## [Course Overview](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494)

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[Getting Started with Kubernetes.](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=4.34) [This is going to be one heck of a ride.](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=9.09) [Well, I'm Nigel Poulton.](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=11.86) [And if you don't already know me, I am a bit of a container geek,](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=13.89) [but I've done everything from programming to sysadmin to](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=17.11) [technical architect in some of the most high pressure and](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=20.87) [demanding environments in the world.](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=23.75) [But, these days I am all about cloud and containers. I'm a Docker Captain,](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=26.04) [author of Docker and Kubernetes books, and, of course,](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=31.49) [I have got a ton of courses here on Pluralsight.](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=34.78) [But enough about me.](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=37.49) [What about the course?](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=38.63) [Well,](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=40.44) [whether you've got an immediate pressing need to learn Kubernetes for](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=40.98) [your job or maybe you're just looking to add a string to your bow and](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=44.32) [stay ahead of the curve, this is the course for you, and no prior](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=47.46) [Kubernetes experience necessary.](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=51.81) [It is fast paced, heavy on the demos,](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=54.74) [crystal clear on the theory, and a lot of fun.](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=57.05) [And by the end,](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=60.22) [you absolutely will have everything you need to take your next steps](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=61.11) [with confidence and power forward in your career.](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=65.66) [Honestly, your mind is going to be blown with how much you learn.](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=69.14) [Speaking of which, we'll deploy an application to](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=73.18) [Kubernetes, expose it to the internet,](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=75.48) [scale it up and down, test self healing, and perform a zero‑downtime](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=78.02) [rolling update and a version rollback. And when you're done,](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=82.81) [you'll be itching to take your next steps. So,](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=87.31) [containers are hot, Kubernetes is hot,](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=91.18) [and I am excited to get cracking with this Getting Started](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=94.01) [with Kubernetes course, at Pluralsight. Let's do this.](https://app.pluralsight.com/course-player?clipId=42362fef-3e0f-42af-ac44-045d97525494&startTime=97.21)

## [Course Introduction](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424)

### [Course Outline](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424)

[All right, Getting Started with Kubernetes.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=1.54) [Now, trust me when I say this,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=6.94) [you are at the very start of something amazing with potentially](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=9.94) [far‑reaching implications for your career.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=14.19) [But all good, because make no mistake,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=17.44) [the tech world is changing in some really positive ways, and](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=20.29) [Kubernetes is at the very center of it.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=23.92) [Now then, if you're totally new to this stuff,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=28.04) [like maybe you're still a bit unsure what a container actually is,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=32.06) [then you might want to hit this course first.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=36.54) [Now, it's up to you, of course.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=40.34) [It's just that I'm going to be assuming for this course](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=42.74) [that you've already got your head around what a container](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=45.74) [is and maybe how to spin one up.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=48.39) [So if you haven't, maybe hit the pause button here,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=51.14) [find this course, and then jump back here when you're all done,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=55.02) [because that course covers all the basics and gets you](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=58.61) [spinning your first container up.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=61.66) [Now it's your call, of course.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=63.64) [I'm just saying the option is there.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=65.17) [Okay, assuming that you're cool with containers,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=68.64) [this is how we're going to do things here.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=71.33) [We'll do a quick intro to what Kubernetes is.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=73.74) [Now for me,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=77.25) [this is vital background info that anyone with any](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=78.6) [experience with Kubernetes has to know.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=82.22) [Like, what is Kubernetes, and where did it come from,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=84.73) [and what are some of the reasons that we have it?](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=87.9) [Plus, we'll level set with a bunch of terminology like,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=91.14) [what do we mean when we say things like cloud native and microservices? Oh,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=95.21) [and as well,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=99.86) [what does the name Kubernetes mean and where does it come from,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=100.84) [and all of that kind of background stuff. Well,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=103.89) [then we'll dive into Kubernetes architecture.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=107.58) [Now, this is a full‑on theory module, but I promise it will be absolutely epic.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=110.46) [And if you've taken any of my courses before,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=118.74) [then you'll already know that I bust a gut,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=121.54) [making the theory fun and entertaining.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=123.98) [So I highly recommend you watch all of this module.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=127.44) [I mean,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=132.24) [the whole point is to lay the groundwork for all the hands‑on](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=132.85) [stuff that's coming later. And then I promise,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=136.45) [as you gain experience,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=139.46) [you'll find that a solid understanding of how everything fits](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=141.16) [together and the likes is invaluable. Anyway, then we'll take](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=144.04) [a look at how to get Kubernetes.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=149.08) [The thinking here is just a few quick and easy ways to get](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=151.24) [your hands on Kubernetes and kick the tires and maybe](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=154.46) [follow along with the examples.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=157.44) [Well, after that, we're up and running.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=160.64) [We'll look at how to deploy apps on Kubernetes using pods, we'll](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=164.24) [expose an app to the network with services. In fact,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=167.94) [we'll even hook it into a cloud load balancer for access over the internet.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=171.16) [Then we'll round things out with scaling,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=175.84) [self‑healing, zero‑downtime, rolling updates, and a version rollback, plus,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=178.99) [I don't know, any other buzzword that I can think of.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=184.94) [But you know what?](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=188.44) [On the topic of buzzwords,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=189.21) [I am well aware that the tech world is littered with](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=191.19) [them, and I don't know about you,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=194.64) [but I hate it when people throw jargon around and assume](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=197.14) [everyone knows what they're talking about.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=200.05) [So any time we hit a buzzword, you'll be getting a crystal‑clear explanation.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=202.64) [And actually, if I forget to explain something,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=208.93) [or maybe my explanations aren't great, call me out on it,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=211.41) [and I'll see if I can fix it.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=215.15) [Well, last but not least,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=217.94) [we'll wrap the course with a few ideas of what you can](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=219.45) [do do next. And the amazing thing is, once you have reached this point,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=222.14) [you will be well up to speed with Kubernetes and properly prepared to take](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=229.54) [all of your next steps, like the transformation from what you know now to](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=234.71) [what you'll know then is going to blow your mind.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=241.12) [Now,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=246.14) [before we crack on, some really quick housekeeping. All the code and](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=246.72) [examples that we're going to be using in the course are in the course's](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=251.64) [GitHub repo here. Now GitHub, fair play,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=254.56) [right?](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=258.68) [You might not be sure what it is. If that's the case with you, no sweat.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=259.04) [We're not going to be using it heavily, and when we do,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=263.02) [I'll be sure to explain how to use it.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=266.26) [Also, throughout the course,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=269.34) [I'm going to be using the Kubernetes icons from here.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=271.39) [These are pretty much the industry standard for Kubernetes diagrams](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=274.84) [these days, so I want to give a big shout out to the folks behind](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=278.4) [them. And this is always an interesting one.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=281.6) [Usually I recommend that people listen to me at probably at least 1.2 speed,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=286.78) [but maybe even up to 1.4 or 1.5 speed.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=291.59) [That way you get to listen to my annoying voice a bit less,](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=295.54) [but it also helps you tick through things more quickly. Though I](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=299.44) [will say, sometimes if concepts are new to you.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=302.48) [Listening to me at 1.5 speed doesn't always give you a lot of time](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=305.84) [to let things digest. So the option is there.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=309.81) [You can by all means play me at a faster speed.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=313.81) [Just be aware that sometimes if something's new to you, it might be](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=317.04) [a bit better to listen to me at normal speed.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=320.53) [Your call, though.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=322.73) [And I think with that we are good to go, though I'll say this one last time.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=324.74) [Feel free to reach out to me if you get stuck, and I will do my best to help, Well, let's get this show on the road.](https://app.pluralsight.com/course-player?clipId=f43296c4-421c-4f77-8a86-fbae328f2424&startTime=330.75)

