, but there is no](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=177.02) [port 8080 that's been opened at this point,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=181.16) [so no proxying goes on to that port. Now coming on back in, we also know that if](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=183.74) [we do a get deployments that we have this deployment called nginx. So let's go](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=189.49) [ahead and do our port‑forward command, but this time let's do it to the my‑nginx](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=195.22) [deployment. And we'll just say 8080.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=201.01) [Okay, now this is going 8080 to 8080 you'll notice.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=204.74) [So let's go back to the browser now, and let's run it.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=208.38) [Notice we got an empty data response.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=211.22) [Well, we know why, nginx is on port 80.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=213.5) [Let's go ahead and stop this and try it again, and we'll do 8080:80.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=217.19) [Now we'll come back in and refresh, and notice we can get back to it.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=223.64) [So you can see how important this would be.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=228.08) [When I first got started with Kubernetes,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=230.3) [I'll have to admit,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=233.04) [I didn't have a great grasp of the different service types, and didn't](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=233.77) [really realize that my pods were ClusterIPs. And so,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=237.84) [as a developer,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=242.83) [when you're trying to test something that's running in a](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=243.6) [container, in a pod, behind the service,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=246.2) [and you didn't really know how this works, it's a little bit challenging](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=248.5) [because you can't even find out how to hit the thing.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=252.76) [Well, this is one way we could do it.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=255.5) [We'll look at some others, but this is one way.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=257.43) [So to wrap up, this port‑forward command is very,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=260.54) [very useful and can be used in many different scenarios, any](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=263.77) [time you'd like to expose a single pod,](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=268.37) [very useful for debugging or maybe analyzing performance on a pod, or](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=270.57) [for just scenarios where you need to be able to get to that worker](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=275.39) [node port and have it do that proxying to whatever pod we say that might be behind a deployment.](https://app.pluralsight.com/course-player?clipId=ceb255c4-e020-48cc-bf74-51bad36f09f1&startTime=278.86)

### [Creating a Service with YAML](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885)

[We can use YAML to declaratively define services that can be](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=0.74) [deployed to our Kubernetes cluster, and that's what we're](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=4.4) [going to jump into in this section.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=6.76) [So first off,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=9.64) [we've looked at YAML quite a bit up to this point, and know](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=10.72) [that if we're going to deploy a service,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=13.32) [we could do a port‑forward, and that would be one option](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=15.34) [that actually is a service behind the scenes, but if we](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=18.28) [want to do this declaratively,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=21.54) [then we'll have to create a YAML file, and then we'll have to create](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=22.94) [or apply that using the kubectl command, and that,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=26.89) [of course,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=30.66) [would generate the service that can then add IPs for the](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=31.06) [different pods we have behind the scenes.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=34.37) [Now the YAML for a service is actually pretty straightforward.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=37.04) [You give it an API version like normal, and you give it a kind of Service.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=40.34) [Now you've seen kind of Pod and kind of Deployment, now kind of](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=45.06) [Service, because obviously we're dealing with services, so that](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=49.66) [part's pretty straightforward.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=52.17) [Now you can also have metadata, and that,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=54.14) [of course,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=56.38) [would be things like the name of the service, any labels you want to put onto](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=56.73) [the service. And then you can have a spec for the service.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=60.82) [And you can give it the service type, the default, again, is a ClusterIP.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=64.94) [You can give it a selector.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=69.14) [This is what would be used to actually select the pods](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=71.4) [that this service would apply to.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=74.57) [And then, of course, you can define ports.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=77.04) [Now there's two types of ports, you have the port that you can call into](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=79.24) [the service with and the port that it would target on,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=82.57) [for instance, the container running in the pod.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=86.15) [So here would be a simple example of a ClusterIP‑type service. Notice, again,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=89.74) [we have the API version, we have the metadata. Now this time there's a](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=94.59) [label there where you could put your key‑value pairs,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=98.22) [maybe frontend, backend or other types of labels.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=101.6) [Now we also have the selector, in this case, app: nginx.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=105.94) [Now that's going to apply, though,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=109.73) [to any other pod or deployment that has app: nginx.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=111.42) [So if we deployed the pods through a deployment YAML file,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=116.58) [then as long as the template for the pod had the selector app: nginx,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=120.94) [then this service would automatically apply to that. It kind of hooks](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=125.12) [itself to any pod that has that label.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=128.67) [You'll also see that we can define the container target](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=132.44) [ports, in this case 80, as well as the port for the overall](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=135.42) [service, so in this case 80 as well.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=140.21) [Now one of the interesting things about services is the name](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=143.64) [that you give them in the metadata section.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=146.47) [So in this case,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=148.83) [we have name: frontend and the bottom one name: backend. That gets its own DNS](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=149.59) [entry within the internal DNS in the Kubernetes cluster.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=155.41) [Now that's great,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=160.04) [because instead of having to memorize an IP address or](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=161.03) [something like that to get to the service,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=164.82) [which then calls the pods,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=166.96) [you can just use frontend, backend or whatever name you decide](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=168.64) [to go with for the name of your service.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=172.25) [So in this case a frontend pod could access this by using just the word backend,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=175.24) [and then call in whatever the port is,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=181.39) [and then we could call into that, and now you don't have to worry](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=184.04) [about the IP addressing. It makes it much easier because, again, IPs,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=186.79) [first off, aren't the easiest to work with,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=191.32) [especially if they change. Services, we know, don't change once](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=193.15) [they're created, but why would I want to worry about the actual IP](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=196.84) [address when I can actually reference it by name?](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=201.34) [Now you can choose.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=204.84) [You can do it either way.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=206.06) [The previous service was a ClusterIP service.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=208.34) [This one is a NodePort service.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=211.64) [So you'll notice that in this case we have the type set to NodePort. The same](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=213.62) [features we talked about in the previous examples apply.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=218.99) [We have a selector that selects all the pods that are app: nginx,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=221.47) [and then we have our targetPort and our port.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=225.95) [Now notice the nodePort there at the bottom.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=229.34) [Now that's optional because it'll assign one dynamically, but](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=232.44) [if you want to specify one in that range,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=236.15) [then you can go ahead and put it, in this case,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=238.83) [31000.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=240.84) [Now we've already seen something like this in](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=242.91) [practice with our port‑forward command,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=245.09) [but now we're officially creating a service that](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=247.23) [would act as a NodePort service.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=249.97) [Now the next type of example is for a LoadBalancer.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=253.38) [Now it's going to be the same thing, except for in this](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=256.44) [case we have type: LoadBalancer, we have our selector, and](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=258.6) [then the port that you see, this would be the external port, so it would be,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=263.03) [for instance, localhost:80, if you want to be really explicit,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=267.22) [but just localhost, since it defaults to 80, and then the](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=270.92) [targetPort of what this is actually going to call into,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=274.3) [we're assuming would be 80 here.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=277.69) [So we set this to LoadBalancer, and then from there we can now call port 80.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=280.44) [And if we had nginx, which runs on port 80, behind this,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=285.64) [then we could call directly into that pod through this LoadBalancer.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=289.54) [Now, the final one is the externalName service.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=294.18) [This is not one that I personally have used quite as much,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=296.76) [but there definitely could be a use case for this.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=299.4) [And this is where we're, in essence, going to create an alias.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=302.31) [I named it external‑service, and that way any pods that need to get to](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=305.69) [this service, instead of going to api.acmecorp.com,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=310.74) [as you'll see in the externalName down below, they instead can just](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=314.8) [call external‑service, and then it will proxy them to the other one,](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=318.78) [to the externalName that you see here.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=324.48) [And that way, all we have to do is update this YAML if that api.acmecorp.com](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=327.14) [ever changes. Very nice, because it keeps it very clean.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=332.73) [And then again, you also notice a port here.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=336.44) [So when the pods call into this, it would be external‑service:9000. Now let's see how we can get this YAML into action with kubectl.](https://app.pluralsight.com/course-player?clipId=569033e1-a547-4ad8-a3cc-7e2438bad885&startTime=338.96)

### [kubectl and Services](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586)

[Fortunately,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=0.94) [the process of getting our service YAML into Kubernetes is very straightforward,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=1.5) [and you're going to know most of what I'm going to show you because](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=5.74) [once you've seen the create and apply commands,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=8.77) [you can use those in many scenarios.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=10.96) [So, we can use the kubectl create command.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=13.74) [Now, keep in mind you can also do the save‑config,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=17.14) [which is always recommended as well.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=19.54) [And when we do that, and we actually create it,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=21.9) [it will generate a cluster IP by default if you didn't specify the type.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=24.8) [Now, in this case, you can see the actual cluster IP,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=30.64) [we won't be able to call it, of course,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=33.2) [but now this service would pick up any of those Pods that might have](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=35.43) [been deployed that would have a specific label,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=40.34) [and that IP address would be used internally,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=43.45) [and the name that you see there, nginx‑clusterip,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=45.94) [could actually be used instead of the IP address.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=49.6) [Now,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=52.84) [we can also use kubectl apply if we want to either create or update a service.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=52.96) [Now, updating a service is actually more common than you may think.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=58.54) [While in this course we don't go into all the different types of deployments,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=63.04) [when you work with a blue‑green type test,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=67.34) [or canary test, or something like that, and you're using deployments,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=70.84) [that's actually going to involve services and changing services.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=75.01) [So there's a lot you can do with services to kind of switch](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=79.02) [them from one set of Pods to another,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=83) [just by changing the labels in the selector for that service.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=85.6) [That's where apply would come in, and we could use it in that case.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=89.84) [Now of course to delete a resource we can use the standard kubectl delete,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=95) [and we could either say service followed by the name of the service,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=99.04) [or we could do the YAML file, as you see here.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=102.47) [Now, a little bonus feature for you here.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=106.94) [Let's say that you'd like to see if a Pod can call another Pod.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=109.89) [How would you do that?](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=115.24) [How quickly can you test to see if that Pod is](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=117.34) [working correctly, in other words.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=120.54) [We could use kubectl exec, go into the Pod name,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=122.42) [and then execute a curl command against the name, or podIP in this case,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=127.37) [that we want to actually call.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=133.39) [Now, if you do that and the curl command isn't available,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=135.68) [so for instance on Alpine Linux,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=139.54) [you'd have to go into the Pod and go ahead and do this apk add curl,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=142.14) [of course the package installer would depend on the](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=147.57) [version of Linux that you're running.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=150.48) [But for Alpine Linux, we could run this apk add curl,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=152.64) [and then we could go ahead and do a curl command,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=156.74) [and that would allow us to see if we're able to hit this other Pod,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=159.25) [and we'll play around with that in just a moment, actually.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=163.09) [So you can see that moving the YAML for a service up into](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=166.41) [Kubernetes is actually very straightforward.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=170.16) [We've used kubectl apply and kubectl create several times for Pods](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=172.74) [and deployments and other things up to this point.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=177.86) [I think the big thing to get out of services so far, though,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=180.06) [is remember that their job or goal in life in the case of,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=183.78) [for instance, a cluster IP service,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=188.24) [is to give each of those running Pods an IP address.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=190.64) [We know that services and Pods are kind of joined together,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=195.64) [if you will, by using labels and the selector.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=199.29) [That's really important to understand so that we know how these work together.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=202.32) [So, now that we've seen that,](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=207.99) [let's go ahead and use a few of these commands to get some services up into a Kubernetes cluster with kubectl.](https://app.pluralsight.com/course-player?clipId=3ac64a09-d68a-4b76-a0b2-4f861a56f586&startTime=209.34)

### [kubectl Services in Action](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28)

[Let's take a look at how we can run our kubectl commands to get services going,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=0.91) [but also at how we can communicate between pods,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=5.2) [and the process that happens behind the scenes with that.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=9.07) [So I've deployed three different nginx pods here.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=12.84) [The first two are through a deployment,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=16.38) [which we saw in a previous module of the course,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=17.79) [and the second, the nginx standalone, I called it,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=20.36) [was deployed through the kubectl run command that](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=24.04) [we've also seen earlier in the course.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=26.87) [Now, what I'd like to do is show you how we can actually talk between these,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=29.34) [and then how we can actually change that a little bit by using services.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=34.51) [In fact, we're going to use the YAML that you see right above.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=37.72) [Before we do that, though, what I'm going to do first off,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=41.54) [is I'm going to go into this pod,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=44.7) [and let's go ahead and we're going to run the kubectl exec command on that pod.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=47.74) [Earlier, I ran apk add curl to get that so that now we can run curl commands.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=53.94) [Now, what I'd like to do is let's go ahead and leave this,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=60.44) [and we're going to create a new command prompt here.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=63.09) [Let's list all the pods,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=68.73) [and now I'd like to get an IP address for one of these pods.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=69.88) [So let's say we'd like to grab this one and get the IP.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=73.11) [So there are a couple of ways we can do this.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=78.04) [We could use a get and format the output,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=79.64) [or we could do a describe; either way would work.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=83.22) [Now, I'm going to go ahead and just show the get,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=86.23) [and we could say, let's get this pod named that,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=89.24) [and then we'll say ‑o is yaml.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=93.24) [And you';; notice right there at the bottom, we have the pod IP address.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=94.45) [So I'm going to go ahead and copy that into my clipboard.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=100.13) [Let's go back to our other one, and now let's try to curl,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=103.84) [and we're going to hit this IP here.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=108.09) [And you can see it worked.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=110.28) [We get thanks for using nginx back.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=112.02) [Okay, so that's nice, that's a good start.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=114.82) [Now, the problem with that is I actually had to know the IP address of that pod,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=117.74) [obviously.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=122.95) [So we had to come back and find that,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=125.34) [and you could imagine if that pod now goes away,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=127.05) [that would present a problem.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=129.5) [So I have the code here for a service.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=132.04) [You'll notice that I have a type of ClusterIP.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=135.28) [Now that means, of course, it's only going to be accessible within the cluster,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=139.14) [but this is still very helpful, because when pods need to talk to pods,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=142.24) [I'd rather not have to look up the IP of that pod,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=146.46) [because that pod may or may not be there.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=149.76) [So what I'm going to do now is. let me go ahead and I'm](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=152.74) [going to cd down into this folder,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=155.57) [and now I'm going to go ahead and do a k apply.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=157.6) [Okay, and that's being created.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=160.7) [Now let's verify that.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=162.89) [Let's do k get services, and there we go.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=163.97) [Notice we have an nginx‑clusterip; remember that](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=167.37) [name, because we're going to use it.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=170.49) [It also has an IP address.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=172.24) [Now, let's go ahead and take this IP address, and we're going to use it.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=174.11) [Now before I use it, though.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=178.63) [as a review, the deployment I have going for my pods that you saw, my two,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=180.18) [they have a label of app: my‑nginx.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=186.11) [So this service is applying to two of those pods,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=189.2) [not to the standalone, but to the other two.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=192.01) [So now I should be able to call from the other pod](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=195.54) [into these two through this service, and let's try that out.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=199.14) [So let's go ahead and run back, and from here, we'll do a curl.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=202.97) [Now I'm going to go ahead and just try to hit the IP address.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=207.05) [Now, one thing I should have pointed out is that notice the port is 8080.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=210.66) [You can see that here, and then that's going to go to 80.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=215.44) [Alright?](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=219.24) [So we'll go on back and let's put 8080 and see what we get.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=219.43) [And it worked.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=223.84) [Now this would actually load balance, if we keep doing curl commands.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=224.54) [We don't have a way to see that here,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=227.65) [but this would load balance between those two pods](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=229.65) [by virtue of having the service.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=233.04) [Now we can do one better than that, though.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=234.53) [If we go on back one more time, let's grab this name here,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=236.74) [and this is a DNS name, I imagine.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=241.24) [So now we can do curl http:/, give it the DNS name 8080,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=243.7) [and notice we get the same result.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=251.4) [Now you can see how useful that would be to not have to know the IP address.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=253.64) [So now we can configure services that are well‑known services,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=258.47) [and we can use those.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=262.07) [Really, really nice, it works really well, you can see.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=263.36) [Now the only reason I'd normally do what I'm showing](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=266.58) [you here is I might have a problem,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=269.37) [and I'm trying to debug a pod calling to another pod.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=271.24) [Well, now you know how you could do that within a Kubernetes cluster.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=275.28) [I hope you will never have to use that in production,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=278.57) [but as a last resort, that would be a way that you could actually jump in,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=281.2) [if you have the proper rights, and actually try calling a pod from another pod.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=284.81) [Alright, so now that we've seen cluster IPs,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=289.54) [let's go ahead first off and go into some others.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=291.84) [Now I'm going to clean up the service that I have.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=296.1) [So let's do get services, and now let me just grab this name right here,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=298.57) [and we'll do a delete.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=304.58) [Alright, and you'll notice we still have our pods,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=306.44) [we have our standalone pod, but I don't have that service now.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=308.36) [Now let's open our nodeport.service, and notice that we have a type of NodePort,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=312) [the selector is the same.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=316.84) [It's going to target the two top pods, and then our nodePort is 31,000.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=318.24) [That's going to go into 80, which will target 80 on the container.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=324.8) [So we kind of have a bunch of hops going on here.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=328.47) [Let's go ahead and apply that.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=331.14) [Alright, now that's been created, so let's list our services now.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=334.44) [Okay, and here we go.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=338.81) [So this would be the cluster IP, but notice we have this 31,000.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=339.87) [Now that's actually the external port 1 is going to be going to 80.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=344.28) [Alright, so let's go ahead now, and first off,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=349.14) [let's just hit localhost, and nothing happened in there; we would expect that.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=351.81) [Let's hit localhost 31,000, and notice it works.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=356.77) [So now we've opened up a nodeport that can get to that pod,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=362.38) [and this would work now.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=367.09) [Okay, so that would be an example of a NodePort.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=369.24) [So let's get rid of that one now.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=371.72) [Alright,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=376.04) [so the last thing we're going to do is I'm going to open](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=376.43) [this one called loadbalancer.service.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=378.86) [Now, the only difference here is the nginx‑loadbalancer is of type LoadBalancer.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=381.74) [You'll see that the external port on this one,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=387.54) [though, is 80, and then the target port,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=389.79) [of course, is 80.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=392.7) [So let's go ahead and apply this.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=393.57) [Now without really changing anything else,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=395.63) [let's come up and just take off the port,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=398.85) [because we said 80, and now notice I can hit it,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=401.62) [externally.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=404.38) [Now what this does is a little magic.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=406.54) [I'm on Docker Desktop with Kubernetes, and so if we do k get services,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=408.49) [this actually does a load balancer,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=412.87) [but notice they automatically created the localhost loopback](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=415.34) [address so that we could just get to it.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=418.78) [Great for development, because now I can call into my website through this,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=420.55) [then other services behind the scenes might call into](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=424.95) [APIs and databases and things like that.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=428.74) [So that's an example of different types of services.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=431.44) [We looked at ClusterIP, LoadBalancer, and the NodePort,](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=434.41) [and we also took a look at how you can use the kubectl exec to actually test](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=438.91) [if you're able to call a service. And we saw that you can call a service based on the name or the service's IP address.](https://app.pluralsight.com/course-player?clipId=69b4d28e-63b8-4660-8dcb-bf4cf69b4e28&startTime=444.38)