## [What Is Kubernetes?](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0)

### [What Is Kubernetes?](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0)

[All right, So what even is Kubernetes?](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=1.44) [And I'm going to split this into two.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=4.7) [We'll start out with, like, I guess the DNA.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=8.04) [I mean, I don't know if that works,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=13.02) [but I mean things like where did Kubernetes come from and what](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=14.3) [does the name even mean and stuff like that.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=18.29) [And I know it's not the fun technical detail,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=21.01) [but it is a vital part of any journey to Kubernetes mastery,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=24.49) [so stick with me and learn it.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=28.67) [Well, after we're cool with all of that,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=32.14) [we'll talk about what Kubernetes actually does and why we have it.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=34.28) [So first up, Kubernetes came out of Google,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=39.64) [which kind of has this movie trailer ring to it, yeah?](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=43.04) [Duh‑Dun, Kubernetes, spawn from the bowels of Google,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=46.96) [rising from the depths of the most hyperscale datacenters in the known universe,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=52.69) [duh‑d‑d‑duh‑duh, d‑d‑duh‑duh, d‑d‑duh.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=59.02) [You know?](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=61.4) [No, probably not.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=63.24) [Never mind.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=64.05) [It is true, though.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=65.54) [Kubernetes was born out of Google.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=66.54) [But in the summer of way back in 2014, like before I had gray hairs in my beard,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=68.93) [it was open sourced and handed over to the Cloud Native Computing Foundation.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=75.5) [And honestly, since then, it's been nothing short of a meteoric rise to the top.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=79.88) [Like, love it or hate it,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=85.15) [there is no doubt that it is one of the biggest and most](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=86.65) [important open source technologies on the planet.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=89.53) [Like I don't know, it's burning so hot and its future so bright,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=94.74) [if you stare at it for too long, you're going to damage your eyes.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=99.43) [Well, look, like most cool cloud infrastructure projects,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=103.34) [it is written in Go, or Golang.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=106.74) [And actually it lives on GitHub at kubernetes/kubernetes.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=109.11) [And if you're hands on with code,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=112.74) [you should definitely get involved. Anyway, it is also actively](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=114.27) [discussed on the IRC channels, you can follow its account on Twitter,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=118.48) [this here is a pretty good Slack channel,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=122.21) [and there's tons of meetups and gatherings all over the planet.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=125.12) [Oh, yeah, and of course,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=128.25) [there's yours truly here and the other Pluralsight](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=130.29) [authors that also have courses.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=133.13) [Okay, well,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=136.74) [there's a good chance you'll hear people talk about how](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=137.93) [Kubernetes relates to Google's Borg and Omega Systems, so](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=140.09) [what's the crack with that?](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=144.64) [Well,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=147.84) [it's no secret that Google's been rocking its own](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=147.99) [infrastructure on containers for years.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=150.36) [I mean,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=152.92) [it's widely known that Google churns through billions of](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=153.45) [containers a week, running things like Gmail and Search and](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=156.46) [pretty much most of their apps.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=160.18) [And yes, you did hear that right. That was billions with a b.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=162.04) [Well,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=169.74) [pulling the strings at Google and keeping all of those](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=170.32) [billions of containers in check are a couple of in‑house](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=172.85) [projects called Borg and Omega.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=175.68) [So I guess it's not a huge stretch to make the connection. After all,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=178.74) [Kubernetes is also about managing containers at scale. However,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=183.61) [and this is important to know, Kubernetes is not an](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=187.73) [open‑source version of either of those, but they are related,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=191.34) [so it's more like, well, actually, yeah,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=195.77) [it's more like they share a bunch of DNA and family history.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=198.47) [So let's say in the beginning was Borg and Borg became Omega, or](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=202.84) [spawned the idea or genesis of Omega, and then Omega led to the idea](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=208.32) [of Kubernetes. But the three of them are separate systems; they just](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=213.44) [share that common DNA and heritage.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=217.59) [So, and I'm waffling, but to be clear,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=221.44) [Kubernetes absolutely was built from scratch from the ground up.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=225.19) [It just happened to leverage a ton of stuff learned from Borg and](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=229.93) [Omega. And as well like you might expect, a bunch of the people that](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=232.96) [built Borg and Omega also built Kubernetes.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=237.42) [Anyway, what else?](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=241.34) [We've got that it came out of Google, got a lot of its DNA from Borg and](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=243.67) [Omega, it's open source under the Apache 2.0 license.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=248.23) [And, oh, yeah, version 1 shipped, wow, way back in July 2015.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=251.79) [So it's not exactly young these days.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=258.27) [Now, I get that it has this feel of being shiny and](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=260.79) [new and all bleeding edge and stuff, and well,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=264.24) [it is, but it's not like it's some 1‑year old project or anything.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=266.86) [Oh, yeah, the name Kubernetes doesn't exactly roll off the tongue, well,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=272.84) [not like Borg and Omega. But the name is rich in meaning.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=278.07) [So the word Kubernetes, and that's how we generally pronounce it.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=282.62) [Well, it comes from the Greek word meaning helmsman.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=285.89) [That's the person that steers a ship. And the logo here, obviously,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=290.58) [that is the helm of a ship.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=294.79) [And the more you get into this, the more it'll make sense because](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=297.84) [you'll start to realize the entire container ecosystem seems obsessed](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=301.27) [with nautical jargon and nautical references.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=306.25) [Now then, uh, oh, now, I love this. Way back in the early days,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=310.64) [Kubernetes was provisionally named Seven of Nine,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=317.38) [which, if you know your Star Trek,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=321.32) [you'll know that Seven of Nine is a rescued Borg drone. Link to Borg? Well,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=323.56) [copyright laws put a stop to that ever being a thing.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=330.82) [But the seven spokes in the logo here are a tip of the hat to Seven of Nine,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=334.04) [which is a pretty nice touch, in my book.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=340.03) [Anyway, look, time is important.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=343.04) [So the last thing I'll say before moving on is that you'll often see](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=345.31) [Kubernetes shortened to this, pronounced as K8s,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=348.98) [the idea of being the number 8 here replaces these 8 characters](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=353.94) [in between the K and the s. And that's it.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=357.86) [And look, I know some of it might feel a bit like waffle,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=363.24) [and you might be wondering if you really need to know this.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=366.28) [But like I said at the start,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=369.27) [I really think you do. There are no Kubernetes experts](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=370.81) [out there that don't know all of this.](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=374.14) [That all said,](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=377.84) [though, there's no point knowing this fluffy and admittedly less important](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=378.72) [stuff if we don't know the more important stuff as well. So next up, what actually is Kubernetes, and what does it do?](https://app.pluralsight.com/course-player?clipId=480131d8-12b5-4c6a-93e4-eed069f4b6c0&startTime=382.79)

### [Kubernetes What and Why](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841)

[Okay, what is Kubernetes, and why on earth do we have it?](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=1.34) [Now like I said in the intro,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=6.15) [I am assuming at this point you know a bit about containers.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=8.01) [If you don't, I highly recommend you take this course here.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=11.55) [What I'm also assuming is you've got an idea of some of](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=17.34) [the challenges that containers bring,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=20.35) [as well as many of the impacts that they're having on how we](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=22.17) [think about the data center and its resources.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=25.89) [Well, generally speaking here,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=29.44) [containers make our old scalability challenges seem pretty laughable,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=32.02) [and I'm putting that mildly.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=36.85) [I mean,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=39.42) [we've already talked about Google's billions of containers a week madness.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=40.11) [But I know, I know.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=44.09) [I'll hold my hands up straightaway and say, yeah, Google is Google.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=45.73) [And true,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=49.67) [the vast majority of companies are about as much like Google as I](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=50.5) [am like Cristiano Ronaldo on a football pitch,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=54.72) [so not even remotely similar.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=57.46) [Well look,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=59.95) [it is true that if your legacy apps had tens or hundreds of virtual machines,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=62.11) [there's a pretty solid chance that your modernized containerized](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=67.66) [apps are going to have thousands of containers.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=70.96) [And if that's the case,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=74.54) [I can tell you right now you're going to need something to help you manage them.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=76.26) [Well, say hello to Kubernetes.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=81.54) [Now another thing I want to mention is that we've kind of abandoned this](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=85.24) [traditional view of the cloud and of your data center as a collection of](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=90.54) [computers in favor of the more powerful idea that the cloud or your data](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=94.45) [center is a computer like a giant one.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=98.79) [So if we look at a computer, and I'm keeping it high level, but](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=103.14) [it's got processing cores, high speed memory,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=107.16) [slower persistent storage, and networking. And for the most part,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=109.84) [application developers are not bothered which CPU core,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=114.66) [for instance,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=118.33) [or memory DIMM that they're application is using. We just let the operating](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=118.9) [system look after all of that. And you know what? It works an absolute](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=122.99) [treat, and the world of application development thrives on this principle.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=127.82) [So it's only natural to take it to the next level and treat your cloud or](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=131.64) [your data center in the same way.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=135.8) [So what am I saying?](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=138.08) [Well,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=139.65) [instead of caring which VM or compute instance to run all of your](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=140.1) [application bits and pieces on, instead of that,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=144.51) [let's have something like a cloud OS to take care of all of that for us.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=148.04) [Well, I'm sure you get this.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=153.02) [Say another hello to Kubernetes. So what I'm saying is we can basically say hey,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=155.72) [Kubernetes,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=164.1) [I've got this app, and it consists of whatever, these different services.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=165.1) [And you know what?](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=169.44) [Just run it for me, please.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=170.64) [And Kubernetes does that.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=172.56) [It goes away and does all the hard stuff for us. Now, I don't know,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=173.82) [if you like analogies, it's a bit like sending packages via a courier service.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=178.73) [So in that situation,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=183.78) [we pack up whatever we're sending, obviously according to](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=185.58) [the courier's packing specifications,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=188.73) [we label it with some information, and we just hand it over to the](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=191.24) [courier, and that's us done. All the decisions of which routes to use](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=194.26) [or routes and which planes and highways and all that kind of jazz, all](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=198.79) [outsourced to the courier. Well, it's kind of the same with Kubernetes.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=203.69) [We package our apps as containers,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=210.24) [describe them in a declarative manifest, and just give it to Kubernetes.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=212.5) [Then, of course,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=217.64) [behind the scenes, Kubernetes does all the hard work of look whatever, deciding](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=219.14) [what nodes to run stuff on and how to pull and verify images and start](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=223.71) [containers and attach to networks and all that complexity,](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=227.95) [right?](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=230.62) [I'm not bothered.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=231.11) [Kubernetes just takes care of it.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=232.11) [And as we'll see as we crack on with the course, it is a beautiful thing.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=234.34) [Now we're super high‑level right now, but yeah, that's pretty much it.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=241.04) [Kubernetes is the leading tool for managing containerized applications at](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=245.22) [scale, what we sometimes call, here we go, cloud‑native microservices apps.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=249.82) [And on that note, I am fully aware that there are a ton of buzzwords in the](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=256.04) [industry, and they can be confusing.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=260.59) [So next up, we're going to define what exactly is a cloud‑native microservices app.](https://app.pluralsight.com/course-player?clipId=905584bc-3c80-4eae-8770-2a6ccebe8841&startTime=262.54)