### [Summary](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606)

[Throughout this module,](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=1.54) [we've talked about some of the basic networking](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=2.25) [features that Kubernetes provides.](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=4.36) [We know pods live and die, so their IP addresses change,](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=6.74) [and services, then, provide that abstraction that allows us to get to the](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=10.1) [pods without actually having to know the pod IP addresses.](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=15.24) [That way, the consumers can just call into the services,](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=19.59) [and that magic happens behind the scenes with Kubernetes.](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=22.63) [Now we associate a service with one or more pods through labels.](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=26.44) [Labels, again, could be used to organize resources possibly,](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=31.44) [so that you can query them, group them, things like that.](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=35.09) [But, in this case, labels are really, really important,](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=38.34) [just like they were in deployments to tie these two things together,](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=41.53) [the service and one or more pods.](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=45.52) [We also talked about, there's four main types of services.](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=48.94) [We have cluster IPs.](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=52.21) [Those are only accessible within the cluster, and that's the default.](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=53.88) [We have node ports,](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=58.24) [where we can actually open up a port on the node so we can](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=59.26) [call into a deployment or a service.](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=62.36) [We can create a load balancer to allow something to be accessed externally,](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=65.27) [and then we can even create an alias, if you will,](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=69.89) [an external name, which can proxy to an external service.](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=72.71) [Earlier in the module,](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=77.24) [I mentioned that services in general and networking in](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=78.18) [Kubernetes are really big topics.](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=82.17) [There's a lot more we could go into,](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=84.64) [a lot of depth that could be achieved if you wanted.](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=86.56) [Things like load balancing, for example, really depends on your scenario.](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=90.39) [Are you running in the cloud?](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=94.77) [Are you running locally?](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=95.73) [What are you going to use?](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=97.2) [But, this should give you a really good idea about these core concepts, of how services are used to provide that entry point into our pods.](https://app.pluralsight.com/course-player?clipId=1d1f75c5-9462-4d16-b3e2-bd2551983606&startTime=98.84)

## [Understanding Storage Options](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc)

### [Introduction](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc)

[One of the topics that comes up a lot as you work with](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=0.5) [containers in general is storage.](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=2.9) [A container can go down.](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=5.71) [And of course, that means the entire file system would be unavailable.](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=7.39) [So what do we do in cases where we need to store data or state somewhere,](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=11.07) [and that's what we're going to talk about in this module.](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=15.53) [So we'll start off by talking about the core concepts of storage.](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=18.44) [We'll then introduce volumes which,](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=21.82) [if you've done much with Docker might be pretty familiar to you.](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=23.8) [From there,](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=27.6) [we're going to go into persistent volumes and](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=27.93) [something called persistent volume claims.](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=30.29) [And then we're going to wrap up with a look at storage classes and how](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=33.14) [they can be used with persistent volumes and the claims.](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=36.74) [Now as far as where we are,](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=40.84) [we're going to introduce a new piece to the puzzle here.](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=42.4) [We still need our pods and our containers.](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=45.44) [But now we're going to focus a little bit more on the storage as well and how](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=48.35) [those pods could even share data amongst each other by using things like volumes and the other things we're going to talk about.](https://app.pluralsight.com/course-player?clipId=cadb9671-2af5-4c19-aa57-815850a93bcc&startTime=52.9)

### [Storage Core Concepts](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390)

[Let's kick things off by talking about some of the core](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=0.69) [concepts associated with storage in Kubernetes.](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=3.13) [So first off, how do you store application,](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=7.04) [state,](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=9.61) [or data and then even exchange it between pods when](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=10.25) [you have a Kubernetes cluster?](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=13.85) [And the answer could be volumes.](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=16.24) [Now, of course, there are other options as well.](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=18.94) [You could always use a database, for example,](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=20.7) [but if this is something that you don't want to put in a database necessarily,](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=22.66) [and when a container comes back up after it was](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=27.12) [restarted you want it to get to it, then volumes can certainly help here.](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=29.71) [So a volume can be used to hold data and state for pods and containers](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=35.04) [and then even access it if that container is restarted.](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=39.31) [We know that pods live and die and so their file system](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=44.44) [is very short lived or ephemeral,](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=47.85) [so volumes can be used to store state or data and then use it in a](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=50.54) [pod so you might be containerizing a database,](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=54.31) [for example.](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=56.97) [Well, the logs and the data needs to be put somewhere.](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=58.14) [You might be writing to logs, in general.](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=61.69) [Whatever the situation may be,](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=64.54) [a pod in the world of Kubernetes can have multiple volumes attached to it,](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=66.3) [and then containers can create what's called a mountPath to access that volume.](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=71.33) [Now Kubernetes supports volumes, in general,](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=76.9) [and then we're going to talk more specifically,](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=79.89) [though, about PersistentVolumes,](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=81.61) [PersistentVolumeClaims, and something called StorageClasses,](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=83.97) [which are a type of template that can be used. Let's go ahead and get started then by talking about volumes in more detail.](https://app.pluralsight.com/course-player?clipId=1b510217-4556-4906-8a32-2a0b6bf52390&startTime=88.52)

### [Volumes](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284)

[If you've used volumes with containers before,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=0.34) [then the good news is they have a very similar](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=2.48) [purpose when it comes to Kubernetes,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=4.84) [although Kubernetes gives a lot more options.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=7.54) [So if you're new to it, a volume references a storage location.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=11.14) [Now, each volume must have a unique name,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=15.29) [and they're going to be attached to a pod,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=17.48) [and then they may or may not be tied to that pod's lifetime.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=19.32) [It really depends on the type of volume that you're creating,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=23.79) [actually, and we'll be talking about some of those.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=26.45) [Now, a volume mount is used to reference a volume,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=29.1) [and it does this by name,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=33.35) [and then it defines how to mount to it and define what's called a mountPath.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=35.02) [There's a lot of different volume types out there,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=41.34) [and here's some of the ones you may come across initially,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=43.46) [First one is called empty directory,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=46.74) [and this is for storing any data that pods need during their lifetime.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=49.34) [But if the pod goes down, then this would go away as well,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=53.67) [so it's tied to the pod.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=57.13) [HostPath.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=59.6) [This is where a pod mounts to a node's file system.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=60.97) [Now, there's pros and cons to this one because it's very easy to set up.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=64.2) [But if that node were to go down,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=68.24) [you could potentially lose data that was in that volume.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=69.91) [Network File System.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=73.25) [This would be where a pod is actually mounting to an nfs](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=75.64) [volume somewhere out there on your network.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=78.5) [Now, these next two, we're going to talk about a little bit later.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=82.39) [ConfigMap is a way to store key‑value pairs,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=84.84) [and secrets are for more sensitive data.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=87.78) [And in the next module, we'll dive into those a little bit more.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=90.32) [But they are a way to store data outside of a container.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=94.14) [Now, we're also going to talk about something called persistentVolumeClaims,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=97.34) [and this is where you're going to claim some type of a PersistentVolume.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=101.08) [There's many of these out there, as you'll see in a moment.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=105.77) [And that way,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=108.18) [the pod will use that claim to actually read and write from that volume.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=109.13) [And then, of course,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=114.84) [you might store data outside of your network and claim that data](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=115.49) [outside of your network using a cloud type of storage,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=118.82) [and we'll talk a little bit about that as well.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=122.22) [Now, I mentioned that there's a lot of volume types out there for Kubernetes.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=125.84) [The most basic ones would be the emptyDir,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=129.54) [the hostPath, or using secrets or configMaps.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=132.86) [But you can set up all kinds of things depending on third‑party products,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=136.32) [cloud options that are out there such as Azure,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=141.44) [Google Cloud, or AWS, and much more.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=143.86) [It really comes down to what your organization is going to use,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=147.64) [and this is where you're more than likely going to be talking to an](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=150.89) [administrator of your production cluster to find out what type of volume](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=153.9) [support they're going to provide you as a developer.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=158.37) [There's not one right way to do it.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=162.1) [In fact, there are many ways that would all work equally well.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=163.95) [It really just depends on what your company has decided to do.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=167.19) [So I'm going to walk you through some of the basic scenarios](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=171.24) [so that you understand how this works,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=173.99) [but just realize that this is a big discussion that you're going to have to](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=175.82) [have with we'll call it the powers that be at your company.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=179.22) [So let's start things off by talking about a simple type](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=183.79) [of volume called an emptyDir volume.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=186.09) [We could go into a pod template, a deployment,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=189.13) [or even other resources in Kubernetes and define a volume.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=193.04) [Now, notice we're giving it a name of html,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=197.11) [that name is very important, you'll see,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=199.92) [and then we're giving the type of the volume as an emptyDir volume.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=201.81) [Now, what this does again is creates kind of a scratch pad volume,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=206.54) [if you will, that as long as the pod is alive,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=209.99) [this will be available.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=213.82) [So if containers inside of the pod need to share data,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=215.74) [they could do it through this emptyDir volume.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=219.48) [If that pod goes down though,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=222.13) [then this volume would be lost as well because it is](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=224.89) [tied to the lifetime of the pod.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=227.32) [Now, our first container here called nginx,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=230.59) [well, this particular container might need to reference that volume,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=233.32) [so notice we have volumeMounts name is html.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=238.14) [And if you look up to the volume definition, that matches.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=242.16) [Now, we have a mountPath here of /usr/share/nginx/html,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=246.04) [and we're only going to read from this volume.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=250.2) [Now, the next one that you see below,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=251.84) [which is the Alpine image called html‑updater,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=255.2) [this is going to do some extra work.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=258.29) [Now, it's going to mount to the same volume,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=261.74) [has a different volume path you'll notice in this case,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=263.95) [but what we're going to do here is this is going to update](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=266.87) [the file index.html every 10 seconds.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=269.95) [Now, that'll reference the html volume above.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=274.99) [And if we sum it up,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=277.72) [both of these containers can now talk to the same location actually.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=279.67) [So as long as this pod stays up,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=284.79) [we'll keep updating the date with the html‑updater,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=287.64) [and then someone hitting the NGINX website through a](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=290.74) [browser would keep seeing the updated date.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=293.29) [Now, of course, this is a very contrived example,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=296.64) [but it provides a simple way to explain how an emptyDir volume works.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=299.61) [The next type of volume we're going to look at is called a hostPath volume.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=304.9) [This type of volume allows you to mount to a volume that's on your node,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=308.82) [your worker node.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=313.28) [So in this example,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=314.94) [we've created a volume called docker‑socket and has a](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=315.89) [hostPath of this /var/run/docker.sock.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=318.96) [This is a way that you can actually hook to the Docker](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=321.36) [daemon that's running on a machine.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=325.34) [Notice this is a Socket type of connection though.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=327.94) [Now, our container might want to integrate in some way,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=331.41) [shape, or form with the Docker daemon were going to say in this case,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=335) [so we would need to mount to that docker‑socket volume.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=338.62) [Now, we would do that by defining a volumeMount,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=344.08) [give it the same name, and then notice the mountPath there,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=346.94) [/var/run/docker.sock.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=350.24) [Now, in the args in the command up above,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=353.14) [we could actually issue Docker commands if we wanted and talk to that](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=355.37) [Docker daemon on the host and do that type of operation.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=360.06) [Now, pros and cons again with this one as well.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=363.94) [It's very easy to set up.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=366.74) [And if you just had a single worker node,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=368.54) [this would be one of the more basic ways to get started with volumes.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=370.73) [But what happens if the worker node goes down and you lose it?](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=374.54) [You would, of course, lose your volume,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=378.04) [so you'd have to be a little bit careful with this.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=379.42) [But that's what a hostPath volume would look like. Now,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=381.47) [we also have more robust cloud volumes out there.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=385.42) [So if you've used Azure, you can do Azure Disk or Azure File,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=388.55) [you can do AWS Elastic Block Store, you can do GCP's GCE Persistent Disk.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=392.73) [These types of volumes would provide some really robust and geo‑replicated](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=399.84) [type of functionality so that your storage is very redundant.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=404.6) [Now, whether or not you're using these again really depends on your company.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=408.84) [You may or may not even be in the cloud, and so it may not be an option.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=412.83) [So I'm going to quickly just run through what the YAML](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=417.04) [would look like from a high level, but understand,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=419.48) [you'd have to dig into this quite a bit more and also set](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=422.28) [this up obviously in your cloud provider.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=425.57) [So an example of an Azure file volume might look like this.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=429.18) [We would define our volumes and give it a name,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=433.84) [in this case, data, and then we have this azureFile property.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=436.32) [And then from Azure, we'd have to give the secretName here and a shareName.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=439.97) [And in this case, we're saying readOnly: false.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=445.66) [Now a container that would want a reference that can then mount to it,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=448.42) [use the same name, data,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=453.5) [and then define a mountPath to be able to talk to this file share,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=455.19) [and that would be one way we could create an Azure type of volume.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=460.34) [There's other ways as well.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=464.17) [Now, on AWS, it would look something like this.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=466.99) [We'd have a volumes with the name, and we have an ElasticBlockStore,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=469.84) [define our volumeID and a filesystem type,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=474.12) [and then we could volumeMount to the data volume and have our mountPath as well.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=477.53) [And then finally, for GCP, you might do the following.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=483.72) [So you'd have the gcePersistentDisc, give it some information here about that,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=487.31) [and then, of course, we would mount to that as well.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=492.41) [Now, what I just showed you there is a very basic explanation of it,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=496.04) [but that would at least help you get started.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=500.07) [And if you go read the docs for these different cloud providers,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=502.76) [they'll have a lot more details about how to actually do this for your cluster.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=506.13) [Now, once volumes have been set up,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=510.94) [can we actually view them with something like kubectl?](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=513.54) [And the answer is yes, and it's very simple.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=515.74) [So if we do a describe on a pod, any volumes for that pod will be listed.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=519.84) [So here's an example of an EmptyDir volume called html,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=524.37) [which you saw earlier,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=528.9) [and you'll notice that their description even says this is a](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=530.4) [temporary directory that shares a pod's lifetime.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=533.47) [I think they're trying to be really obvious here that be careful,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=536.94) [this is more of a scratch pad type of volume.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=539.58) [Now, you could also use the output option when you do a get on a pod,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=543.44) [and we could say yaml or json again right there,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=547.63) [and that would also list the volumeMounts,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=550.54) [that is, we have a mountPath of html,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=552.88) [and we have a name of html for this example.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=555.56) [So that's how you can get started with volumes.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=559.54) [And yes, there's a lot of different options out there,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=562.84) [but now you'll know the basic YAML to get started,](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=565.73) [whether it's a simple volume, like an EmptyDir volume, or more complex ones, such as a cloud volume.](https://app.pluralsight.com/course-player?clipId=c277dd25-3c50-47d8-8ea1-ce0b8712c284&startTime=568.54)

### [Volumes in Action](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e)

[Let's take a look at a few types of volumes that you can create.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=0.38) [So the first type of volume we're going to look at is the emptyDir.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=4.39) [Now, as a quick review, as the comment implies here,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=8.34) [this is tied to the lifecycle of the pod.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=11.04) [So if that pod goes down, then obviously, we're going to lose that volume.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=13.54) [But when we have multiple containers running inside of the pod,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=17.73) [this provides an easy way for them to share data.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=21.71) [Now, this would be very similar to what I showed a little bit earlier.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=24.91) [What we're going to have, first off, is in this pod,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=27.67) [we're going to have an nginx:alpine, and it's going to mount to a volume,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=30.27) [which we're going to talk about in a moment,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=35.53) [and then we're going to have just a alpine image,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=37.48) [and that's going to update the volume's index.html.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=39.44) [Now,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=43.48) [this is going to point to the same path that the](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=43.61) [nginxalpine container is going to point to,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=46.07) [and it's going to update the date every 10 seconds.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=48.54) [Now, to kind of kick this off then, we first name the volume,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=51.55) [in this case, html, and we say it's an emptyDir.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=55.5) [Now,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=59.99) [the next thing we do is you'll notice we then have a](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=60.11) [volumeMounts with that same name, and then we give it the mountPath.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=62.61) [Now, in this case, we're saying this volume that's being created,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=67.31) [we're going to mount it to /html inside of the alpine](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=71.04) [container, and then notice the date will be updated into](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=74.44) [that path to update this index.html.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=78.06) [Now, if we move on up,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=81.44) [we have another volumeMounts also to the same volume, but this is going to mount](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=82.38) [the container to the /usr/share/nginx/html directory. Now,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=87.43) [in essence,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=92.77) [what that's going to do then is this one will update the](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=93.23) [file and then this one will read the file.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=95.83) [In fact, you'll notice this is a readOnly type of volumeMounts.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=99.06) [So to run this, I already have the containers going.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=103.38) [So I've done a kubectl apply on this pod template,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=106.5) [and now we can go ahead and port‑forward to it so we can hit it.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=110.34) [So now, let's go ahead and open the browser.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=114.93) [Now, you notice this has already been running for a while.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=117.44) [And so if we wait about 10 seconds, you're going to see a new date show up.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=120.38) [It just keeps concatenating to the file, and there we go.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=124.78) [Now, we have yet another date,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=128.62) [So that would be an example of an emptyDir volume where you just need to share](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=132.08) [data between containers that are running inside of a pod.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=136.78) [But if that pod were to go away or be rescheduled somewhere, with an emptyDir,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=140.74) [you're kind of saying I'm alright with that.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=145.31) [The next type of volume we're going to look at is the hostPath.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=148.64) [Now hostPath, again, is where you would like to mount to a](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=152.14) [directory that's on the actual host,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=155.54) [the worker node where that pod maybe running. Now, the dangers of this,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=157.88) [of course,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=162.55) [are that a pod could get rescheduled in the case](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=163.13) [where you have many worker nodes.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=165.66) [And so in that case, you'd have to set up Node Affinity.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=167.54) [But in this case,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=171.04) [we're going to assume we just have one worker node, and we just want to be able](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=171.63) [to talk to a specific directory on that worker node. Now,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=174.51) [this is actually going to allow us to talk to the](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=178.67) [Docker daemon that's on the worker node.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=180.96) [So we have a container here for Docker itself,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=184.48) [and I named it docker. Doesn't do much.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=188.14) [It just sleeps, and that keeps it running.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=190.89) [But under the covers,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=193.74) [you're going to notice I have volumes, I have a name,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=194.64) [docker‑socket, and then it's a hostPath volume this time.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=197.71) [And this is pointing to where the Docker daemon is actually](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=202.09) [accessible, this docker.sock. You'll also notice that the](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=205.74) [type in this case is a Socket.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=210.43) [Now, there's other types we could do there.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=213.54) [But for this one, we'd want a Socket connection to that Docker Daemon.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=215.26) [Now, from there, up in the container,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=221.04) [you can see it's very similar to what we did with the empty directory.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=222.88) [In this case, we give it the name, docker‑socket, that matches, of course,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=227) [the name of the volume, and then we give it a mountPath to](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=230.55) [where we want to get to in this case.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=234.5) [So from the docker container, anytime I issue a command now,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=237.04) [it's actually going to go to this /var/run/docker.sock,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=241.08) [which ultimately is going to talk to this path on the host.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=243.54) [So let me stop what we had before.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=248.41) [Now, let's go ahead and do an apply on this pod. Before we go](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=251.34) [too far, let's get the name of that pod.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=255.69) [You can see, Docker‑volume, and let's do a describe on that. Now,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=258.28) [if we look in here, there we go.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=265.84) [You'll notice the volumes are actually defined when we do](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=268.86) [the describe, and you can see the type,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=271.57) [you can see the path, and other information there.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=273.91) [And that's how you can get to information about a running pod is through](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=276.2) [describe, or we could even do a get with a ‑o, as we've seen earlier in](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=279.88) [the course, and do output of json or yaml.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=284.07) [Now, what I'm going to do from here though is I'm going to go ahead and](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=287.9) [sh into the pod, and that pod is docker‑volume again.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=291.08) [So let's go ahead and run this command. We'll do a k exec on docker‑volume,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=296.21) [and then we'll do our interactive TTY sh shell, and now we're in.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=301.73) [Now, I'm going to go ahead and just type docker here.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=307.14) [Now,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=310.52) [what that did is that actually ran against the Daemon because what's](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=310.69) [happening here is any calls to the /var/run/dockor.sock,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=315.07) [which is what's happening when I run Docker, are actually forwarding,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=319.44) [if you will, to the host Docker Daemon. So if we came on in and did a](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=323.35) [docker ps ‑a, this will show us all the different containers that are](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=328.45) [running on the host. And you can see, there's quite a few things](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=333.03) [running actually behind the scenes, most of which are Kubernetes.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=336.64) [So that's an example of a different type of volume. Now, we](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=340.74) [could also set up different types of volumes.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=344.67) [We did Socket here, but we could do things like File or Directory,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=346.72) [and there's even some other options if you go take a look at the documentation.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=351.43) [So if we just wanted to write, for instance, to a](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=354.61) [text file that makes it on the host,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=356.92) [then we could just come on in and change the path, change the type to File or](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=359.91) [Directory if you'd like to write different files, and then the container could](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=364.46) [just write to that directory or file. Pretty simple. Now, the pros and cons of](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=369.06) [this again are this is locked down, in this case, to the worker node where this](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=374.27) [particular pod is running, and if that pod were to get rescheduled, that could](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=379.57) [cause a problem.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=383.93) [But in cases where you're worried about the pod getting](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=385.17) [rescheduled on many different worker nodes,](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=387.95) [this is probably not the route you'd want to go, and you want to look at](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=391.34) [some other options that are more network file based.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=394.35) [So that's an example though of getting started with volumes and using those within pods.](https://app.pluralsight.com/course-player?clipId=5260207e-01a5-4e97-b275-056bd9eb250e&startTime=398.14)