### [Quick Jargon Busting](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f)

[Okay, let's do this, and it's going to be quick.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=1.44) [Back in the day, like before I had gray hairs in my beard,](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=4.04) [we built applications as monoliths.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=7.08) [In fact, that's probably what gave me the gray hairs.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=10.03) [Anyway look,](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=13.44) [a monolith is just techno jargon for a massive honking application with all of](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=14.36) [the code and clevers bundled into a single giant program.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=19.74) [Well, that model had its issues,](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=24.04) [and it is being replaced by cloud‑native microservices apps.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=26.41) [Only and actually let me flip that, and I'll mention the microservices bit first.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=31.14) [So the monolithic app did lots of different things,](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=38.11) [maybe reporting, logging, authentication,](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=41.71) [inventory, you name it.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=44.89) [It just all happened to be built and shipped as this single monolithic unit.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=46.17) [Well,](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=52.44) [each of those little different things that it did is called an](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=53.31) [application service or just service for short.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=56.63) [Well,](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=59.44) [microservices just takes all those different services and](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=61.24) [breaks them out into their own little apps,](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=65.16) [hence the name microservices.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=67.86) [Now the overall application experience is the same.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=72.24) [I mean, it's the same features as before.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=75.61) [They just happen to be a lot more loosely coupled in this model.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=77.97) [Now on the positive side, each of these little microservices can be developed,](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=82.24) [built, and shipped independent of all of the rest.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=87.07) [Plus, they can be scaled independently, updated, and even patched independently.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=90.58) [The overall model just offers way more flexibility.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=96.9) [But I'll be honest, there can be a cost in complexity.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=100.84) [I mean,](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=104.47) [keeping all these things connected and talking and even keeping the](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=104.9) [different development teams talking and on the same page, well](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=108.15) [obviously that's going to have its challenges.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=111.2) [But in a nutshell, that's microservices.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=113.74) [Now the cloud‑native bit, that means it's all scalable,](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=116.59) [dynamic, loosely coupled via APIs.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=121.73) [But really importantly, it means it can run anywhere.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=125.14) [So I always stress this.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=129.25) [Cloud native does not mean an application that will](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=131.42) [only run in the public cloud.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=134.88) [In fact,](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=137.04) [I'd even say a core tenet of cloud native is the ability for an](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=137.53) [application to run anywhere that you have Kubernetes.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=142.11) [So that can be a public cloud, of course, it can be a private](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=146.94) [cloud, or even a more traditional cluster of Kubernetes nodes in](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=151.41) [your own on‑premises data center.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=155.46) [So cloud‑native apps run anywhere that you have Kubernetes.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=158.74) [And you know what, that'll do for now. If you feel like](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=164.44) [you need more detailed information, go and check out this course.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=167.51) [Now then, look. If some of this seems a bit out there and, I don't know,](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=172.44) [maybe you're like, what is this guy on about?](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=176.44) [Trust me.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=179.48) [Stick around because I promise you, by the end of the course,](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=180.53) [you'll be like it all makes total sense to me now.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=184.07) [Okay, well,](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=189.54) [I'll tell you what. Time for a quick disclaimer. Kubernetes and the cloud](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=190.75) [are both moving frighteningly close to the speed of light.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=195.66) [And if you snooze, you'll lose.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=200.25) [So crack on with the course, get on the Slack channel,](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=203.14) [get along to a local meet up, reach out to me.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=206.3) [But most importantly,](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=209.66) [crack on with the course and then get your hands dirty and just play with it.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=211.84) [It is a skill that will pay you huge dividends in the future.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=215.74) [Anyway, look.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=220.84) [Next up, this is where the real learning starts.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=221.76) [Next up, we're going to dive into Kubernetes architecture. And I'm telling you, you're going to love it.](https://app.pluralsight.com/course-player?clipId=864df46e-d05a-42d6-9215-5d3a32cec75f&startTime=226.09)

## [Kubernetes Architecture](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a)

### [Module Overview](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a)

[Okay, this is the good stuff.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=1.34) [And I hope you're excited because at the end of this module,](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=3.47) [you will absolutely know the major components of both a](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=7.21) [Kubernetes cluster and how it manages apps.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=10.97) [Anyway, here's the plan.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=14.64) [We'll start off with a view from 100,000 ft because I think](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=16.31) [it's really important to have a proper big picture view of](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=20.98) [everything before we dive in deeper.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=24.02) [Anyway, once we've got that bigger picture,](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=26.84) [we'll start looking at things a bit closer.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=29.54) [Maybe, I don't know, 50,000 ft or whatever.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=32.01) [But we'll start out with the infrastructure bits first, so masters and nodes.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=34.57) [Then, we'll switch tack a bit,](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=41.16) [and we'll look at the bits of Kubernetes that we use to deploy and manage apps.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=43.19) [And seeing as how Pods are the most fundamental and atomic](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=48.64) [unit of scheduling work on Kubernetes, we'll start out with those first.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=51.42) [Then, we'll look at how we expose apps on the network with services,](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=55.34) [and we'll look as well at how Kubernetes deployments let us](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=60.34) [do cool and important stuff with our apps,](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=64.49) [things like scaling and rolling updates and version rollbacks.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=67.01) [And I know we haven't even started,](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=71.54) [and I'm already throwing the buzzwords around,](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=74.6) [but don't worry.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=76.44) [We'll explain every one of them as we crack on with the course.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=77.6) [And we'll finish up with a quick chat about what the heck](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=81.28) [the Kubernetes API is and the API server.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=84.73) [Oh, and of course, we'll wrap the module up with a quick fly‑by recap.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=88.15) [It'll be a great way to tell whether you grasp the](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=93.11) [concepts we've covered so far, so don't skip that out.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=95.82) [Now, okay, go on then.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=99.68) [One last thing before I go.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=101.31) [This is a getting started course here so we're not going to be](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=102.81) [covering everything that Kubernetes can do.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=106.34) [I mean, not even close.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=108.69) [But we absolutely will cover more than you need to get on](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=110.13) [your feet and taking your first steps.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=116.58) [You're going to love it honestly.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=118.32) [So listen, get a pen and paper, flip yourself into learning mode, and let's get our heads around the big picture architecture stuff.](https://app.pluralsight.com/course-player?clipId=24bfc59c-9c0d-4aa2-ac68-de2b366a642a&startTime=120.38)

### [Kubernetes Big Picture View](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f)

[So at the highest level,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=1.24) [Kubernetes is an orchestrator of microservices apps,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=3.03) [and like we said a minute ago,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=7.03) [microservices app is just a fancy tech word for an application](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=9.22) [that's made up of lots of small and independent services that work](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=13.12) [together to create a useful application.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=17.2) [And, yeah, that's fine, right, but what is this orchestrator buzzword?](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=19.74) [Well, tell you what, let's draw a picture.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=25.24) [In fact, actually, as I hate PowerPoint,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=28.76) [let me just steal one from one of my Docker courses.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=31.28) [Okay, here we go.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=34.84) [In the real world, a football team or a soccer team,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=35.86) [right, depending on where you live in the world, is made up of individuals.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=38.15) [Now,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=42.14) [no two are alike, and each one has a different skillset and](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=42.84) [a different role to play in the team.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=46.22) [So, maybe some sit back and defend, some push forward and attack,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=49.34) [some are great at breaking down plays, some are creative,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=54.46) [some are quick, you know the score.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=57.47) [Forgive me, that was bad, the score. Anyway,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=59.89) [right, the point is,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=62.37) [there's a bunch of individuals with different skills and abilities.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=63.99) [Well, along comes the coach,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=66.97) [and she or he gives everyone a position and a responsibility.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=68.86) [Basically,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=72.9) [they organize all of these individuals into a team, and we go from this](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=73.7) [absolute mess here to this average formation, something that at least looks](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=77.4) [like it's got a fighting chance of winning a game.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=83.21) [Well, you know what, as well as that, the coach also](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=85.59) [makes sure everyone sticks to plan, so holds the formation and does their job.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=90.01) [Plus,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=95.46) [they replace injured players and make other on‑the‑fly decisions as](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=96.64) [they react to a constantly changing situation.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=100.24) [Well, guess what, and I'm not kidding here,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=103.84) [but microservices apps in the Kubernetes world,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=106.72) [they are just like that.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=110.13) [Seriously, stick with me, okay.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=111.85) [We start out with an app made of multiple services, each packaged as a](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=114.84) [container, and we're massively high level at the moment, right, but each one](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=118.5) [is different with a different job in the overall app.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=123.21) [So we've got, like, load balancers, web servers,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=125.93) [logging, the whole picnic. And Kubernetes comes along, a bit like](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=129.19) [the coach in the football analogy, and organizes everything into a](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=134.6) [useful app, so on the right networks and ports, and with the right](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=138.72) [secrets, credentials,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=143.92) [you name it. And what we end up with is a useful app made up of lots of small,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=145.47) [specialized parts, and we call this what Kubernetes is doing](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=151.9) [orchestration, so it's orchestrating all of these pieces to work](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=155.49) [together, kind of as a team. There you go, told you.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=161.02) [Anyway, look,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=165.74) [I know big pictures are easy, so how do we actually make this happen?](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=166.75) [Well, we start out with an app, and we package it up and give it to the cluster,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=172.24) [the cluster being Kubernetes and being made up of one or](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=176.41) [more masters and a bunch of nodes.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=179.55) [So let's just say the masters are like the brains of the cluster,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=182.74) [like they're always making the scheduling decisions and things like that.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=186.33) [And, I don't know, if you're like me and you like to try and sound intelligent,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=190.34) [then the stuff that runs on the masters make up what](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=195.05) [we call the cluster control plane.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=197.81) [Very intelligent sounding.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=201.84) [Anyway, look,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=204.24) [it's just clever talk for the stuff that monitors the cluster, makes](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=204.8) [the changes, schedules the work, responds to events,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=208.3) [all of that jazz, right.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=210.74) [It is all done by the masters that we sometimes call the control plane. Well,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=212.06) [the nodes then are where we run our user or our business applications.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=217.41) [And, of course,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=221.73) [they do stuff like report back to the masters and watch for new instructions.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=222.34) [Now, look, we're in kindergarten right now.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=226.84) [It really looks like this.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=229.06) [I love the detail and we'll cover it all later, but](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=232.04) [I think for now this is enough.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=235.78) [That's our physical infrastructure stuff, masters and nodes.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=238.05) [But, at the start we said something like,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=242.54) [we package the application and give it to the cluster.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=244.81) [So to do that,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=247.68) [we take our app code and containerize it, like make it run as a container.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=248.58) [Well, then we wrap that in a pod,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=253.54) [seeing as Kubernetes needs containers wrapped as pods, detail to come later.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=256.34) [But then if we want things like scaling and self‑healing,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=261.67) [we further wrap that pod inside a deployment. Head‑spinning stuff, yeah?](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=266.17) [Don't worry, though, you're not supposed to understand it all yet.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=271.75) [I mean, look, if you do, magic, but if it's all feeling a bit much,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=274.63) [don't worry, stick around, it is early days yet,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=278.62) [and I'm just seeding ideas for later.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=281.14) [For now,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=285.14) [I'm just going to say we define all of this kind of](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=285.98) [stuff in Kubernetes YAML file,](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=289.45) [which is basically just a way to describe what the app should](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=292.33) [look like to Kubernetes, so things like what container image to](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=295.75) [use, and what ports and networks, how many replicas, all of that](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=300.66) [kind of stuff, in a file.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=303.83) [We then give that file to Kubernetes on the master here, and the master](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=305.9) [makes a persistent copy as a record of intent, and goes to work making it](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=310.37) [all happen, and it's incredibly powerful.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=315.19) [Well, you know what, look, that's the 100,000‑foot view.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=318.95) [Should we start digging a bit deeper? Heck, yeah, let's do it.](https://app.pluralsight.com/course-player?clipId=65a5161a-b32b-424d-8f1d-7c76de06731f&startTime=321.91)