### [PersistentVolumes and PersistentVolumeClaims](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a)

[Now that we've talked about the fundamentals of volumes,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=0.49) [let's dive in even deeper and get into PersistentVolumes and](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=3.08) [something called PersistentVolumeClaims.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=6.65) [So a persistent volume is a cluster‑wide storage unit that you can see](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=10.24) [here and it's provisioned normally by an administrator with a lifecycle](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=14.21) [that's completely independent from the pod.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=19.56) [So think of it as something that you as either the administrator or you work](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=22.69) [with an administrator to set up would get in place and then it would talk to](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=26.54) [cloud storage or local storage or whatever it may be.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=30.72) [Now, in order to use one of these,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=35.49) [you would use what's called a PersistentVolumeClaim,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=37.3) [and this is just a request for a storage unit,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=40.28) [which would be the persistent volume that would have been set up earlier.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=43.5) [So these work hand in hand so that an administrator sets up the PV,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=47.24) [the persistent volume,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=50.84) [and then you might use the PersistentVolumeClaim within your pod](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=52.54) [or deployment so you can talk to that storage.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=56.9) [And here is a breakdown of how this works then.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=60.44) [So a persistent volume is cluster‑wide,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=62.27) [and this is a resource that is definitely going to rely on](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=65.41) [some type of network attached storage, now again,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=68.36) [that may be cloud, it may be a local network.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=71.6) [This is normally going to be provisioned by a](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=76) [cluster administrator, but obviously, if you're working locally on your machine,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=77.89) [you might want your cluster to possibly talk up to a dev version of the cloud.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=82.44) [Now it's available to a pod,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=88.04) [even if that pod gets rescheduled to a different node because this type of](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=89.45) [storage is obviously not specific to any of the worker nodes.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=93.41) [So unlike something like an empty directory,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=97.24) [well, we know that is tied of the pod lifetime,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=100.5) [so that's a very limited scope.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=102.78) [Then from there, you have the host path, well,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=104.94) [that's tied to a worker node, but what happens if your pod](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=107.06) [gets rescheduled to a different node?](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=109.99) [That wouldn't work very well.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=112.2) [So with this type of approach, no matter where your pod gets scheduled,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=113.9) [you're going to be okay.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=117.45) [Now, this will rely on a storage provider such as, as mentioned,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=119.94) [the network file storage, cloud storage,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=123.2) [or maybe some third‑party type of storage option.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=125.57) [And then we're going to use this PVC, PersistentVolumeClaim, to kind of say,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=128.94) [hey,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=134.01) [I have a pod here, I need to get to this storage over](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=134.38) [here, and so we're going to claim it.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=137.23) [Now to better understand this, let's walk through a](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=139.72) [visual explanation of how this works.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=141.64) [So the first thing we're going to do is create some type of network storage](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=144.84) [resource, NFS, cloud, whatever it may be. Now the next thing we're going to](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=147.89) [do is we're going to define a persistent volume and then that's going to be](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=153.44) [registered with the Kubernetes API. Step three, now we need to create a](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=157.75) [PersistentVolumeClaim, or PVC, in order to be able to use this persistent volume.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=163.94) [And then Kubernetes is going to bind that PVC to the PV, the persistent volume,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=170.44) [which in essence means we can now talk to the storage.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=176.74) [We'll then go into the pod template, the deployment template,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=181.5) [or maybe another type of resource and we'll bind to that PersistentVolumeClaim.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=184.15) [And now the circle has been completed, you could say. Now we're going to be](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=190.07) [able to talk to the persistent volume and no matter where that is, NFS, or](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=194.65) [cloud, or some third‑party option, magically,](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=198.91) [this would allow your pod to read or write to that storage.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=202.36) [So that's a quick look at the workflow. Now let's jump into what some of the YAML would look like to set this up.](https://app.pluralsight.com/course-player?clipId=ac231d71-a08c-429f-a04b-a5a92b3c196a&startTime=206.34)

### [PersistentVolume and PersistentVolumeClaim YAML](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc)

[I found that one of the trickiest aspects of working with PersistentVolumes](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=0.68) [and PersistentVolumeClaims is just getting the YAML right.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=4.52) [Now the good news is there's actually a GitHub site out there](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=8.24) [that's going to give you different examples,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=11.25) [and I'll show you where that's at just a little bit later here,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=13.43) [but let's walk through an example of how we would set this](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=16.18) [up in general from a higher level from the perspective of](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=19.4) [what's the YAML look like, and what are we doing,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=23.65) [and how would we actually set this to talk to,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=26.02) [say, a cloud provider, for example?](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=28.88) [So let's start right here where we have a Pod,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=31.74) [and in that Pod template or maybe in the deployment for the Pod,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=34.18) [we're going to have a volume mount, and that's going to reference the PVC,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=38.04) [the claim, and then that's going to reference the PersistentVolume.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=41.75) [So let's first focus on the PersistentVolume itself and](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=46.34) [how we could define that potentially.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=49.4) [So here's an example from a GitHub site.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=52.34) [You can see at the bottom here, github.com/kubernetes/examples.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=54.98) [This is a great site to know about because if you're really new to this,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=58.47) [and let's face it, everyone is at some point,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=63.76) [then at least this gives you a good starting point.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=66.47) [Then you can also go to the docs and learn more there.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=68.97) [What this YAML would do first off is define a](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=72.74) [PersistentVolume kind as you can see here,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=75.52) [and then it's going to go in and give it a name,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=77.99) [a very simple one of my‑pv, ffor this example.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=80.54) [We can then define a storage capacity, 10Gi, and we can then define accessModes.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=83.49) [Now in this case, we're going to allow a single client,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=88.87) [which would be a Pod, for example, to mount for ReadWrite access,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=92.94) [but many pods or many clients could mount for Read access.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=97.64) [Now we're also going to override the default policy,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=103.14) [which is the persistentVolumeReclaimPolicy to say,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=105.96) [hey, even if this claim is deleted,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=109.3) [don't erase what's going on behind the scenes,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=112.34) [maybe in the cloud, for example.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=115.23) [Now in this case, we're setting up an Azure file storage,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=118.24) [and so you'll notice again we'll have to provide a](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=121.48) [secret name and a shared name, and then we're saying,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=123.22) [no, it's not read only,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=126.03) [that's why we did the ReadWrite once up above in the access mode.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=127.19) [If you're not using Azure, I showed some simple examples earlier for GCP or AWS,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=130.99) [and if you go take a look at these Kubernetes examples,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=136.84) [they'll provide a whole bunch of examples there that](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=140.46) [you can at least get started with,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=142.85) [and then as I've already mentioned a few times,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=144.45) [obviously if you go to the Azure GCP or AWS docs,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=146.57) [you can get even more details there.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=150.32) [So now that we've created the PersistentVolume,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=153.24) [let's switch over to the PersistentVolumeClaim.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=156.04) [What would that look like from a YAML perspective?](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=158.46) [Well, here's an example.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=161.94) [You'll notice first off we have a kind of PersistentVolumeClaim.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=163.02) [From there, we give it a name again,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=167.44) [and then we're defining an access mode that we would](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=169.84) [like to use when we claim this, in this case,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=172.43) [ReadWriteOnce.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=174.74) [So this would be hooked up to a Pod that would connect to it,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=176.34) [and then not only be able to read, but also be able to write to this storage.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=180.14) [Now from here, we're also requesting how much storage we would require,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=184.44) [5Gi, Now recall that the actual storage itself was 10 GB max,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=187.38) [but we're saying we need 5 GB for this particular claim.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=194.44) [Now, once the claim's been set up, we need to reference that inside of the Pod.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=198.54) [So the way we're going to do that is we'll either go into a Pod spec,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=205.24) [or a deployment spec, or maybe even another resource,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=208.89) [and we're going to come on in and create a volume.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=212.58) [Notice that the volume has a name blogdisk01,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=216.4) [and just like we talked about before in the volume section of the course,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=219.64) [this name would be used, and we're going to see that in just a second here.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=224.91) [Now notice though instead of an empty directory,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=229.04) [or host path volume, or something like that,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=232.07) [we're saying this is a PersistentVolumeClaim,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=234.04) [and we're giving it the name of that claim that you saw just a second ago.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=237.08) [Now the final step is we would then take the name of the volume,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=242.94) [blogdisk01, and we would define our mount path,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=246.29) [well, any time now, this container,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=250.44) [which you'll see is a little NGINX one that has a](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=253.07) [little loop running in the background, any time that runs,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=255.04) [it's now going to write to some out file every second,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=259) [and that's going to be written out to this storage that,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=262.74) [in this case, would be up in Azure.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=265.52) [And that's the basic process for creating a](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=268.54) [PersistentVolume and a PersistentVolumeClaim.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=271.4) [Now there's a little bit more to the story.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=274.99) [There's one little piece that I ignored,](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=276.75) [and we're going to talk about that next, and that's called a storage class.](https://app.pluralsight.com/course-player?clipId=4aec6a91-e702-47ef-97e9-6731643a5acc&startTime=279.78)

### [StorageClasses](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937)

[While you can manually create PersistentVolumes and then](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=0.64) [use that with a PersistentVolume claim,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=3.76) [there's another technique we can use called StorageClasses.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=5.98) [Now, a StorageClass is really a template,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=10.84) [if you will, and it can be combined with a provisioner,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=13.24) [and you can then dynamically set up the storage on the fly](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=18.36) [whereas what I talked about earlier would have been static where](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=22.39) [we have to go in and set up the storage,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=26.18) [and create the PV, and create the PVC, and kind of do all that ourselves.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=27.8) [Now, while you could certainly use a StorageClass locally,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=32.24) [and I'm going to show you the basics of that,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=34.82) [this is normally where an administrator would set up a StorageClass template,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=36.76) [and then you could bind to it,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=41.94) [and I'm going to show you how that process works here.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=43.92) [So on the left, you're going to see an image with a PVC,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=46.64) [and that'd be our claim, and you'll notice it's going to bind to a PV,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=49.7) [but there's a little dash line between the claim,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=53.39) [the PVC, and the StorageClass, the SC.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=56.81) [And we're going to talk about kind of what is that SC and what does it do here.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=61.1) [A StorageClass can be used to define different classes of storage,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=65.49) [so you could have many different types of storage out there](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=69.2) [and many different StorageClass definitions.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=72.39) [So it acts as a template for different types of storage,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=76.14) [but what's unique about it is it support something called dynamic provisioning.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=79.56) [What dynamic provisioning would allow for is an](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=85) [administrator to set up the StorageClass.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=87.99) [We could then request it through a PVC, a claim,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=91.14) [and then it could dynamically set up the PersistentVolume,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=94.94) [the PV.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=99.01) [This makes it much more flexible so that you as a developer,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=100.28) [for example, are not constantly saying, hey,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=103.55) [Administrator, I need you to set up yet another PersistentVolume,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=106.61) [and another, and another.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=110.72) [And then, who knows, maybe some of your pods are reusing,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=112.5) [and you ended up duplicating without realizing this.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=116.14) [So this provides a lot more dynamicness when it's needed,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=119.44) [but you can always go the static approach as well where somebody creates the PV,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=122.98) [you then create maybe the PVC and use it in a pod.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=127.57) [Now, as mentioned,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=131.44) [this means administrators don't have to create PVs in](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=132.34) [advance if this is set up to be.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=135.56) [So just like we did earlier,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=138.84) [let's go through a visual explanation of how this would work.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=140.06) [So the first thing that would happen is you would create a StorageClass,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=144.24) [and this is a YAML file again that I'm going to show you momentarily.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=148.26) [Now, if you had a PVC, it can then reference that StorageClass.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=152.04) [But instead of a PV having to already have been created,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=157.84) [we could dynamically provision that instead.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=161.94) [So in essence, it's dynamically creating the PersistentVolume.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=165.34) [And then, of course, that's going to point to our storage, wherever that is.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=169.54) [Now, from there, because the PV used the StorageClass,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=173.62) [it would then be bound to the PVC,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=176.91) [and then we can talk to that and write to our storage.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=179.51) [So let's walk through what the YAML would look like,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=184.14) [at least from a high‑level in this scenario.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=186.08) [So the first thing you would do is create a StorageClass,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=189.44) [so you have your API version, but then you have your StorageClass.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=192.79) [Now, the next thing is in addition to giving the StorageClass a name,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=197.2) [which is very important, you can also define a reclaimPolicy if you'd like.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=200.48) [We talked about that a little bit earlier on what happens to](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=204.73) [that storage once the claim is released.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=207.66) [Well, in this case, we're going to say, Retain the storage,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=211.14) [don't kill it, don't delete it.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=213.59) [Now, this is the important part.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=216.34) [I did what's called no‑provisioner here because this is a very simple example.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=217.87) [And this means that for my example, I would have to create the PersistentVolume.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=222.44) [It's not going to be dynamically provisioned; however,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=227.74) [there's different values you can supply here,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=231.86) [and this is where it depends on the type of storage and the type](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=234.41) [of dynamic provisioning that you want to do.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=238.51) [So the bottom line here is to find out the other options,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=240.54) [you're going to have to go look at the docs for your different storage types.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=243.21) [Now,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=247.84) [this last one I just kind of threw in because what this](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=247.96) [will do is instead of immediately binding to this and](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=250.32) [create in it as the PVC is created,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=255.08) [if we say WaitForFirstConsumer and what this will do is actually](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=258.14) [wait until the pod is created to actually provision the storage](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=262.75) [whereas I could create the PVC, the claim,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=268.04) [behind the scenes, and that would immediately create the storage,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=270.85) [and that's the default mechanism.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=273.42) [So if you don't want that and you want that first pod to actually trigger that,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=275.44) [then in this temple, you could say WaitForFirstConsumer.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=279.64) [Now, the next thing is, we're going to use that StorageClassName,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=283.44) [which I called local‑storage, in a PersistentVolume.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=286.19) [I didn't have a dynamic provisioner here,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=290.14) [and this is going to be a local storage that just writes to a worker node,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=292.85) [so a very basic example.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=295.89) [But what we're going to do here's we'll set up our normal stuff,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=298.14) [like what's our accessModes?](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=301.01) [ReadWriteOnce.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=302.63) [In this case, we're going to allow one pod to read, one pod to write.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=304.24) [We referenced that StorageClass from the previous example,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=309.57) [and that name was local‑storage,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=313.24) [and then here's the path information on the worker node.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=314.9) [Now, the last little piece we haven't seen up to this point.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=319.54) [You'll notice now we have a nodeAffinity,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=321.95) [and this is going to make it so if we had multiple nodes,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=325.04) [here's the node that we'd like to write to.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=328.34) [You'll notice I have a nodeSelector this time,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=331.64) [and I'm going to matchExpressions based on the hostname.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=333.85) [So that kubernetes.io/hostname will basically know about the hostnames](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=338.31) [that are out there for our different worker nodes,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=342.71) [and then the In operator is going to say,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=345.24) [hey, any of the values I list, and notice,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=348.01) [node‑name here, that's just a placeholder,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=350.12) [let's say it was called foo, then if one of the hostnames was foo,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=352.42) [then that's where this volume would be set up is on that particular node.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=357.74) [So this is a way we can actually lock in this type of a volume to a](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=362.11) [specific node based on if it's in this value.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=366.07) [Now, the last thing is we then have a PersistentVolumeClaim.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=370.64) [In this case, what we're going to do is we'll define that kind,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=374.54) [but then we're going to go down,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=378.28) [and in addition to setting the accessMode that we've already talked about,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=379.89) [we're also going to come in and set the type of storage,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=383.84) [and notice the StorageClass name here.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=386.62) [So this StorageClass name, anytime this claim is used,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=389.54) [would reference the template.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=393.31) [Now, in this case, the PV, the volume, was actually set up statically,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=395.34) [but again, the template could also have that triggered to be set up dynamically.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=401.01) [Now the last piece is then in a pod template,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=406.69) [a deployment,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=409.33) [or other types of templates, we could then go in and do our normal volume,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=410.04) [give it a name, and then give it that claim that you just saw.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=414.62) [Now, that claim would be hooked up to the blueprint,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=418.54) [that would be the StorageClass, and then that would tie into the PV,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=420.72) [the PersistentVolume.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=425.12) [So in this case, we define the volume, and we use a PVC to claim it,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=426.94) [and we can now write to that storage.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=431.08) [Now, you can see there's quite a bit to this,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=434.09) [and quite honestly, this is something as a developer,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=436.22) [you may or may not really have to deal with as far](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=439.73) [as the Kubernetes cluster goes.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=442.66) [Where I found I did need to know at least the basics was if I was,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=444.74) [for instance,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=448.92) [trying to emulate production locally on my machine or I](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=449.37) [was trying to do maybe some testing, end‑to‑end testing,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=453.27) [for example,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=456.37) [and I wanted to test a real scenario where maybe I do have some](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=457.64) [volumes out there that my pods are hitting.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=461.27) [Well, in that case, I need a way to get it up and running,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=464.04) [at least in a test scenario.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=467.59) [Maybe, for instance, you only use hostPath type of volume,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=468.9) [very, very simple,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=472.34) [just writes to that single node that you might have](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=473.48) [on something like Docker Desktop.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=476.02) [Really depends on your scenario,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=477.96) [but understanding at least the basics of this are definitely good because,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=479.82) [as we all know,](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=484.88) [it's very common to write to some type of a file system or other](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=486.22) [storage mechanism out there in some applications.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=489.81) [So to wrap up, let's take a quick look at some examples of how we can put all this together.](https://app.pluralsight.com/course-player?clipId=808b5550-4ef6-48af-87f7-7143ba693937&startTime=493.89)

### [PersistentVolumes in Action](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332)

[Let's dive into an example that shows off how a StorageClass,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=0.74) [a PersistentVolume, and a PersistentVolumeClaim could be used.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=4.4) [So jumping into this mongo.deployment file,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=9.24) [you're going to notice I have a StorageClass,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=11.84) [and we have the standard stuff in here, the apiVersion,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=14.29) [we have the name, we have no‑provisioner in this case,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=17.41) [so this will be a statically provisioned one,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=20.68) [and then we have a Retain on the reclaimPolicy.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=22.87) [And then, in this case,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=26.43) [we're going to wait for that first pod to actually be created](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=27.16) [before we register all of this behind the scenes.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=30.54) [Now, moving on down, we then have a pv, a PersistentVolume.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=33.69) [Notice the name, mongo‑pv.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=38.5) [We have some basic information in the spec, such as what's the storage capacity?](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=40.84) [The volumeMode you'll notice is Filesystem, and we have ReadWriteOnce.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=44.77) [So whatever pod actually connects with the claim,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=49.07) [they'll be able to do multiple writes, but that's it.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=53.17) [We're not going to allow anyone else to write in this case.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=57.36) [Now, the important part is notice the storageClassName, local‑storage.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=61.24) [Well, that again points right back up to here to our local‑storage StorageClass.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=65.22) [Now, moving on down, we have nodeAffinity.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=71.09) [And in this case,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=74) [I said that I want to make sure the hostname is in docker‑desktop.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=75.27) [Now,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=79.84) [that's all we have right now for running docker‑desktop is just one worker node,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=79.97) [and it's called docker‑desktop, at least at the time of recording,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=83.94) [that certainly could change, but that will make it so it'll set it up.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=87.05) [And then if I jump back up,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=91.35) [you'll notice the path then that it's going to write to Is this /tmp/data/db.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=92.55) [So we have a StorageClass which doesn't dynamically provision,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=98.21) [but it sets up a few basic template properties.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=103) [We then have a PersistentVolume that sets up all the details about where](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=106.14) [the volume is going to write to and things like that.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=110.91) [And then to use it, we need a claim.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=113.35) [So we have a PersistentVolumeClaim, mongo‑pvc.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=116.64) [Notice, ReadWriteOnce again and the storageClass is the same.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=120.03) [So what'll happen here is any of those properties](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=124.98) [from that storageClass template,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=127.31) [they're going to be available to the claim and to the PersistentVolume.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=129.59) [Now, when we create that PersistentVolumeClaim,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=134.34) [it can hook up to the PersistentVolume and then automatically](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=137.54) [get those properties from the StorageClass.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=141.29) [Now, to use this, we have a service,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=144.98) [but we also have a special type of deployment here called a StatefulSet.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=148.09) [Now,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=154.64) [this is one that we did not cover in the previous session on](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=154.94) [deployments because in a core concepts course,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=158.68) [there's only so much we could go into,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=161.59) [but I wanted at least throw it in the course itself.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=163.14) [What this does is provides a stateful type of pod.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=166.52) [It'll always have a predictable name, and you'll see that as we start this up,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=170.84) [and it has some other features related to state because this is a database.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=175.74) [We want this to kind of stick around and always be put in the same place,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=179.48) [have the same name, those types of things.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=183.71) [Now, this is for MongoDB.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=186.94) [So if we scroll on down, notice we just have one replica,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=188.97) [that's going to be pretty standard, we have our template with our labels,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=192.05) [and then we have our containers, notice we're using Mongo with the port 27017,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=195.94) [and then we have it looks like some mongod auth,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=201.37) [and this will set up the database,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=204.34) [get it running, and turn on the authentication mode.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=205.89) [Now, from here, you'll notice the volume mounts,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=209.54) [mongo‑volume, and notice the mountPath, /data/db.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=212.68) [What's going on here is this is kind of your standard place where](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=217.74) [database type files are going to be written to.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=221.09) [But if we were to jump back up to the PersistentVolume,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=225.01) [notice it's actually going to store them in](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=228.84) [/tmp/data/db on the local filesystem.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=231.05) [Now, I actually had to go, in this case,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=235.84) [on my Mac, and create this /tmp/data/db folder to get that ready for my host.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=237.81) [Because in this case,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=244.57) [docker‑desktop will actually proxy from the host where the](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=245.5) [containers are running onto my local machine.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=249.28) [Very similar, if you've ever done volumes with docker on your local machine,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=252.57) [how the container can actually talk back to your local machine,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=256.27) [and they kind of do some proxy magic to make that happen.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=260.18) [Now, moving on down, the last piece then is the volumes.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=264.24) [Notice the persistentVolumeClaim, mongo‑pvc,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=268.74) [so this now goes through all those different things we](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=272.22) [talked about in the previous section.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=275.8) [Now, to run this, there's a readme in the file.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=277.74) [So when you go to the course's downloadable materials,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=280.42) [you can get to the GitHub repo, and you can get all this.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=283.39) [But what I've done up to this point is I created this tmp/data/db,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=287.34) [and now what I'm going to do is run this command right here,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=291.26) [so I'm just going to copy that,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=294.7) [and then we'll run through some of these to wrap up.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=296.34) [So let's go ahead and go to a CommandPrompt, and we'll go ahead and create this.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=298.84) [And you'll notice in this case because the YAML had several](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=304.14) [different resources defined in one file,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=308.28) [we had the StorageClass, the PersistentVolume,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=311.14) [the PersistentVolumeClaim, there was a service,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=313.82) [and even a statefulSet defined, but all that was created all at once,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=316.66) [which is really nice.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=321.31) [So now, let's go ahead and take a look at the pod,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=323.04) [and you're going to see a little different naming convention here for Mongo.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=325.51) [Notice this mongo‑0, very,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=330.21) [very different than what we've seen with a standard deployment because](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=332.72) [you saw when we did NGINX and some other examples,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=336.77) [it came up with a type of unique identify.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=339.4) [Well, because this is a statefulSet type of deployment,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=343.24) [we're always going to get this predictable name.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=347.04) [And even if we had replicas, we'd get mongo‑0, mongo‑1, mongo‑2.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=349.84) [It'd be very predictable.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=353.5) [Now, let's clear that.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=355.44) [And now what I'm going to do is go into the mongo‑0,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=356.65) [and then we're going to do it sh.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=359.81) [Now, what I'm going to prove is that we're actually writing to my hard drive,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=361.41) [and I'm going to show you how this is going to work here.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=365.13) [So now I'm inside of the running container, we'll do a mongo command.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=367.94) [Now,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=372.25) [this will just kind of get the database in a mode where we](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=372.34) [can query the database if we wanted, and notice it did.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=375.58) [Now,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=378.23) [what I'm going to do is I'm going to jump over to my](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=378.44) [filesystem, and let's see if that /tmp/data/db folder on my](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=380.82) [local system actually has some MongoDB files,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=384.56) [and here we go.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=388.02) [Now, that was empty before, and now it went and it created all those Mongo files.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=390.5) [So we've now kind of proxied through from the actual](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=395.65) [container through to the pod through to the host through](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=399.67) [to my local machine in this case.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=403.27) [Now, that's only because I'm running on Docker desktop though,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=405.69) [but it's great from a development standpoint because now I can](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=408.47) [start to work with files locally if I'd like to.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=412.05) [So from here, let's do a kubectl get‑pv,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=415.79) [and I just want to point out that the reclaimPolicy that's something we saw](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=418.48) [in the StorageClass a little bit earlier if we go back,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=422.71) [and you see it right here, that that has been set to Retain.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=425.76) [So even win the PVC, the claim is released,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=429.06) [it's still going to keep around that local‑storage for us.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=432.34) [Now, once we're done,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=436.46) [we could finish up, and we could start to delete these resources, so](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=437.38) [we could run this command here. And that's not something I'll put](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=440.88) [here because we know how to do delete.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=444.7) [We've done that a bunch, but that would be an example of kind of](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=446.29) [putting all these together. In the effort of keeping this very](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=449.54) [focused, I haven't shown the dynamic way because that really depends](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=453.08) [on what type of storage you're using.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=457.62) [So keep in mind though that if you're using some of the](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=459.57) [other third‑party or Cloud Storage options,](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=462.4) [some of that can be done dynamically, and that can really add](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=465.84) [some powerful features for your Kubernetes administrators](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=468.81) [because now they can kind of get out of the business of](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=471.44) [constantly creating PersistentVolumes. They can just create the StorageClasses and let everyone use them.](https://app.pluralsight.com/course-player?clipId=25fd5b96-564e-4c09-ad98-41191d72e332&startTime=474.12)

### [Summary](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9)

[You can see that storage is a really big topic in Kubernetes,](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=0.54) [but we've covered some of the key concepts that you need to](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=3.93) [know at least to get started with it.](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=6.76) [So as a quick review, we talked about ephemeral storage,](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=9.04) [where it's tied to the life of the pod, and that would be the empty directory.](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=12.38) [We looked at persistent storage, and there're many,](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=17.54) [many options from third‑party products to open source](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=20.11) [to cloud that we could use for that.](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=23.11) [From there we took it up a level,](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=26.54) [and instead of hooking a volume directly to a pod,](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=28.18) [we said,](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=32.51) [What if we were to break that out and we could create a persistent volume, and](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=33.22) [then we could use a claim within the pod? That keeps it more loosely coupled.](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=37.61) [And then from there we took it up a notch and talked about how storage classes](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=41.91) [act as a template for storage, and they could even be used to dynamically](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=45.58) [create our persistent volumes.](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=50.28) [Now there're two other things that we didn't get into](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=53.24) [here that technically are storage,](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=55.41) [though, that we're going to be covering in the next module,](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=57.44) [and that's going to be config maps,](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=60.74) [which are key/value pairs, very useful for configuration data](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=62.42) [that your different containers and pods need.](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=66.22) [And we're also going to talk about secrets, which is for sensitive data.](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=69.09) [So in the next module, we'll jump into those two topics, config maps and secrets.](https://app.pluralsight.com/course-player?clipId=168ad837-51d1-49c4-ba6e-40baee5251c9&startTime=73.94)

## [Creating ConfigMaps and Secrets](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad)

### [Introduction](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad)

[Nearly every application that I've worked with over the years has some](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=1.14) [type of configuration that we need to get into it.](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=4.42) [And it might also have some sensitive data that we need to get into it.](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=7.29) [So we're going to talk about how in a Kubernetes world we can](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=11.67) [do that with something called ConfigMaps,](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=14.71) [which are going to be key/value pairs, and secrets.](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=16.8) [So we're going to start off by talking about the core concepts of ConfigMaps,](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=21.48) [and then we'll move into what is the process for actually creating a ConfigMap.](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=25.81) [And you'll see it's actually pretty straightforward,](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=30.02) [and there are going to be several different options you can choose from there.](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=32.22) [Now from there, we're going to go into how to use a ConfigMap,](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=36.34) [and I'll also show you some kubectl commands that you can use.](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=39.47) [And then we're going to move on to what do you do when you have sensitive data?](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=43.59) [And Kubernetes supports a concept that's actually similar in](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=47.15) [functionality anyway to what Docker supports. And so we can store](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=50.69) [sensitive data in what's called secrets.](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=55.31) [So we'll learn how to create a secret,](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=59.14) [and we're also going to learn how we can use a](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=61.12) [secret in our applications as well.](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=63.21) [So where are we in the overall Kubernetes resources? Well,](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=66.4) [we're really still in the storage area because ConfigMaps](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=69.41) [and secrets kind of fall into that realm.](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=72.87) [And, obviously,](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=75.6) [we're also going to be talking about how pods can then](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=76.8) [consume these ConfigMaps and secrets and actually use them](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=79.72) [to get data in our containers.](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=83.43) [Let's go ahead and jump on in and get started with some of the core concepts of ConfigMaps.](https://app.pluralsight.com/course-player?clipId=94c5d444-f436-441f-bd20-a09e9034e9ad&startTime=86.39)

### [ConfigMaps Core Concepts](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a)

[Let's start off by talking about what is a ConfigMap first off.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=1.11) [So a ConfigMap provides a way to store configuration](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=5.03) [information and then provide it to our containers.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=8.67) [What's really nice about this is if you have a container within a pod and](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=12.51) [that gets scaled out and even scheduled on other nodes,](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=17.14) [then you're going to be able to get to this configuration](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=20.64) [information anywhere throughout the cluster.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=22.87) [So it provides a really easy way to work with our configuration.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=25.61) [Now to discuss ConfigMaps in more detail, they provide a way](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=29.56) [to inject config data into a container.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=33.89) [I started this module off by talking about just about every](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=37.39) [application out there has some type of configuration data,](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=40.36) [and when you now say, Hey,](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=43.91) [this part of the app running in this container now](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=45.69) [needs to get to data, but, oh, by the way,](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=49.19) [this could be scheduled anywhere in the cluster, well,](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=51.86) [that complicates things a little bit.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=54.57) [I can't just drop a file, for example,](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=56.1) [and put it on the host because if your cluster has multiple nodes,](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=58.53) [which it more than likely will, then what's going to happen there?](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=61.86) [Well, it wouldn't be able to get to the data, obviously.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=65.74) [So this will work for that. So you can store data,](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=67.57) [actually, in multiple ways. You can actually put these in a file.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=71.12) [You can register it through the kubectl command, and do other things.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=74.28) [So storing it in a file is certainly an option.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=78.44) [What will happen, you'll see here, is the file name becomes the key,](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=81.34) [and then the value would represent all the contents of the file.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=85.44) [And then you can dive in from there to actually get the values out of it.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=89.51) [You can also provide these values on the command line as just literal values,](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=93.94) [if you'd like, and I'll show you how to do.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=98.09) [It's very simple with kubectl.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=99.42) [That's really nice when you just want to add a config value really](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=101.84) [quickly. And then you can also create a manifest.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=104.46) [This is actually a YAML file, very similar to what we've seen with](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=107.6) [pods and deployments and services and things, and define the](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=111.17) [key/value pairs inside of the manifest.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=114.8) [So what will happen is your ConfigMaps then can be accessed](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=118.44) [from a pod using one of two techniques.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=121.81) [You can either access it by environment variables or you](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=124.36) [can access a ConfigMap Volume, and that would give you](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=128.32) [access to an actual file system.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=131.79) [That file system then would allow you to load that file, as I just mentioned](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=135.01) [earlier, and then you can get to the values in that file.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=138.09) [So it really depends on which approach you want to go.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=141.34) [I'm going to show you both approaches as we dive in a little bit deeper.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=143.75) [But that's the basics of what a ConfigMap does and how you can get started using them.](https://app.pluralsight.com/course-player?clipId=43b7e461-4551-48fc-a7c9-7f55af99249a&startTime=147.74)