### [Kubernetes Masters](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205)

[Okay, masters. Now,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=1.34) [on the terminology front, like we've said before, we quite](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=3.74) [often call the masters the control plane.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=6.96) [So, masters, head nodes, control plane, it is all just jargon for the](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=10.21) [same thing, brains or the intelligence of the cluster.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=15) [Now, as the masters are effectively in charge of running the cluster,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=19.24) [you can guess it's kind of important that they're always available.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=22.72) [So, multi‑master control planes are most definitely a thing.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=25.85) [In fact,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=30.21) [you should never deploy Kubernetes to production without a](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=30.87) [highly‑available multi‑master control plane.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=34.31) [Now, Kubernetes is cool and all,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=37.84) [but it doesn't change the normal rules of high availability.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=39.86) [So, you pick an odd number,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=43.44) [and you most definitely stick them in different failure domains](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=45.35) [that are connected by fast, reliable networks.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=48.17) [I mean, sticking them all in the same data center rack under](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=51.36) [the same dodgy air con unit, that is an automatic nomination](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=54.47) [for a Darwin Award, and you should, at the very least,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=58) [expect to lose your job. Now,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=60.53) [on the topic of how many masters to have in your H/A config, for the most part,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=63.97) [three is the magic number. Five is an option,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=68.53) [though if you're really paranoid,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=71.05) [but going more than five, that can start to increase how long it](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=72.59) [takes the cluster to reach consensus. Which,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=76.01) [if you're not familiar with consensus,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=78.78) [just think about being out in a group and deciding where to eat.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=80.62) [If there's three of you, it's easy, right?](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=83.88) [But if there's like 23 of you,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=86.04) [you probably spend half the night trying to decide, and it's not](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=88.04) [massively different with cluster consensus.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=91.28) [So, three is the magic number for most people.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=94.54) [Five's good if you need a bit more resilience, and](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=97.22) [one is better than two, actually.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=99.9) [So, yeah, wait a minute.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=101.79) [One is better than two? Oh, yeah, well, let me explain.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=103.03) [This comes down to avoiding a condition called split brain and deadlock.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=107.54) [So, imagine a control plane here with four masters,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=111.4) [and if the network between them goes down or partitions like this,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=114.43) [we've got a deadlock.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=118.2) [So, all four knew there used to be four, but none of them can reach](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=119.88) [more than two, which is a problem because if none of them can be sure](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=124) [that they can communicate with the majority,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=127.64) [then the cluster goes into read‑only mode.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=129.54) [I mean,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=131.51) [look, your apps will continue to work, but you won't be](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=131.89) [able to change or update anything.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=134.97) [Now, if you had three masters in this scenario,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=137.14) [then this side over here knows it has a majority.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=140.27) [So it'll elect a leader, and the cluster carries on at](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=143.15) [full throttle with this one over here,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=145.55) [obviously knowing it does not have a majority.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=147.61) [But, this is a rabbit hole.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=150.94) [I mentioned leaders.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=153.03) [So, despite the fact that multi‑master H/A control planes are a thing,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=154.38) [Kubernetes operates an active‑passive multi‑master model.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=158.66) [So, loaded jargon there, right?](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=162.24) [This is just where only one master is ever actively](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=164.48) [making changes to the cluster.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=168.27) [We call that one the leader,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=169.84) [then the others are followers, and they proxy any connections or](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=171.44) [requests across to the leader. Then, of course,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=175.37) [yeah, if the leader goes down,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=178.34) [then these followers come together and elect a new leader. Anyway,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=179.68) [right, if you're building your own cluster,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=183.74) [you need one or more Linux machines to run your masters.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=185.62) [Now a couple of things to mention. They do need to be Linux machines,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=190.14) [by the way, yeah, but they can be pretty much anything anywhere.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=193.21) [Like Kubernetes couldn't care less if they're bare metal](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=197.14) [physical servers in your on‑prem data center or virtual](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=200.06) [instances in the public cloud.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=203.05) [So long as you use a modern version of Linux and you connect them with good,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=205.23) [reliable networks,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=209.73) [then Kubernetes is cool with it. Now, the other thing to note is that](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=210.84) [every master actually runs a bunch of smaller services that's each](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=215.55) [responsible for a single control plane feature.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=220.06) [It's microservices, yeah.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=223.09) [Now, as things stand, every master runs every master component.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=225.24) [So, an H/A setup with three masters,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=229.5) [then all three are running every control plane service. Now then,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=232.11) [in a cluster that you build yourself,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=238.54) [you get to choose how many masters, and where they get](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=240.38) [located, and all of that goodness.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=242.63) [But in a hosted Kubernetes platform,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=244.98) [the masters are hidden from you, and they're out of your control.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=247.23) [So, let me back up for a second. Hosted Kubernetes is where your cloud](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=250.94) [provider runs Kubernetes for you as a service. You basically get an API](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=256.24) [endpoint, and the mechanics of how the control plane is built, and all](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=262.53) [the performance, and the H/A,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=266.59) [and sometimes even the upgrades and the likes are](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=268.01) [taken completely out of your hands.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=270.22) [It's a service, right?](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=272.71) [So, you must understand, in this situation, you are making a](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=274.84) [conscious decision to outsource your Kubernetes control plane to](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=278.03) [your cloud provider, and for a fee, of course.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=281.89) [But, in return, you get a so‑called production grade cluster](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=286.14) [with pretty much zero effort on your behalf.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=289.89) [And for a lot of people, it is a great model.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=292.54) [So, Google Kubernetes Engine, GKE, and Azure Kubernetes Service,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=296.14) [AKS, and AWS Elastic Kubernetes Service, EKS, are the big ones,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=300.29) [right?](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=304.71) [But loads of others exist.