### [Creating a ConfigMap](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40)

[There are several different techniques you can use to get key value pairs and](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=1.04) [data into config maps and get those set up within Kubernetes.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=4.71) [So let's talk about some of the different options.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=8.57) [So first off, you could do a normal ConfigMap Manifest.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=11.74) [Now you'll notice it looks very similar to what we've seen with pods,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=14.91) [or deployments, or other resources in Kubernetes.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=18.43) [So we have our API version and notice the kind is ConfigMap.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=21.44) [Now, one of the important parts of this,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=26.09) [like other Kubernetes resources, is the name app‑settings.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=28.02) [We're going to need that later to be able to get to the data for this ConfigMap.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=32.24) [Now,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=37.94) [the actual configuration data itself would go within this data](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=38.1) [property and you'll notice I have enemies,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=42.59) [lives, and even some complex properties like enemies.cheat. Whatever you want](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=45.29) [to put here, this would then be the config data that would be registered](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=50.54) [inside of Kubernetes, and then a little bit later,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=54.69) [I'll show you how we can get to this based upon the](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=57.38) [name that you see, app‑settings.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=60.48) [Now, in order to get this data into Kubernetes,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=63.14) [we could use kubectl create, and use the normal ‑f, and](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=65.67) [then give it the file name just like we've done with pods,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=69.76) [and services, and deployments.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=72.1) [Now,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=75.24) [another option is you could get the data up into](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=75.36) [Kubernetes by loading it from a config file.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=77.59) [So in this case, notice our key value pairs are just in a normal file.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=80.64) [Let's say this is called game.config, as an example. and then we can use](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=84.67) [kubectl to get all these properties up into Kubernetes.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=89.31) [Now that would look like the following.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=93.19) [We'd say kubectl create,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=95.44) [we'd say configmap, and then from here, we can give it the name, and](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=97.47) [then the important part of this is the from file,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=101.63) [and then we can give it the path to, in this case, game.config.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=104.8) [Now what that will do behind the scenes is a little bit](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=109.3) [different than what we just saw earlier.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=111.9) [It'll still add the kind and the API version and the data property, but](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=114.24) [notice that the key and the value is now game.config, that's actually the](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=119.14) [key, it adds a separator, that's the pipe that you see,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=123.96) [and then the actual file contents are everything that](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=128.74) [follows that, enemies, and lives, and others.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=131.87) [So this had a little bit different approach because we said](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=135.44) [from file, the file name becomes the key,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=138.57) [and then the value is actually the different properties](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=142.14) [that you see, kind of his one blob, if you will.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=144.64) [So this is another way we could load from a file and get](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=147.54) [it up into Kubernetes if you'd like.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=150.2) [Now the final technique we're going to use is you can also](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=152.93) [create what's called an environment file and it's just](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=155.47) [properties like you saw earlier, in fact,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=158.6) [it doesn't really look any different than what you saw earlier,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=160.35) [but the command we're going to use to get this up into](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=163.44) [Kubernetes will be slightly different.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=166) [Now,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=168.01) [let's say this is called gameconfig.env, that's our environment variables file.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=168.12) [To get this registered and all these properties available to](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=173.94) [Kubernetes, we can do kubectl create configmap again, that's](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=176.64) [the same as what we just saw, but we can say from‑env‑file, and in this case,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=180.36) [give it the path to game‑config.env. Now, that will actually create a](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=185.88) [different setup within Kubernetes, it'll look a lot more like the](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=191.46) [manifest that we looked at to start this section.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=194.93) [Notice we have a data property, and then we just have the key value pairs there.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=198.08) [There is no file name as the key, and then the value is the entire file.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=202.3) [Now there are different reasons why you might use one or the other,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=207.04) [and that's going to be a little more evident as we move along.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=210.31) [So before we move on to how do we use all this, let's review these commands.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=213.54) [So first off, if you want to load from a config file, you can say from‑file.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=218.8) [That's the command‑line switch that would load it](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=223.94) [and then just give it that path.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=225.86) [If you want to load from an environment variable type of file,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=227.88) [you would say from‑env file.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=231.12) [Now you can also just load key value pairs directly if you'd like into a](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=234.19) [configmap of whatever name you choose. So you'll notice this from‑literal](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=239.18) [command‑line switch and then API URL would be the key and the HTTPS URL value](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=243.85) [would be the value for that key, of course.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=250.7) [And then you could see I have another one with other key and other value.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=253.44) [Now, I don't typically do this for, say,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=257.74) [a production deployment because normally I want to be able to check in some](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=260.08) [type of file to source control somewhere and manage files, but if for some](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=264.05) [reason, especially in dev or maybe even a test scenario,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=269.52) [you just want to get some config data out there, then you](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=273.21) [could go ahead and do it this way, it would be a kind of](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=275.81) [quick and easy way to do it.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=277.56) [And then finally, if you're just doing a ConfigMap Manifest,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=280.04) [which is the first technique that we started this section with,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=282.91) [then we can do the kubectl create or apply,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=285.84) [and then ‑f, give it the file name, and that'll get](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=288.46) [it registered up in Kubernetes.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=291.47) [So now that we've seen different ways of defining a ConfigMap,](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=294.14) [how would you actually use it? Well, that's what we're going to cover next.](https://app.pluralsight.com/course-player?clipId=8c95bb11-197a-413e-8052-1efe7b208a40&startTime=297.52)

### [Using a ConfigMap](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0)

[When it comes to using ConfigMaps, there are several](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=1.04) [different techniques that can be followed.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=3.46) [We're going to talk through a few of those. Now, the really](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=5.26) [important thing that kind of kicks everything off is what's the name](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=7.74) [of the ConfigMap, and we'll be talking about that and seeing that as](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=12.18) [we go through some of the YAML.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=16.11) [So first off, to get a ConfigMap and just list the names, you could do either](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=18.74) [kubectl get cm, or ConfigMap, and then give it the name.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=24.45) [And if you want to see the details about it, you could do ‑o yaml.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=29.33) [Now, of course,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=33.94) [if you just want to get all ConfigMaps, you could do kubectl get cm, or](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=34.45) [ConfigMap. It really depends on what you're after. Now what's useful](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=39.21) [here is earlier I showed three techniques.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=43.32) [One was we could use a ConfigMap manifest, one was a configuration file,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=45.89) [and the final one was an environment file.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=51.68) [Well,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=54.3) [depending on which command line switch you use to create the ConfigMap,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=54.42) [that really changes what's stored inside of the ConfigMap,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=58.76) [and you can see exactly what it does with this ‑o yaml. So let's](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=63.43) [look at an example of how we could actually load data up from a](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=69.34) [ConfigMap into an environment variable.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=72.88) [So you'll see on the left a ConfigMap manifest , in this case.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=76.74) [Now this could've been created using the from env file switch](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=80.97) [that we talked about, or it could just be a manifest you](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=84.61) [created and added into Kubernetes.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=87.25) [You'll look at that and notice that the name is app‑settings, and then we](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=90.74) [have the data property with the different key value pairs.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=95.32) [Now,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=99.34) [any pod that actually wants to use this, now you could define this in the pod](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=99.64) [template or the deployment template or something like that, you can go in,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=104.42) [then, and say env, give it a name, in this case,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=109.07) [ENEMIES.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=112.95) [Now what that's going to do is create an environment variable named ENEMIES.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=113.48) [Now where's the value going to come from?](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=117.84) [Well, you can see the syntax is actually pretty](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=119.58) [intuitive, valueFrom a configMapKeyRef.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=121.39) [So, in this case,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=126.14) [what's actually going to happen is aliens would be assigned to an](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=127.46) [environment variable named ENEMIES, and then in your code that's running](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=131.43) [inside the container for the pod, you could then write the code to get to](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=136.02) [that environment variable called ENEMIES.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=140.21) [Of course,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=142.29) [that would just return aliens as you see right here. Now this provides a nice,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=142.63) [easy way to just load individual settings and then put](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=146.46) [those in an environment variable.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=150.37) [It's also possible, though, to load all of these properties on the left,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=152.78) [enemies, lives,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=156.81) [enemies.cheat, and the last one there into environment](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=157.91) [variables with just one simple command.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=161.33) [So let's take a look at the YAML for that.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=163.56) [So, if we want to load kind of everything in, enemies, lives,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=167.24) [enemies.cheat, and the last one, level,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=170.66) [then we could use on the right side, you'll see](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=173.34) [envFrom, ConfigMapRef, app‑settings.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=176.03) [Now what this will do is it's going to create four](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=181.5) [environment variables based on the keys,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=183.96) [enemies, lives, and the others, and then you could, again,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=186.75) [in your code,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=190) [reference those environment variables just like you](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=191.2) [would any environment variable.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=193.82) [So if it was Node.js or ASP.NET Core or Java,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=195.32) [whatever technique you used to get the environment variables would](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=199.84) [apply here as well. They'll basically be made available to the pod and](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=202.62) [the containers within that pod. Now this provides a really nice way to](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=206.46) [just get everything loaded up in one shot for that particular pod, but](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=211.64) [as I just showed earlier, if you don't need everything,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=216.99) [then you can load individual keys as well.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=220.14) [Now we can also create a volume.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=223.27) [Now this is a little bit different because each key is](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=226.39) [actually going to be converted into a file.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=230.06) [So there's going to be an enemies file,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=232.77) [a lives file, an enemies.cheat file, and you get the idea.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=234.82) [And then for the enemies file,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=239.44) [the value in the file would be aliens. For the lives, it](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=241.39) [would be 3, and you can see how that works.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=245.41) [What's unique here is if the ConfigMap changes at all, then the files that are](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=249.54) [referenced by the volume would automatically get updated,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=255.75) [and then your code would have to detect those file changes.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=259.12) [But assuming you did that, you could then kind of have live updates.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=261.82) [Now with that technique, though,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=266.74) [I've seen it take anywhere from 30 even 60 seconds for a](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=268.66) [change to actually make its way to where the container](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=272.6) [and the code could get to it.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=276.23) [But it is kind of nice that you could just update the](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=278.04) [ConfigMap and magically the volume files that are created here](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=281.72) [also get updated. It keeps it in sync, even if there is a slight delay.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=285.67) [Now in this example, you'll notice first off,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=291.04) [we're defining a volume and the name is app‑config‑vol, which we're](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=293.15) [going to use in a moment, but notice the ConfigMap we're going to](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=298.04) [use for this volume is app‑settings.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=301.17) [What that's going to do, then, is wherever the volume is defined,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=304.64) [which you're going to see below here in a moment,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=307.55) [will have four files in this example, again,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=310.04) [enemies,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=312.57) [lives, enemies.cheat, and enemies.cheat.level would be the files, and](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=313.19) [then the values would be inside of those files.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=318.67) [From there, we want to use the volumeMounts. And,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=322.04) [of course,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=326.15) [in our containers we can do that. So our containers property has a volumeMounts.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=326.61) [We give it the name, and you'll see that matches with what's above,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=331.87) [app‑config‑vol, and we give it the mountPath.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=335.24) [So what Kubernetes will do, then, is a volume will be created at the](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=338.94) [/etc/config, and then we'd have those four files in the volume.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=342.85) [Now you'd have to write the code to load those files,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=347.18) [of course,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=349.81) [but that's where we as developers kind of need to know what's going on here.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=350.84) [And that would be another technique that you could use. So you can see that,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=355.89) [you know,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=359.48) [if you prefer environment variables and your config](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=359.67) [data is not going to be changing much, then that's a really simple way to go.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=362.42) [But if you want to have actual files for the config data,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=368.14) [then you could use this technique.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=372.99) [It's a little bit interesting, I think,](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=374.94) [because of the fact that each of the properties and](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=376.83) [values actually becomes a file. But that's how it works, and now let's take a look at all this in action.](https://app.pluralsight.com/course-player?clipId=a07bb717-ab86-48ad-a863-aea78ad120d0&startTime=379.21)

### [ConfigMaps in Action](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c)

[We've seen how we could create a configMap using several different techniques,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=1.15) [we've seen how we can reference the configMap from,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=4.84) [for instance, pod YAML or a deployment, but how do we put all that together?](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=7.52) [Well, we're going to look at a demonstration here of configMaps in action.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=12.33) [So I've gone into a folder called configMaps,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=17.14) [and there's a few things to go over first.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=19.54) [You'll notice I have a dockerfile,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=21.65) [and this builds a really simple node:alpine image,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=23.66) [as you can see here, and just copies in a server.js file.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=26.58) [Now, the server.js file is really basic.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=30.74) [It does two things Number one,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=33.31) [we're going to read from a volume that we're going to create from this](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=35.44) [/etc/config, and we're going to read this enemies.cheat.level.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=38.66) [Now, if you think back to previous sections in this module,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=43.23) [we actually have this property and then it had its associated value.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=46.37) [So what we're going to do is expose it as a volume, and then Node.js](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=50.4) [is going to use that to get to a file that's going to be created from](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=53.93) [the property, and then we'll read that, and then what we're going to](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=57.45) [do is display it. So down here, you're going to notice this fileData,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=60.78) [and we're going to display that fileData.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=65.17) [Now, we're also going to work with environment variables. In the Node.js world,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=67.54) [we can do that using this process.env.ENEMIES. ENEMIES is going to be in the](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=71.96) [environment variable they're going to be after. Now,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=76.75) [that's the basic setup of where we're going to go.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=79.42) [So once we hit this, we should see the ENEMIES,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=81.63) [and we should see the enemies.cheat.level, if we want.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=84.94) [One is going to be from a volume, and one is going to be](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=88.2) [from an environment variable.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=90.69) [Now, in order to run this, I first need to build the Docker file.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=92.64) [T he README has the instructions on how to do that.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=96.76) [We need to call it node‑configmap.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=99.62) [Now,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=102.24) [we could run this command, or in VS Code, I have the docker extension installed,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=102.38) [and I can just say Build Image, and then I can hit Enter, and I've already built](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=107.03) [it, but this should be really quick, you'll see,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=112.45) [and we're ready to go there.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=114.34) [So now we have that image.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=115.51) [Now, the next thing we're going to do is if we move on](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=117.74) [down, you'll notice this Create ConfigMap.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=119.96) [I'm going to call it app‑settings, and then we're going to load it](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=123.51) [from an environment file called settings.config.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=126.41) [Let's open up setting.config, and you should recognize this](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=130.24) [from our code earlier that we looked at.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=133.09) [So we have enemies is aliens, lives is 3, and you get the idea here.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=136.29) [If you want to do the cheat code,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=141.35) [it looks like you can do noGoodRotten somewhere.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=142.62) [Now, what we're going to do from here is we want to load that then. And in](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=145.79) [order to load that up into Kubernetes, we're going to use the](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=149.45) [from‑env‑file. And if you think back to the section were we covered this,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=152.77) [this will actually create that data property, and then all the environment](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=158.24) [properties you just saw would be subproperties, key‑value pairs, and](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=161.98) [that'll get that all available.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=166.59) [Now,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=168.29) [that's one way to get a file up into Kubernetes, and we talked](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=168.44) [about several ways. Now, the next thing we're going to do is](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=172.55) [we're going to apply a node.deployment, and we're going to talk](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=175.79) [about that in a moment,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=178.38) [and then we're going to port forward to that so we can actually hit](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=179.38) [the web page on port 9000. So let's go back up.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=182.24) [I've already built the image, so now we need to create the ConfigMap.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=186.81) [Now, before we do that, let's see if we already have any ConfigMaps.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=190.1) [So I'm going to say kubectl get, and I could do configmap,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=193.58) [that would work, none are found, or k get cm, ConfigMap. That also works.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=198.8) [Now, you'll notice we don't have any. That's as expected.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=204.34) [Now,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=207.84) [the first thing I'm going to do is let's go ahead and get into](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=208.04) [that directory, so we'll go ahead and say Open in Terminal from](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=210.35) [there. And now that I'm in there,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=213.61) [let's go ahead and paste that command in, and there we go.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=216.08) [So now, if we do a kubectl or k get cm,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=219.76) [you'll notice that I have app‑settings, there's 4](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=224.54) [pieces of data. Now, from here,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=226.95) [let's do a k get cm, we know it's called app‑settings though,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=229.54) [and I want the output again to be yaml. Now, this is how it](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=233.63) [actually loaded it up into Kubernetes.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=238.65) [So it took that file,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=241.42) [added some metadata, and then if we looked a little](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=243) [bit up here, you're going to notice,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=246.04) [in addition to the API version and the kind, there's our data. And you](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=248.2) [can see it loaded that right up into the data property,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=252.39) [as you'd expect.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=255.99) [So a very easy way to get this ready and available in Kubernetes.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=257.34) [The next thing we need to do is we need to apply our deployment.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=262.64) [Now, before we officially do that, I'll get it ready.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=266.04) [Let's go take a look at the deployment and what we're doing.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=269.68) [This is where it gets interesting.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=272.45) [And remember that we called this app‑settings. That was the ConfigMap.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=273.81) [So let me scroll on down. In fact, will come back to that.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=279.04) [Now, I'm going to come to the very bottom, and notice I have a](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=282.55) [volume called app‑config‑vol, and notice that the configMap we're](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=285.06) [going to use is named app‑settings.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=289.63) [Now, of course, that references what we just looked at.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=292.11) [Now, if we scroll up a little bit, you're going to notice a volumeMounts here.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=295.2) [MountPath is /etc/config,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=300.44) [and that's going to reference the volume that then references the configMaps.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=302.91) [So, in essence, what's going to happen, you'll see,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=307.04) [is that the four different properties are going to create four](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=309.57) [different files that we can get to through this path.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=312.84) [So if we go back to server.js, notice right up top here, we're](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=315.91) [accessing /etc/config, that's our volumePath, and then](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=320.12) [enemies.cheat.level was one of those properties.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=324.01) [But as mentioned earlier,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=326.68) [that will actually create a file. That will be the file name,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=328.14) [enemies.cheat.level,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=332.67) [and then whatever the value was, NoGoodRotten, I think, it is,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=333.88) [that would be with the contents of the file.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=337.21) [Now, we're also going to read a process environment variable called ENEMIES.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=341.24) [So how are we doing that?](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=345.94) [Well, now that the volume has been discussed,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=347.81) [let's come on down, and you'll notice there's going to](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=349.65) [be two things I'm going to show you.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=351.83) [First off, to create the ENEMIES, we create an env property.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=353.05) [Now, you'll notice the level this env is at if we scroll](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=357.64) [up. Notice it's under containers here.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=361.07) [So the container is that node‑configmap, and then we have this](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=364.04) [environment variable named ENEMIES. Now, I only have one,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=367.79) [but you can do as many of these as you'd like. And where are](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=370.75) [we going to get the value of this from?](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=373.57) [Well,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=375.76) [it's going to be a configMapKeyRef, the name is](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=376) [app‑settings again, and then the key is enemies.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=378.86) [So as we just looked at,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=381.94) [that would come in, and aliens would now be assigned to](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=383.77) [that environment variable. Really easy.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=387.05) [Now,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=390.1) [if you don't want to hand‑pick the properties and you want to load all of them](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=390.27) [up into appropriate environment variables, we could just do this, we could say](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=394.22) [envFrom and give it a configMapRef of app‑settings. And we discuss this a](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=398.56) [little bit earlier in a previous section.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=403.76) [Now, that would load all four of those, and the key name of the](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=406.44) [properties would become the environment variable name.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=410.74) [So in that case, if you like your environment variables uppercase,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=413.94) [which I usually do,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=417.31) [then we might come into here and maybe uppercase the property value,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=418.86) [the key value. In this case,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=422.78) [it's not going to matter because I'm actually not going to use that. Now,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=424.74) [putting this all together, and then we're going to run it. That means in](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=428.18) [server.js, I should be able to get to this file here.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=431.56) [I should also be able to get to the enemies and all those other](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=434.97) [enemies.cheat, enemies.cheat.level and all the other values that](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=438.97) [we had in our configmap. So going back, let's open this again in our terminal.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=442.95) [Let's apply our deployment.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=451.64) [Now, let's grab the pod‑name.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=454.84) [So you can see that name there. So let's do a port‑forward on that pod‑name.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=458.14) [Now, let's go to the browser, and we'll check it out. So now I've already gone](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=464.95) [to localhost: 9000, and you're going to notice from the environment variable](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=469.24) [that ENEMIES from the configmap was loaded up, and we only referenced that one](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=473.6) [key in this example, and we got back aliens. Now, the enemies.cheat.level,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=478.32) [that was from the volume, and you'll notice noGoodRotten here, and that was](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=482.96) [the actual value.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=488.08) [So that's an example of how we can get a ConfigMap from an environment file](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=491.03) [loaded up into Kubernetes, and then using either a pod template or](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=495.68) [deployment or some other type of resource that needs it, we can then get](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=500.11) [those values available to our containers.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=503.92) [Now, the last thing is as a bonus, we could come in and stop this,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=507.34) [and we could go ahead and do an exec into that pod.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=512.08) [So now, let's go into the /etc/config that you saw earlier, so we'll](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=516.44) [do a cd into that, let's do in ls, and there we go.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=521.68) [So look at that.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=526.08) [We have our enemies, our enemies.cheat, enemies.cheat.level, and lives.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=526.79) [So now, we could do a cat on, say,](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=530.92) [lives, and it's 3, cat on enemies, and it's aliens, and you can see](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=533.92) [that these are now files that were created in the volume, and that's](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=542.27) [the process of setting up the volume. So now that we've looked at ConfigMaps, let's switch our focus to secrets.](https://app.pluralsight.com/course-player?clipId=e82f24e8-15b7-45b5-9d7f-920930dbb27c&startTime=546.07)