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=305.23) [Now then, it is generally considered a good practice not to run](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=308.04) [user or business applications on the masters.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=312.6) [And in fact, if you're using a hosted Kubernetes service,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=315.94) [you've got no choice in the matter because you can't](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=318.41) [even see your access to masters.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=320.58) [But, yes, generally speaking,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=322.74) [you should run user apps on the nodes or the worker nodes and leave the](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=324.81) [masters to concentrate solely on looking after the cluster.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=329.08) [It's about lines of demarcation,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=332.61) [and you know what, it keeps things clean and simple.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=334.56) [So, tell you what, after all that blabber,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=338.44) [let's look at the specialized bits that make up the master.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=341.59) [And first up is the API server, and this is a biggie,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=345.64) [right, as this is the gateway to the cluster.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=348.46) [In fact, actually,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=351.71) [it's the only master component that anything should be talking to.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=352.61) [So, when we issue commands to the cluster, yeah,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=357.16) [we're sending them to the API server.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=360.13) [But even cluster nodes and the apps that are running on the cluster, if they](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=362.28) [need to communicate with anything on the control plane,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=366.32) [they come in through the front door just like the rest](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=368.72) [of us by talking to the API server.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=370.9) [In fact, you know what?](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=373.06) [Even the different bits of the control plane here, so all the different](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=374.44) [control plane services, when they talk to each other,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=378.09) [they do it via the API server.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=380.98) [Well, okay, like all good things these days,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=384.24) [it exposes a RESTful API over a secure port, and it consumes JSON and YAML.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=387.03) [And in the case of us as users deploying and managing apps, we send YAML](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=393.24) [manifest files describing our apps to the API server.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=398.16) [The API server authenticates,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=401.9) [authorizes, and validates it, and then it instructs the other](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=403.41) [control plane features to deploy and manage it. Oh,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=406.84) [okay.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=411.32) [Alright, next up, the cluster store.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=413.34) [Now first up,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=415.31) [this is the only persistent component of the entire control plane, right?](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=415.88) [And, as the name suggests,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=420.54) [it is where the config and the state of the cluster itself,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=422.42) [as well as any apps running on it gets stored. Now, right now,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=425.23) [it's based on the etcd distributed NoSQL database.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=429.08) [Those words again, gosh.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=433.34) [Now, you can swap it out for something else if you want,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=435.08) [but that's a pretty advanced thing to do. Anyway, look,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=438.6) [it is super critical to cluster operations, and you know what?](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=441.55) [In large, busy clusters, it's probably going to be the first](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=445.29) [thing that's going to come under pressure.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=448.37) [And believe me,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=450.03) [that's no disrespect to etcd. It's just a fact that doing distributed](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=450.67) [databases at scale when there's lots of changes going on is hard.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=455.99) [So, okay, if you plan or expect your clusters to be large and busy,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=460.84) [like lots of change going on,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=466.58) [then you will definitely want to look at splitting out the cluster store bit](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=468.36) [onto their own set of highly‑available infrastructure.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=472.62) [Oh, and, of course,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=477.64) [you should have things in place for backup and](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=479.37) [recovery and be regularly testing them.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=481.61) [Alright, what next?](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=485.14) [Oh, yeah, the controller manager.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=486.4) [So, this is like a controller of controllers,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=488.7) [if you will, a bit of a mini monolith, actually.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=492.1) [Anyway,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=494.51) [look, inside of it, we've got a bunch of controllers that are](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=495.02) [each responsible for something different.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=498.62) [So, there's like a node controller in charge of nodes, yeah.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=500.42) [A deployment controller in charge of deployments,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=504.3) [endpoint controllers, namespace controllers.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=507.04) [There's pretty much a controller for everything in the cluster.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=509.65) [And you know what?](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=514.14) [We'll be looking into this in more detail in a second,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=515.04) [but each one basically runs as a reconciliation loop,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=518.04) [watching the bits of the cluster that it's responsible for and](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=522.02) [looking for changes with the aim of the game being to make sure](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=525.35) [that the observed state of the cluster matches the desired state.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=528.86) [And right now, like we said,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=532.94) [they're all managed by the overall controller manager.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=534.64) [Well, last but not least,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=539.44) [we've got the scheduler. This watches the API server](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=541.28) [for new work, applications, yeah,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=544.2) [and it assigns it out to nodes. Only, we are doing it a huge](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=546.12) [injustice because it's actually pretty complex,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=550.62) [and it has to chew on a lot of things when making scheduling](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=552.89) [decisions, so things like affinity and anti‑affinity,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=555.66) [constraints, taints, resource management.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=559.34) [The buzz words I know,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=563.14) [but the point I'm making is there's quite a lot for the scheduler to consider.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=564.8) [But you know what?](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=569.26) [That's enough for now, right?](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=570.29) [The masters or the control plane are the brains of Kubernetes.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=571.94) [Commands and queries come into the apiserver here,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=575.66) [usually via the kubectl command line tool.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=578.18) [Well, they get authenticated and authorized, and then,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=580.78) [well, let's say it's a command to deploy a new application.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=583.65) [The desired state of the app gets written to the cluster](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=587.07) [store as a record of intent, yeah, and the scheduler farms](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=589.87) [the work out to nodes in the cluster.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=593.04) [Okay, brilliant.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=595.84) [Once that's done now, various controllers sitting in watch loops,](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=596.88) [observing the state of the cluster, and making sure that it](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=600.82) [matches what we've asked for, and that is the crux.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=604.04) [Now, there's loads more detail and plenty of examples](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=608.57) [coming as we crack on with the course. Right now, though, let's go and take a look at worker nodes.](https://app.pluralsight.com/course-player?clipId=bca23a3c-5aba-4e97-a8ed-e9686c3f7205&startTime=612.63)