### [Secrets Core Concepts](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a)

[In addition to getting config into an application,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=1.04) [there are also times when we need to get sensitive data into an application.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=4.14) [So we're going to take a look at how to do that with](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=8.44) [something called secrets in Kubernetes.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=10.29) [So a secret is an object that contains a small amount of sensitive data,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=13.8) [this could be a password, a token, a key,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=18.44) [even a certificate, and with secrets in Kubernetes,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=21.43) [we can securely make that data available to pods and to](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=25.23) [the containers running in those pods.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=29.87) [So Kubernetes provides a secret store for this sensitive type of information,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=32.54) [again, passwords, keys, certificates, and those types of things.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=38.04) [Now that avoids us storing secrets, and container images,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=42.34) [and files, or deployment manifests,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=46.05) [all of which could easily be compromised compared to putting this](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=48.28) [somewhere that's designed to store this type of data.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=51.89) [Now we can mount these secrets into pods as files,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=55.48) [and that'll involve volumes, or we can use environment variables.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=58.77) [Now, you'll recall that's very similar to what we can do with ConfigMaps as well.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=62.53) [So a lot of what you've already learned with ConfigMaps is](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=67.23) [going to translate over directly to secrets.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=70.46) [Now,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=73.34) [one of the nice features with secrets is that Kubernetes only makes](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=73.54) [secrets available to nodes that need the secrets,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=76.92) [they have to have a pod that's requesting it.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=79.98) [If you have a node with pods and none of those pods needs the secrets,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=82.12) [then the nodes simply don't have that information and that,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=87.04) [of course, reduces the attack surface.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=89.79) [Now, when it comes to secrets, they're stored in tmpfs on a node,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=92.84) [and so they're not written to disk anywhere and that,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=97.1) [of course, is a good thing as well.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=99.91) [Now, while you know this course is all about us,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=102.04) [as developers, learning core concepts of Kubernetes,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=104.32) [I still think it's important to know what are some of the](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=107.94) [best practices for working with secrets,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=110.7) [and even if you're not the administrator of your production cluster,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=113.54) [at least you can make sure these types of things are being followed.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=118.14) [So first off, if your cluster were to stop and come to rest if you will,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=122.14) [and we can encrypt it and there is a way we can do that](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=126.54) [through the link that you see here,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=129.85) [so there is some information about that process and](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=131.19) [what would need to be done and that, of course,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=134.06) [would be important so that the secrets couldn't accidentally be stolen.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=136.35) [The secrets themselves are stored in the SED key](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=140.19) [value store on the master nodes,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=142.66) [and so we want to make sure we limit access to that](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=145.39) [to only people that are trusted, and this would typically be admin users.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=148.52) [This is definitely not an area that we'd want to expose to everyone.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=152.84) [We also want to use SSL/TLS etcd peer‑to‑peer communication.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=157.64) [So as this information is being passed,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=163.5) [we want to make sure that's done securely as well just in case anybody](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=166.11) [somehow got on the network and was able to snoop around.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=170.17) [You're also going to see coming up that why you can](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=174.14) [create a Secrets Manifest file, the data in that is not encrypted,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=176.88) [it's just Base64 encoded.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=181.91) [So until it gets into Kubernetes,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=184.34) [that kind of presents a problem and I'm going to show you that normally we](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=186.98) [can load this in through the command line through kubectl,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=191.39) [but if you wanted to actually create a manifest much like a ConfigMap Manifest,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=194.94) [you could,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=199.31) [but you'd have to have extra practices in place to make sure that was secure.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=200.04) [And finally, pods can access secrets, of course,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=205.24) [that's really the purpose of secrets,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=207.71) [so we need to secure who is allowed to create pods because if they're](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=209.94) [allowed to create a pod and they shouldn't have been doing it,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=213.94) [then in theory they could actually get to the secrets,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=217.37) [so that'd be another thing we would want to lock down within our application.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=220.94) [So now that we've introduced the core concepts of secrets,](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=225.14) [let's go ahead and jump into some more information about how to get started using them.](https://app.pluralsight.com/course-player?clipId=0c921952-3b8c-4129-a565-b5338379855a&startTime=227.6)

### [Creating a Secret](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff)

[There are several ways that we can get a secret into Kubernetes,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=1.04) [and we're going to look at several kubectl commands in this section.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=4.42) [So, first off, kubectl has a create secret command that you can run,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=8.84) [and I'm going to show you that you can create what's called a generic secret,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=13.12) [and that would be for things like files or text that you want to get in.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=16.59) [And then you can create a TLS type of secret as well.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=20.98) [So if you want to use this create secret command to just get a](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=24.84) [key and a value in, such as a database connection string or a](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=28.39) [password or something like that,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=32.5) [then you can use kubectl create secret generic and then give it](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=34.58) [the name of the secret, my‑secret in this case.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=39.67) [Now you can see that what we're adding is this pwd key and some password,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=43.07) [and we're going to do that using the from‑literal command line switch.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=48.64) [And that's very similar to what we saw with config maps actually. Now we](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=51.85) [could also use this to load files if we wanted. So if we had some type of](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=56.51) [SSH keys and we want to get those in, then we could use the from‑file](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=61.27) [command line switch, give it a key again,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=65.49) [in this case, ssh‑privatekey or ssh‑publickey.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=68.3) [And then give it the path to the file.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=72.59) [And then that would automatically be loaded and stored in Kubernetes.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=75.32) [And then, finally, if you're working with TLS certificates,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=80.14) [then there's a create secret tls versus the create secret generic](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=83.19) [that you saw above. You give it a name again.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=88.45) [And then there are some different command line switches.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=91.81) [So what you'll do is give the path to the cert itself using](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=93.79) [‑‑cert and to the key using the ‑‑key command line switch. That](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=96.57) [will load this up and make it available, and then from some](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=103.15) [server that needs this certificate,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=106.37) [it can actually use that to do the security it needs.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=108.5) [Now up to this point,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=112.54) [we've declared just about every type of Kubernetes resource with YAML.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=113.69) [So can you declaratively define secrets using YAML? Good question.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=118.25) [Well, the answer is Yes,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=124.84) [but any secret data that you put into the manifest type](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=126.59) [file would only be base64 encoded.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=130.54) [So you need to understand that if that file is just](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=134.24) [sitting around in source control, for example,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=137.71) [and anybody can get to it, then your secrets might be exposed.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=139.99) [So if you want to go this route,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=144.34) [you'd have to be really careful to secure that type of a file because any](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=145.69) [of the key/value pairs in it are only base64 encoded.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=150.61) [Now here's an example of what that might look like.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=154.94) [Now this could be something you could create, or it could be](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=157.15) [something that the kubectl create secret might create.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=160.26) [It really depends on what you're doing.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=164.26) [So, first off, you'll notice we have a kind of secret.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=167.14) [We have a secret name, very important, just like with config maps,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=170.92) [because we're going to need to reference that.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=174.4) [And then we have the keys and the values. Now almost](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=176.74) [identically you'll see two config maps.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=179.65) [Obviously, it's a kind of secret, so that's different.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=182.28) [But the data for each key is base64 encoded here. Obviously, very](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=185.44) [different from what we had with config maps.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=190.82) [Now that's an important thing to remember because, again,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=193.89) [if you're going to store this somewhere like source control, it's](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=196.41) [really easy to base64 decode and get to these values.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=200.2) [So be really careful about that.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=205.28) [And that's where you're going to need to work out a plan with your](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=207.02) [administrator on if they're going to get this in,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=209.64) [if they're going to let you get this data in,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=212.66) [how's that process going to work?](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=214.64) [Now if you created the manifest file this way,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=217.1) [you could do the standard kubectl create ‑f and give it the](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=219.8) [file or kubectl apply ‑f and give it the file.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=223.74) [But, again, you'd want to be very,](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=228.24) [very careful about using this type of file to store your secrets.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=229.83) [So now that we've looked at that, let's take a look at how we could get access to the secrets from a pod.](https://app.pluralsight.com/course-player?clipId=b22fdabc-78bf-402d-b4f4-84991472f0ff&startTime=234.14)

### [Using a Secret](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69)

[Getting access to a secret is much like getting access to a ConfigMap.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=1.14) [We can use environment variables or we can use volumes with files.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=4.74) [So first off, before I show you that part of the equation,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=8.94) [how could we just list the secrets that are out there?](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=12.44) [Well,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=15.64) [we could do kubectl get secrets and that would](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=15.77) [output something like the following.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=19.54) [So if we had db‑passwords, for example, then it could list that.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=21.26) [Now we could also do kubectl get secrets,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=26.44) [give the specific name of the secret,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=29.64) [and then do our normal ‑o for the output type of YAML.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=31.67) [And now it outputs something like the following.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=36.64) [Now from here, if we add rights to do this against secrets,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=38.73) [notice that I can get to, in this case,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=43.54) [a MongoDB password and a root password and that's](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=45.69) [just Base64 encoded again, well,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=49.2) [it'd be really easy right on the command line actually to decode that.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=52.23) [So this is where an administrator normally is going to shut this](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=57.24) [type of thing down to only administrators or trusted people within](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=61.42) [the organization that should be allowed to do this type of thing. So](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=66.52) [you can see the importance of locking down access to certain](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=71.01) [resources within Kubernetes.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=74.86) [Now, when it comes to accessing secrets from a pod,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=77.44) [if you want to access them as environment variables,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=80.69) [then we could do something very, very similar to what we saw with ConfigMaps.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=83.79) [So over on the left, you'll notice we have in the data section](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=88.04) [a db‑password and admin‑password that would have been stored](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=90.76) [in the Kubernetes secrets area.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=94.44) [And let's say that we'd like to create an environment](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=96.74) [variable called DATABASE\_PASSWORD.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=99.05) [To do that,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=102.19) [you'll notice we're going to get the value from a](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=103.02) [secret key ref, so not a config ref,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=105.83) [but a secretKeyRef and the name of that is db‑passwords, so you can see](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=108.86) [that points over to the name of the secret on the left.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=114.08) [Now the key we'd like to get is db‑password from the actual data,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=118.04) [and what that will do is now decode that data and assign it to](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=123.84) [the database password environment variable.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=127.79) [Now, using standard environment variable access,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=131.24) [we could write a little bit of code to get to that](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=133.71) [environment variable and then we could use it.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=136.37) [Now, if you'd prefer to use volumes to do this,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=139.21) [then you can do that as well, and just like with ConfigMaps,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=142.64) [each key is going to be converted into a file.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=145.52) [The property name or key name becomes the file name,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=149.14) [and then the value of that property or key becomes the contents of the file.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=152.16) [So you'll notice that we have volumes here configured and we](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=157.24) [have secrets, that's the name. Now the secret,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=160.97) [though, is going to be from db‑passwords.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=164.91) [Now you'll notice we can do our containers and we could do our volume](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=169.24) [mounts, get to that volume called secrets, and in this case,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=172.11) [we're going to say we'd like to go to etc/db‑passwords,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=176.35) [and that's our mount path.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=180.36) [Now,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=182.8) [the db‑password that you see on the left and the admin password would](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=183.06) [now be put into that db‑passwords folder or directory,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=187.55) [and we'd then be able to write code to access that much along](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=192.04) [the lines of what we saw with ConfigMaps.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=195.94) [So the good news here is the concept is very,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=199.14) [very similar to what you've already seen with ConfigMaps so there is not a](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=202.25) [lot of new things here. There are a few new properties,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=205.94) [but the general concepts of I can access this through an environment](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=209.04) [variable on the pod or I can access this through a volume mount that I](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=212.49) [can get to through the pod and container, well,](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=217.16) [that applies for both ConfigMaps and secrets.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=219.79) [So now that we've seen how to create secrets and list secrets and actually access secrets, let's take a look as secrets in action.](https://app.pluralsight.com/course-player?clipId=5fffed63-a841-48ac-be3d-22e57f630a69&startTime=223.64)

### [Secrets in Action](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c)

[Let's take a look at how we can use secrets and access them in a pod.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=1.24) [So I have a simple MongoDB deployment,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=5.84) [and what we're going to do is grab the password to use for that from a secret.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=8.5) [Now in order to do that,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=14.34) [we're going to run the kubectl create secret generic command,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=15.59) [and we're going to name that secret db‑passwords,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=19.18) [as you can see here.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=21.94) [No we're going to use the from literal to set a db‑password,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=23.84) [and then we can set a a db‑root‑passwords.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=27.29) [Now we're actually only going to use the db‑password,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=30.14) [as you'll see in a moment,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=32.64) [but I wanted to show how we could use multiple literals,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=33.87) [if you'd like.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=36.95) [So let's get our secret in place by running the create command.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=37.85) [Okay, so that's being created.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=42.38) [So now let's clear this and run a get secrets, and let's see what we have.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=44.3) [And there we go, you'll notice that we have a db‑passwords,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=49.84) [and it has two pieces of data, two properties in that particular secret.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=52.63) [Now the next thing we're going to do is we're going to get](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=57.94) [this deployment in place for MongoDB.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=59.88) [So I'm going to go ahead and start the deployment,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=62.61) [and then we're going to take a look though at what's going on behind the scenes,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=64.44) [and you can see that's created several things,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=68.12) [including the StorageClass, a PersistentVolume,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=69.94) [volume claim, and then the actual deployment itself,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=73.19) [which in this case we're using something called a statefull set.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=76.87) [Let's go take a look at the Mongo deployment.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=80.34) [Now at the very top, you're going to notice we have two keys in our ConfigMap,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=83.74) [we have a MONGODD\_NAME, and that's codeWithDan in this case,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=87.12) [and then we have a very specific name that Mongo looks for initially,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=91.2) [which is this MONGO\_INITDB\_ROOT\_USERNAME.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=96.06) [Now this is one of those pieces of data that you may](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=99.74) [certainly choose to put in a secret.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=102.33) [I wanted to show how we could use a ConfigMap and](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=104.84) [the secret in the same deployment, but you might move that.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=107.49) [Now moving on down, we have our StorageClass,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=112.44) [which we've looked at earlier in the course,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=114.52) [we have a PersistentVolume, and then finally we have a PersistentVolumeClaim,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=116.38) [and then we get to the interesting aspect of this,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=123.08) [which is our StatefulSet.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=125.38) [Now the first thing we're going to look at is I did create a volume,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=126.71) [although we're not going to use it here,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=130.34) [I wanted to show how If you wanted to expose your secrets as files,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=132.34) [that only that pod could get to the pod being deployed through this deployment,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=136.55) [then we can create a volume if we wanted,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=141.47) [kind of have that choice, do I want to use environment variables,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=143.71) [do I want to use files that are accessed through a volume?](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=146.2) [So in this case, I have a mongo‑volume,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=149.88) [PersistentVolumeClaim that ties into the claim above,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=153.29) [and then notice this name secrets, and then we have this secret property.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=157.14) [Now the secretName that we want to expose is db‑passwords.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=163.04) [That's the one that we just created when we ran the command back here.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=166.52) [Now what that will do is the two properties that were exposed,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=172.44) [the literal properties, those are going to become file names,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=175.72) [and then the value would be the file contents,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=179.54) [very similar to what we talked about with ConfigMaps actually.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=182.12) [Now if we scroll to the very bottom of this,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=185.9) [you're going to see that we have a VolumeMounts,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=188.78) [and this is going to first off set up a mongo‑volume,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=191.58) [and that mongo‑volume was defined above,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=195.24) [and then we have our secrets.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=197.5) [And notice the secrets are going to be written to the dtc/db‑passwords.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=199.36) [Now because the MongoDB image itself uses environment](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=204.54) [variables to get it initially set up,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=208.59) [we're actually going to use that for this demonstration,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=210.64) [but this is how you could easily get secrets exposed](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=212.82) [through a volume if you'd like.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=216.13) [Now coming back up,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=219.14) [let's walk through some environment variables that are going to](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=220.21) [be available to the containers of this pod.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=222.34) [So the first one is MONGODB\_DBNAME,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=225.44) [and you'll notice that's a configMapRef pointing up to the](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=228.84) [configMap that I just showed you earlier,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=232.5) [and it's going to expose the MONGODB\_DBNAME that you saw.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=234.76) [Now that name and value would be added as environment variable.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=240.34) [Now we also have the MONGO\_INITDB\_ROOT\_USERNAME, Notice](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=245.28) [that's also coming from a configMap,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=249.1) [and this is the one I mentioned you may actually decide to put in a secret,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=251.22) [but in this case, we're going to just use a ConfigMap.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=255.74) [Now finally, we have the password, and notice the value from is a secretKeyRef.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=259.14) [Now this is identical to what we saw a little bit earlier in this module.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=265.14) [We give it the name,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=269.84) [which is the name of the secret, db‑passwords, and then the key that](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=271.1) [we want to grab the value for is db‑ password.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=275.86) [Now if we go back and look at that, db‑pasword had a password of, well,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=278.93) [password. Please pick a better one for your real](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=284.22) [databases, but we'll keep it simple here.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=286.76) [And then notice that that's going to be added as the](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=289.64) [value to this environment variable.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=293.06) [So now all these environment variables,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=296.04) [all these names that you see, there's three of them, are going](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=298.28) [to be exposed to the container in this pod.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=301.15) [Alright, so let's try this out then and see if it worked.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=305.04) [So again, if we do k get pods, you'll notice that we have mongo‑0 running.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=308.04) [Now what I'm going to do is a port‑forward, now I'm going to switch to a](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=314.54) [tool that will allow us to connect to that database.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=318.9) [So I'm in a tool called Studio 3T, and we're going to connect to localhost 2717.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=322.39) [And then I've already set up the authentication to use the admin username that](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=329.81) [you just saw, and the password in this case is password, as you can see. Now the](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=334.02) [admin database is what we're going to connect to.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=339.09) [Now if all went well and the environment variables were set as appropriate,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=342.04) [then we should be able to test the connection and connect, and there we go.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=346.46) [You can see that we successfully connected, and now we could work with](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=350.35) [different collections in this database if we wanted.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=354.48) [Now if we shell into the Mongo container,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=357.84) [we can also check out the volume and see what we can find.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=360.76) [So let's go ahead and do a k exec for mongo‑o, interactive tty and sh shell.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=363.4) [And now if we go to the volume that you saw, etc/db‑passwords,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=372.54) [let's go ahead and cd to that, we'll go to etc first, we'll do an](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=378.1) [ls, notice we have it right there.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=381.85) [And now let's cd into db‑passwords, and ls, and there we go.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=384.96) [So now if I do a cat on db‑password, notice we get password back.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=391.84) [So the volume also worked in this case, and we could use that if we wanted.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=396.9) [So that's an example of how we can work with, not only ConfigMaps,](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=402.24) [but also secrets. Definitely a valuable skill to know as a developer](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=406.36) [because often times we have to get this configuration information or sensitive data into our applications.](https://app.pluralsight.com/course-player?clipId=9c94a8be-ee65-467f-91e1-dfcc8d09e51c&startTime=410.8)

### [Summary](https://app.pluralsight.com/course-player?clipId=f1639e25-0db9-4752-af91-ff0c1cd3708b)

[Applications often need to get access to configuration data, as](https://app.pluralsight.com/course-player?clipId=f1639e25-0db9-4752-af91-ff0c1cd3708b&startTime=0.94) [well as sensitive data, and in this module we've seen how we can](https://app.pluralsight.com/course-player?clipId=f1639e25-0db9-4752-af91-ff0c1cd3708b&startTime=4.98) [work with ConfigMaps to find those and then access those ConfigMap](https://app.pluralsight.com/course-player?clipId=f1639e25-0db9-4752-af91-ff0c1cd3708b&startTime=8.78) [key/value pairs inside of Pods.](https://app.pluralsight.com/course-player?clipId=f1639e25-0db9-4752-af91-ff0c1cd3708b&startTime=13.2) [We've also seen how secrets can be used to store sensitive data in](https://app.pluralsight.com/course-player?clipId=f1639e25-0db9-4752-af91-ff0c1cd3708b&startTime=16.24) [our applications and how we can use very similar techniques as](https://app.pluralsight.com/course-player?clipId=f1639e25-0db9-4752-af91-ff0c1cd3708b&startTime=20.01) [ConfigMaps to get to that sensitive data and expose it to the](https://app.pluralsight.com/course-player?clipId=f1639e25-0db9-4752-af91-ff0c1cd3708b&startTime=23.36) [containers running in those Pods.](https://app.pluralsight.com/course-player?clipId=f1639e25-0db9-4752-af91-ff0c1cd3708b&startTime=27.27) [The two main ways we looked at for both of these were accessing key/value](https://app.pluralsight.com/course-player?clipId=f1639e25-0db9-4752-af91-ff0c1cd3708b&startTime=30.04) [pairs using either environment variables or volumes.](https://app.pluralsight.com/course-player?clipId=f1639e25-0db9-4752-af91-ff0c1cd3708b&startTime=34.23) [We also looked at several key things that you should](https://app.pluralsight.com/course-player?clipId=f1639e25-0db9-4752-af91-ff0c1cd3708b&startTime=38.54) [consider when working with Secrets,](https://app.pluralsight.com/course-player?clipId=f1639e25-0db9-4752-af91-ff0c1cd3708b&startTime=41.09) [such as not storing them in source control and ensuring that](https://app.pluralsight.com/course-player?clipId=f1639e25-0db9-4752-af91-ff0c1cd3708b&startTime=43.38) [proper security is in place for not only listing secrets. but viewing the output of secrets.](https://app.pluralsight.com/course-player?clipId=f1639e25-0db9-4752-af91-ff0c1cd3708b&startTime=47.7)

## [Putting It All Together](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2)

### [Introduction](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2)

[In this module,](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2&startTime=1.17) [we're going to put together all of the different Kubernetes resources](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2&startTime=1.68) [that we've talked about up to this point in the course and see how](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2&startTime=4.86) [they can be used to run an application.](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2&startTime=7.67) [So we'll start off by talking about the application itself,](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2&startTime=10.74) [give an overview of kind of what it looks like and what the different players](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2&startTime=13.61) [are. From there, we're going to jump into the YAML manifests.](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2&startTime=16.83) [They're going to be used in Kubernetes to get this application up and running.](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2&startTime=20.53) [We'll then start the application and get it running. And then wrap up](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2&startTime=25.39) [with a quick look as some troubleshooting techniques.](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2&startTime=29.73) [Now you've seen a few of these commands already up to this point in the course,](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2&startTime=32.78) [but there's going to be a few others I'll introduce as well.](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2&startTime=36.01) [That'll help as your Pods are having problems. Now,](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2&startTime=39.18) [as far as where are we in the overall big picture of Kubernetes,](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2&startTime=43.26) [we're going to be touching on just about everything, actually.](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2&startTime=46.35) [We'll touch on storage, Pods obviously,](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2&startTime=49.12) [deployments, services, and more to get this application up and running. Let's go ahead and jump into an application overview.](https://app.pluralsight.com/course-player?clipId=eabf6bae-5f0f-4e57-adf7-82fa4f1a49b2&startTime=52.44)

### [Application Overview](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6)

[Let's take a high‑level look at the application that we're going to be](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=1.34) [using to work with different Kubernetes resources.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=4.06) [Several different pieces are put together for the application to run.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=7) [The first is going to be nginx,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=11.44) [and that's going to run on port 80 and act as a reverse proxy.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=12.95) [Dynamic requests that are coming in through port 80 will be routed to Node.js,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=17.13) [and that's going to be running in its own container,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=22.3) [of course.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=24.9) [And it's going to be calling into a database which will be MongoDB,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=26.04) [and also retrieving cache data from Redis.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=29.6) [To get all these moving pieces together,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=32.72) [we need to use deployments and services and the different Kubernetes resources.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=35.83) [We're also going to be using ConfigMaps and secrets as well.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=40.53) [But before we jump into the actual YAML manifest files,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=44.54) [let's look at the overall structure of the application.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=48.24) [So the application is based on Node.js as mentioned,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=52.08) [and the container images are going to be generated from these](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=54.93) [Docker files that you see in the .docker folder.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=58.43) [For nginx, it has some additional configuration, which I'll be loading.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=61.64) [But that's going to be included as part of the image.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=66.16) [If you wanted to include that through Kubernetes,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=69.2) [then we could use a ConfigMap to get that config in,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=72.09) [and we could use something like a volume mapping.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=75.17) [MongoDB is going to retrieve data that it needs to](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=78.22) [start up from environment variables.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=81.77) [And this will include the username and the password to be able to interact](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=84.11) [with that database and make those calls from Node.js,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=87.6) [as well as the root database user account.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=90.92) [Now Redis is also here, you'll see, and that's going to be our caching server,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=94.38) [and it stores key/value pairs if you haven't used it before.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=98.21) [While we won't focus on that much here,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=101.63) [it is going to be part of the overall puzzle that we need to](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=103.88) [put together to get this app up and running.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=107.07) [Now as far as the application, it's a pretty standard Node.js app.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=110.54) [You're going to see a server.js down here at the bottom.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=114.27) [It has some routes that load to load different web pages.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=117.14) [That's going to be using Express.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=120.59) [And then we have some libraries and models that are going](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=122.98) [to be used to call into the database, get data back,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=126.49) [and put that into some objects that'll ultimately be passed into the views,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=130.68) [the web pages.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=135.64) [So if you worked with Node.js or ASP.NET Core or](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=137.14) [Java Spring or something like that,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=140.57) [the overall structure would be very similar and something that's](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=142.64) [pretty common between different applications.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=146.05) [Now in order to get this app up and running,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=149.24) [which we're going to do a little bit later,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=151.28) [there are some steps in the README,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=152.8) [and those are going to include adding some environment variables,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=154.72) [such as the app environment.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=157.8) [We'll be setting that, actually, to production.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=159.11) [Also setting the Docker account for this demo of codewithdan,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=161.74) [although you could certainly go in and change all of this,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=165.45) [of course.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=168.65) [And then we'd have to build the initial images.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=169.26) [Now I've already done all that,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=172) [and everything is kind of ready to go as far as these steps are concerned,](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=174.13) [so what we'll do moving forward is take a look at the Kubernetes manifest files and then get the app up and running.](https://app.pluralsight.com/course-player?clipId=d8754746-bb24-416c-85b5-ec6282a9ddd6&startTime=178.44)

### [YAML Manifests](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27)

[Now let's switch our focus to the YAML manifest files](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=1.24) [that are used by the application.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=3.71) [In the k8s folder that you see here you'll notice that I have](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=6.24) [different deployment and service files.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=9.9) [Now some of these files actually have some other Kubernetes resources as well,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=12.64) [and I'll mention that as we go along.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=16.49) [Let's go ahead and start from the back forward,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=18.81) [which would mean we'd start with something like Redis or Mongo.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=21.84) [Let me open up the mongo.deployment file.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=24.95) [Now this is going to be very, very similar to what we saw earlier.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=27.81) [And I want to emphasize that all of these manifest files](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=31.34) [for this particular application are kind of the minimum](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=34.29) [viable type of manifest file.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=37.76) [There's certainly other things you would do.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=40.19) [For instance,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=42.01) [you might configure the resources that can be used for memory and CPU](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=42.55) [and other things that are unique to your organization.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=46.79) [But for this particular manifest you'll notice we have a ConfigMap and](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=50.64) [it has data configured in standard key‑value pairs.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=54.83) [Now you'll notice we have a DBNAME, and a ROLE, USERNAME, those type of things.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=58.4) [The usernames were not put in the Secrets on purpose in this case,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=63.54) [mainly to keep that part very simple on the set up,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=67.04) [but this is certainly something that you might move into the Secrets.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=70.44) [Now we have a standard StorageClass.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=74.78) [This is a non‑provisioned one,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=76.52) [so this would be just a local‑storage type of class.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=78.93) [We also have a PersistentVolume.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=82.74) [This particular volume is in here to show you the setup,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=85.44) [but local volumes don't work so well on Docker for](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=88.47) [Windows at the time of this recording, especially when it comes to MongoDB.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=92.27) [So I've commented those sections out as you're going to see in a moment,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=96.74) [but everything's here in case we want to just start](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=100.16) [with this and then tweak a few things.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=103.54) [Now moving on down, you'll notice that we also have a PersistentVolumeClaim.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=106.74) [Just like the PersistentVolume,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=111.74) [this is also going to use the StorageClass name of local‑storage,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=113.58) [and that's something that we specifically talked about](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=117.5) [in the storage module of the course.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=119.6) [Now the more interesting part is where we get into the StatefulSet,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=122.84) [which is a type of deployment again, and we have one for Mongo.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=127.2) [Now, notice we only have one replica.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=132.44) [That again is something that may change.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=135.13) [You may be doing sharding or something else with your Mongo deployments,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=137.18) [but I wanted to keep it very, very simple here.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=141.08) [And then we have some labels and things.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=143.54) [Now moving on down, I've commented out the volume here,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=146.28) [as you'll see,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=148.74) [mainly because this only works at the time of](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=149.82) [recording with MongoDB on Mac or Linux.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=152.32) [However, that may change so feel free to play with that if you are on Windows,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=156.54) [but I'm going to leave it commented out for this particular demo.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=161.06) [Now the really important part is where we pull in](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=165.22) [the environment variables we need.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=168.21) [And you'll notice that we're pulling in from configMapKeyRef.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=170.29) [These are the values you just saw up at the top of the file,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=173.81) [and we have a few of these.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=176.89) [So we have one for the DBNAME and the ROLE and the](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=177.92) [USERNAME and things like that.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=181.59) [But then you'll notice that the PASSWORD here is a secretKeyRef.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=183.52) [And this looks very,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=187.79) [very similar to what we covered earlier when we](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=188.9) [talked about ConfigMaps and Secrets.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=191.48) [We have a few of these as we move down.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=194.68) [Here's another secretKeyRef for the ROOT\_PASSWORD.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=196.54) [And then we're referencing the ConfigMaps up above for the ROOT\_ROLE,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=200.74) [the ROOT\_USERNAME, and things like that.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=205.12) [Now the image we're going to use in this case is the custom Mongo image.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=208.28) [This is one that I'll discuss how to build using Docker Compose,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=212.54) [but we'll get to that in the next section of the course.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=216.44) [Now I've also commented out the volumeMounts as you'll](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=219.2) [see for the issue I mentioned earlier,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=221.51) [but that will be there in case you'd like to play around with that.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=223.53) [Now the service that's used for most of the different](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=228.62) [moving parts of this application, it's going to be pretty straightforward.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=231.44) [There's going to be a standard ClusterIP service.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=234.53) [You'll notice we have 27017.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=237.44) [That's the default MongoDB port.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=239.98) [We're exposing that within the cluster,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=242.32) [and then the targetPort is 27017 in the container as well.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=244.86) [Now moving on down, Redis is actually a fairly straightforward example.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=250.48) [So you'll notice that we have a deployment for Redis,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=255.04) [and the image is going to be this custom codewithdan/redis.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=257.89) [Now, the service is also very basic.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=261.62) [It's a ClusterIP service.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=264.57) [Notice it has the port, and these are the defaults for Redis.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=266.36) [No surprises here.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=269.88) [Now moving forward a little bit we now have the node deployment.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=271.94) [At the top of this file you'll notice another ConfigMap with a key for NODE\_ENV,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=275.27) [and we're going to set that to production.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=280.39) [So this will be an environment variable that ultimately we want to get into](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=282.34) [our container and make it available through that pod.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=286.2) [Now moving down to the deployment, this is pretty standard.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=290.24) [We've seen ConfigMaps already with MongoDB,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=293.74) [but you'll notice that I have one now for the NODE\_ENV.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=296.64) [We're going to pull that from our ConfigMap named NODE\_ENV.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=299.74) [And the key is that NODE\_ENV value that you saw earlier.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=304.08) [And that would grant production and assign it and](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=307.78) [make it available to this container.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=310.12) [Now finally, we have a custom image again called node‑codewithdan,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=312.58) [and this will be built as part of the set‑up process.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=316.31) [For the node.service, it's also a ClusterIP.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=319.48) [And in this case,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=322.03) [I chose port 8080 and that's just because that's what the server.js](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=323.03) [that kicks off this app is going to listen on.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=327.26) [The final piece to this puzzle is nginx.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=330.24) [Now nginx is a reverse proxy, and this is a pretty standard setup,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=333.64) [very basic actually.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=337.15) [I'm going to build a custom image, I'm going to assign some ports here,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=338.87) [and that's about it.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=343.04) [You'll notice everything else is a very, very standard deployment.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=343.99) [Now what's different about this though is the service.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=348.24) [So if we go to nginx.service you'll notice the type is a LoadBalancer.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=351.73) [Now we're going to listen on port 80 and 443.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=356.94) [In this case, I don't have SSL certificates installed on it,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=359.71) [so port 80 is what we'll be using.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=363.15) [But this will allow us through localhost to actually talk to nginx on port 80.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=365.34) [And then it will, through the magic of Kubernetes,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=371.21) [communicate with the cluster IPs behind the scenes to get to Node and](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=374.45) [then call MargoDB and Redis and things like that.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=378.91) [So that's a quick walkthrough of some of the different YAML manifest files.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=382.14) [And I hope as you've now seen this in different contexts that the different](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=386.66) [puzzles are kind of fitting together now in your mind.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=391.36) [You're having what I call the lightbulb moment where you go oh okay,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=393.84) [I know what a ConfigMap is, I know what a Secret is,](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=397.48) [I know what a deployment is, and so on and so forth.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=399.93) [So now that we've looked at that, let's see how we can get this app up and running.](https://app.pluralsight.com/course-player?clipId=14919148-0b0b-4591-8c29-95b0267a4d27&startTime=403.18)

### [Running the Application](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c)

[Getting the application up and running in Kubernetes is](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=1.14) [going to be very straightforward, you'll see.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=3.62) [The hardest part is just getting the images built,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=6.09) [but fortunately we can use Docker Compose for that task.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=8.94) [So to run the application, there are a few things we'll have to do.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=12.68) [First off,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=16.14) [we're going to need to export some environment variables and have those set.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=16.87) [The initial environment variables listed in the README file are](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=21.28) [just to run it locally outside of Kubernetes.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=24.73) [If you want to run it inside of Kubernetes,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=28.09) [we can come down a little bit further and it's going to say](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=30.23) [we need a production Docker Compose build.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=34.33) [Well, the production build, if you go open the Docker Compose file,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=37.64) [is actually going to say to set our app environment to production so](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=41.45) [we can export that and put production, and then we need to set this](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=46.13) [environment variable because this will be the account that's going to](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=51.39) [be used for our local images.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=55.14) [Although we're not going to be deploying the images to a registry,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=57.64) [this would be the account that you would use for that,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=61.14) [and you could certainly change this by going into the various](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=64.14) [files and replacing it with your account,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=67.07) [but we'll go ahead and set it to this codewithdan value here.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=69.14) [Once the environment variables are set, we can then run docker‑compose build.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=73.34) [I've already run that command since it takes a while to run and that](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=77.54) [will then generate the images we need. Now jumping back on down, the](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=80.83) [next thing we're going to have to do is we need to create our secret,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=85.55) [and we walked through this exact process earlier, and just to show you](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=90) [that I've already set this, let me run kubectl get secrets,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=93.82) [and you're going to notice that we already have a db‑password secret with](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=100.04) [two data keys available, so that's all been set up.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=104.02) [Now I do want to emphasize again that I'm using password purely for simplicity.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=109.49) [You would want a real password, of course,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=114.16) [as you work with this in whatever database or other](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=116.4) [scenario you may have for your applications.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=119.65) [Now the last thing is,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=123.14) [we can run kubectl create and actually give it the](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=124.11) [folder that we want to work with here.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=128.11) [Now, up to this point in the course, we've used ‑f a lot,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=131.12) [but we really only use it for single files.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=135.14) [Well,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=138.44) [we can also do k, I'm going to apply in this case, ‑f](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=138.69) [and then give it the folder name.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=143.94) [Now that's the folder that had all the deployments and services inside of it.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=145.26) [Well, as you're going to see,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=151.94) [that will automatically iterate through those and](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=153.08) [configure all of them. Very nice.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=157.42) [Now,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=159.41) [I did an apply because earlier I had already done a create and](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=159.66) [some of these resources are still hanging around.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=163.53) [So rather than getting an error, I can do apply and just update the](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=166.14) [things that I need to change. Now that we've done that,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=169.74) [we can run get all, and in get all, you're going to see we should have](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=173.49) [several different pods running, you can see those right up top.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=178.58) [We also have several cluster IPs and our load balancer.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=183.5) [Our load balancer, again, is what's going to call on Port 80 into Nginx.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=186.98) [Here is our deployments, and then here is our backing replica sets](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=192.44) [for those deployments that we actually need.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=195.73) [We also have a statefulset and that's for MongoDB,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=199.04) [that's a specialized type of deployment.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=202.53) [Now that we have this up and running and our pods are running,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=205.9) [we can now go to the web browser and try to hit localhost.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=209.74) [So I've gone to localhost in the browser,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=213.74) [and you can see that we now have a web page loading.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=215.72) [Now, the web page itself doesn't do a whole lot.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=218.94) [If you go to any of these, it's going to say no pages found because this](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=221.69) [is just a partial website, but it is using Nginx, Node,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=225.81) [MongoDB, and Redis, and it is running all of that inside of Kubernetes as](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=230.12) [we just discussed with the different manifest files.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=236.08) [Now, if this app looks familiar,](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=239.04) [it's from the Docker for Web Developers course, I've just modified](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=240.82) [it a little bit and added in the Kubernetes manifest files so that](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=244.33) [we could get this up and running.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=248.14) [I hope that helps you put together how we can use these different Kubernetes resources.](https://app.pluralsight.com/course-player?clipId=ffb6bf03-179b-405c-8a4c-99a5d1567b6c&startTime=250.68)

### [Troubleshooting Techniques](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc)

[Once you have an application up and running in Kubernetes,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=0.84) [there are times where a pod may not behave quite as you'd expect.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=3.35) [Maybe it didn't start up right, or as it was running after time,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=7.48) [it started to have some problems.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=11.27) [Maybe it was a memory leak or some other type of problem.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=12.83) [Well, when this happens,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=16.24) [knowing about a few basic troubleshooting techniques](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=17.73) [and commands we can run is really, really important.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=20.55) [And we've seen a few of these commands already,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=23.69) [but I'm going to revisit these and show you some](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=26.33) [others that you can use as well.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=28.47) [So, first off, just like with Docker, you can run a docker logs command.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=31.34) [Well, with Kubernetes, you can run a kubectl logs command,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=35.56) [and you can give it the pod‑name to get the logs for the container in that pod.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=40.32) [If it's a specific container you want to get,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=45.67) [and this would be useful in cases where a pod has multiple containers running,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=48.31) [then you can use the ‑c switch, as you see here.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=52.76) [You'll follow that with the name of the container that's](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=55.68) [actually running inside of that pod.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=59.21) [If you'd like to view the logs for a previously running pod,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=61.54) [one that maybe isn't currently running at all,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=64.86) [but you'd still like to kind of go back in time,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=67.71) [if you will, then you can use kubectl logs ‑p and give it the pod‑name.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=70.25) [And, finally,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=76.34) [if you'd like to stream a pod's logs because you want to watch those overtime,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=76.86) [you can use kubectl logs with the ‑f switch and then follow](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=81.61) [that with the pod‑name. I've found this command alone, kubectl](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=85.68) [logs, to be immensely valuable, just like I have with docker logs as well,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=90.43) [because often times it's just something basic going on in the container,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=95.74) [and you can resolve the issue by looking at the logs.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=99.54) [Now in addition to using kubectl logs,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=103.34) [there are other commands we can run to describe or get details](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=105.97) [about a pod. We've already seen kubectl describe,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=109.25) [and then we can list pod followed by the pod‑name.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=113.66) [Very, very useful because not only will this give us information about the pod,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=117.04) [but we can also get events that have occurred.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=121.75) [Maybe you find that the pod's been restarting the container a lot and that might](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=124.54) [lead to some other discoveries on how to fix that problem.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=128.39) [Maybe the image that was supplied for a deployment was wrong.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=132.08) [Maybe that led to the pod not loading properly.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=135.98) [But all these types of things can be found pretty easily with kubectl describe.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=138.7) [We've also seen how you can use kubectl get, provide the pod and pod‑name,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=144.54) [but then do ‑o yaml, or you could even do json. By adding ‑o and supplying,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=149.9) [for instance, yaml as the value, it makes it very,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=156.51) [very easy to dive into all those details about the container,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=159.24) [the image, the IP address, and more that's going on with this pod.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=163.66) [And then, finally, we can do the same thing with deployments as well.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=169.14) [We can do kubectl get deployment, give it the name,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=172.01) [and then do ‑o yaml. Now the final command that we've also seen quite a](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=175.03) [bit throughout the course that I found to be very,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=180.26) [very useful is kubectl exec.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=182.67) [Just like with docker exec, we can shell into a pod and get into the container](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=185.64) [within that pod and then start to run commands. We could see, Can this pod and](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=191.09) [the container communicate to other cluster IPs?](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=195.53) [Maybe there's a problem with our services,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=198.53) [for example, that we're trying to resolve.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=200.95) [Whatever it may be,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=203.24) [this command definitely has its place when you need to get into that](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=204.47) [container and actually run some commands either against that container or](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=208.66) [maybe from that container to other containers.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=213.32) [Now there are many other techniques that could be used for troubleshooting.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=217.04) [For instance,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=220.67) [you might have a very robust Kubernetes cluster logging](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=221.47) [mechanism set up for diagnostics and other details.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=224.64) [There are many tools out there like Prometheus, third‑party tools,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=229) [paid tools, free tools, open‑source tools,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=232.89) [many different options available.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=235.88) [But these commands that we've just covered are a great starting point](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=238.04) [and kind of very important to add to your tool belt,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=242.09) [if you will,](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=244.31) [as you're starting with Kubernetes and especially working with it locally on your machine.](https://app.pluralsight.com/course-player?clipId=8ba28421-f326-436f-973b-13a9a4e1f9bc&startTime=245.35)

### [Troubleshooting Techniques in Action](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19)

[Let's take a closer look at some of these troubleshooting](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=0.7) [commands and how they can help us out.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=3.06) [So first off,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=5.74) [I've loaded the CodeWithDanDockerServices project](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=6.35) [that we looked at earlier here,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=9.11) [but I've messed a few things up and we're going to try to](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=10.54) [discover what's going on and try to fix those.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=13.86) [So first off,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=18.14) [let's go ahead and get this running like we did before and we'll run a k](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=18.88) [apply and that will get all of our resources up and running.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=22.26) [Now from here, let's go ahead and take a look at the pods.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=27.18) [So we're going to run k get pods, and it looks like first off,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=29.63) [we have an error with mongo‑0.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=33.91) [So that's a MongoDB pod and we can tell that we have](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=36.09) [some type of configuration error, but what exactly is it?](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=39.64) [There's a couple ways we could get information about this.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=43.48) [First off,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=46.54) [we could do a k get pod mongo‑0 and then we're going to do the output of yaml,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=47.03) [and let's see what we see here.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=53.32) [So you'll notice first off the state says waiting and it](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=56.11) [looks like db‑passwords was not found.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=59.35) [Okay, well that would explain why we have the CreateContainerConfigError,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=62.14) [and if we also did a k describe on the pod,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=66.24) [we can see something similar down here in the bottom of the events,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=71.14) [Error: secret db‑passwords not found.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=74.37) [Well,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=77.74) [let me go ahead and let's add in that db‑password so that](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=77.91) [we have that available in our secrets.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=81.36) [All right, so I've added that here.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=83.74) [Let's go ahead and add it in and let's go ahead and](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=85.19) [start over now and see where we're at.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=88.08) [So we'll do a k delete and that'll remove all of our](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=89.83) [resources that we just added earlier.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=92.81) [Now let's go ahead and do a k get pods,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=95.39) [and it looks like the node one is terminating,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=97.94) [so let's see when it terminates, we're going to add a ‑‑watch here.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=99.96) [This will sit there and watch it until it's done and then we can exit out.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=104.19) [All right, it looks like it stopped writing out information,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=108.34) [so let's go ahead and exit out of here and let's do a k get](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=110.81) [pods and you can see now we have no pods,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=114.51) [that's perfect.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=116.68) [So now we'll go ahead and do apply again.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=117.94) [We'll get our resources back in order, and now let's do k get pods again.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=120.44) [Okay so first off, mongo‑0 looks to be up and running,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=126.74) [so that's a good first start.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=129.76) [It looks like all the others are up and running,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=131.64) [but is everything working properly?](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=133.69) [Well, let's take a look.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=136.07) [So let's run off to the browser now.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=136.99) [Let's go ahead and go to localhost and you'll notice I'm](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=139.41) [already getting a 502 Bad Gateway on nginx.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=142.41) [So that obviously presents a little bit of a problem.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=146.48) [What is the problem though, and how do we find out more details?](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=149.34) [Well, let's go on back and it looks like our pods are running,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=153.64) [but what nginx does is it's going to forward the request to node](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=156.89) [and then node would hit MongoDB and do its thing.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=162.24) [So, how do we get details about nginx, first off?](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=165.59) [Well, let's run on in, we'll copy this,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=169.11) [and now we're going to run a clear and we'll do k logs,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=172.94) [and then we're going to put that pod.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=177.42) [Now it looks like everything here is in order.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=180.64) [I don't see any errors that are nginx per se.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=183.1) [You'll notice that we do have an error though that says](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=185.73) [upstream prematurely closed connection.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=187.72) [Okay, well that's probably the problem it looks like.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=191.14) [So now let's go to the node.js pod.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=193.94) [Okay, so here's our node pod.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=197.64) [Let's grab that, and first off, let's do a describe on it.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=199.2) [Okay, and I don't see anything there that is a problem.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=203.63) [It looks like we successfully grabbed the image,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=206.58) [started the container, and everything's up and running,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=208.92) [so it must be something inside of the container.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=211.49) [So let's go ahead and do a kubectl logs on that](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=215.34) [particular one and see what we can see.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=219.1) [All right, so it looks like it created some routes,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=221.54) [but ah, there we go, it looks like we have a MongoNetworkError,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=223.56) [and let me scroll up just a little bit here,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=226.94) [failed to connect to server mongo‑2.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=230.46) [Okay, well that's probably the issue.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=234.62) [That probably means my connection string is wrong.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=237.6) [Let's go take a look.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=239.71) [So in the config folder, I can come on in and there we go.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=240.67) [Now, obviously I put this error in there for this demo,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=245.38) [but,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=248.67) [if this was the scenario and maybe this was pulled](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=249.54) [dynamically during a build process,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=252.28) [maybe the build process just wasn't configured properly,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=254.44) [then now we can figure that out.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=257.24) [For this particular case because that is actually in the config,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=259.84) [I'm going to need to rebuild the container.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=263.35) [So through the magic of video I'm going to do that.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=265.53) [I'm going to do a docker‑compose build as the README would tell you to do,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=267.74) [and then I'll let this run and we'll come on back.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=271.94) [All right, so everything's been built again.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=274.64) [We'll go ahead and make sure everything is deleted and we'll go ahead](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=277.3) [and monitor the pods to make sure they get cleaned up.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=280.86) [So it looks like we're good to go there.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=287.34) [Let me go ahead and clear.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=289) [Let's do get pods one more time.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=290.12) [All right, now all the pods are cleared up.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=291.78) [So now that we've rebuilt the image,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=293.84) [we've cleaned everything out locally here and we fixed our connection string,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=296.88) [let's go ahead and apply again,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=301.44) [and then we'll give the pods a second to get started up,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=303.81) [and let's go ahead and run to the browser again and see where we're at.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=307.41) [So let's go ahead and hit refresh and all right,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=310.94) [it looks like everything loaded up okay here,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=314.12) [so that's a good start and we're off and running.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=316.47) [Now,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=319.23) [what happens if the connection wasn't the issue and that](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=319.94) [instead there was something else going on with either node or](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=323.57) [some other pod that we want to get to?](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=327.02) [Well, the final command we can look at in addition to the get,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=329.44) [the describe and the logs is the exec command.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=332.96) [So let's go ahead and get the pods again and let's run into nginx,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=336.14) [and to do that, we're going to do k exec,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=340.9) [we're going to go into that pod,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=343.27) [then we're going to run an interactive tty and get an sh shell.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=345.33) [Now, early in the course, we looked at how we can run things like apk add curl,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=350.34) [and now we can use curl to actually issue a command against another pod.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=356.18) [So for example,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=361.36) [maybe we want to call from nginx into node and actually](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=362.18) [see if we're able to communicate.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=366.25) [Now, we kind of proved we could,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=367.67) [but this is yet another command where we could do that.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=369.74) [So in this case, we could go to, let's go to the node‑service actually,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=372.26) [looks like the name is node, so we can http://node,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=376.34) [and then we'd have to know the port to call it,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=379.97) [which looks like it is 8080,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=383.36) [and you can see we get back some information here for the home page.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=387.14) [So, that seems to be working,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=390.52) [and that's another command that we could do in addition to the get,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=392.82) [the describe and the logs is we could use the exec to kind of figure out what's](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=396.95) [going on and fix these different issues that might come up.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=401.32) [So that's an example of quickly using some of the different commands.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=405.14) [But,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=409.11) [knowing about these basic commands is really good to](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=409.45) [have on your troubleshooting toolbelt, if you will,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=411.63) [because we're going to be using these,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=414.54) [especially locally in development or maybe on a development](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=416.42) [type server somewhere else to resolve issues,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=419.78) [or maybe you need to help out an administrator who just doesn't](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=422.94) [know your app very well and there's some other problem maybe in](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=426.02) [QA or possibly even production.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=428.87) [Of course, to run these commands,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=431.64) [you'd have to have the access to run them with kubectl,](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=433.69) [and in production you more than likely won't have access, but you can certainly know enough to help an administrator out as needed.](https://app.pluralsight.com/course-player?clipId=d02debbe-0c4a-41b8-90a5-3840cea17a19&startTime=436.93)

### [Summary](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a)

[In this module,](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=0.19) [we've seen how to put all the different pieces together and get an application](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=1.01) [up and running in Kubernetes. We looked at how different YAML manifest files](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=4.89) [can be used to define these different resources, including things like](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=9.38) [ConfigMap, services, deployments, and more.](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=13.41) [We also looked again at kubectl create and apply,](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=17.14) [but we saw how ‑f can actually be used to deploy multiple](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=21.24) [manifest files simultaneously, if you'd like.](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=24.81) [And then we learned about different Pod troubleshooting commands and techniques](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=28.74) [that we can follow to resolve issues that come up as a Pod is having problems](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=31.84) [either starting or maybe running down the road.](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=36.79) [So I hope that helps you put together this big puzzle that initially](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=40.84) [feels a little bit intimidating with Kubernetes.](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=44.8) [Once you understand how these different resources are used and](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=47.8) [how we can build the YAML manifest files,](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=51.71) [you can see that really,](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=54.44) [like anything in technology, it's not so much that it's hard.](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=55.83) [It's more about taking the time to practice and to learn about these core concepts and see how they cbe applied.](https://app.pluralsight.com/course-player?clipId=dd47b031-5baf-43b4-bd3b-4e5b2b941a5a&startTime=59.4)

## [Course Summary](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d)

### [Course Summary](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d)

[Thank you for watching the Kubernetes for Developers: Core Concepts course.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=1.14) [I hope you've enjoyed the course and learned a lot about](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=5.04) [how containers can be running Kubernetes.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=7.38) [Let's review some of the key concepts covered](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=10.24) [throughout the course to wrap things up.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=12.4) [The course started out by discussing the big picture of](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=15.08) [Kubernetes and the benefits it brings to the table.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=17.43) [This included discussing master and worker nodes, as well as key](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=21.58) [Kubernetes resources and how they work together.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=25.06) [You also learned how to get Kubernetes running locally and gained some](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=28.73) [initial experience using the kubectl command line tool.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=32.53) [Next, you'll learn about the role of Pods in Kubernetes.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=37.07) [Although Pods are the most basic type of resource,](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=39.94) [they play a critical role since they ensure containers are](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=42.94) [running and handle restarting containers as needed.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=46.11) [You learned about how to create Pods using the kubectl run command,](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=49.54) [as well as by using YAML combined with the kubectl](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=53.2) [create or kubectl apply commands.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=56.29) [The next topic covered was deployments. Deployments work hand in](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=59.84) [hand with replica sets to ensure that the desired number of Pods are](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=63.43) [available in the cluster. By using deployments, you can scale Pods,](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=67.19) [perform zero downtime deployments, and even create blue‑green or](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=71.69) [canary deployments.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=75.71) [If a Pod fails,](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=77.44) [the deployment will ensure that it's rescheduled so that the](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=78.83) [desired number of healthy Pods is available.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=82.15) [As Pods are created,](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=85.37) [we need a way for them to talk to each other, of course. This is](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=86.57) [accomplished by services whose primary goal is to provide IP addresses](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=89.77) [for Pods. By using services, Pods can talk to each other without having](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=94.18) [to know about specific IP addresses.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=99.21) [This is important because as Pods are rescheduled,](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=102.44) [a service can automatically handle the IP address of a new Pod and](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=105.32) [enable communication to continue within the cluster.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=109.3) [Different types of services are available from cluster IP](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=112.54) [services all the way out to load balancer services. From there,](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=115.36) [different types of storage were discussed,](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=119.77) [including volumes, persistent volumes, persistent volume claims,](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=121.49) [storage classes, config maps, and secrets.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=126.03) [The different storage options provided by Kubernetes allow Pod containers](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=129.68) [to store data within Pods on worker nodes or outside of the cluster in a](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=133.5) [network storage or cloud storage location. Config maps and secrets allow](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=137.87) [configuration data and sensitive information to be provided to Pods](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=143.1) [through different means, including environment variables and volumes.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=147.02) [Finally,](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=152.04) [you saw how to put all of the Kubernetes resources together](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=152.39) [to get an application up and running.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=155.7) [This included discussing the application's YAML manifest files and](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=158.24) [how they can be used to create the desired resources, as well as](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=162.18) [commands to get those resources running so that the application can](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=165.57) [be called from a browser.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=169.91) [You also saw several key troubleshooting commands that can be used](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=171.84) [to diagnose problems in Pods and containers.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=175.08) [While there's a lot more that can certainly be discussed about](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=178.64) [Kubernetes, I hope this course has provided you with a solid](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=181.43) [foundation for learning the core concepts in getting started](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=184.95) [running your applications in Kubernetes.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=188.23) [Thanks again for watching the course, and I hope you'll check out my other courses on Pas well.](https://app.pluralsight.com/course-player?clipId=6be7820e-3f60-45ea-95f3-bb1e26f1882d&startTime=191.44)