### [Kubernetes Nodes](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7)

[Okay, well, straightaway we can see that nodes are a bit simpler than masters.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=1.04) [So there's basically three components that we care about,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=6.74) [kubelet, the container runtime, and the kube‑proxy.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=10.17) [So first up the kubelet, and let me be really clear about this.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=14.74) [The kubelet is the main Kubernetes agent that runs on every cluster node.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=19.22) [In fact, we sometimes use the terms node and kubelet interchangeably.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=24.35) [Anyway, you start with a Linux or Windows machine because,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=29.44) [yes, nodes can be Linux or Windows these days.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=33.04) [But they can be physicals, VMs, cloud instances, you name it.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=36.57) [You just install the kubelet.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=41.6) [This registers the machine as a node in the cluster](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=43.59) [and effectively adds its CPU, RAM,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=46.65) [and other resources to the overall cluster resource pool.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=48.74) [Net net, the scheduler can intelligently assign work to the node.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=53.24) [Now speaking of work, and we'll get to this shortly,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=58.27) [but work on a Kubernetes cluster comes in the form of](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=61.86) [pods and detail to come remember.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=65.66) [But right now,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=68.28) [just think of a pod as one or more containers packaged](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=69.39) [together as a single deployable unit.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=73.11) [Well,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=77.04) [it's the job of the kubelet to constantly watch the API server on](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=77.96) [the master for any new pods assigned to it.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=81.98) [When it sees one, it pulls the spec and it runs the pod.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=85.42) [But it also maintains a reporting channel back to the API](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=88.68) [server to keep the masters in the loop.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=92.71) [No pun intended, right?](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=95.24) [Remember control loops.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=96.59) [Anyway,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=98.33) [it's the kubelet's job to keep the masters appraised of the](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=98.86) [state of the cluster and any running apps.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=102.39) [Okay, well,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=105.74) [we said that the kubelet runs pods and that pods are one or more containers,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=106.98) [meaning if we strip everything away, it's all applications running in containers.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=112.06) [Only Kubernetes and the kubelet don't know how to run containers.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=117.65) [They don't know how to pull image layers or talk to the OS](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=122.21) [kernel and build and start containers.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=126.61) [So for all of that stuff, it uses a container runtime.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=129.54) [Now in the beginning, this container runtime was always Docker,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=134.84) [and quite often it still is.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=138.37) [But this whole component is actually plugable via something](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=140.54) [called the Container Runtime Interface or CRI.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=145.02) [So to cut a long story short, for the most part,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=148.18) [this container runtime that's got all the smarts on how to](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=151.6) [start and stop containers and the likes,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=154.82) [for the most part, it's going to be Docker or containerd.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=156.39) [But it's plugable,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=159.92) [and there's plenty of others out there that support Kubernetes and the CRI.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=161.32) [In fact, as a homework assignment,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=166.64) [grab a notepad or something because I recommend that you](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=169.36) [Google gVisor and Kata Containers.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=171.99) [Now look, other container runtimes exist,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=175.02) [but these are a couple that'll give you a decent idea of some of the](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=177.95) [features and differences between the different ones out there.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=181.88) [That all said, whichever container runtime you use,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=185.64) [they are what takes care of the low‑level sort of](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=190.29) [stop and start container stuff.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=193.43) [Sweet.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=196.12) [Well, the last piece of the node puzzle is the kube‑proxy,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=197.49) [and this is like the network brains of the node.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=200.97) [So for one thing, it makes sure that every pod gets its own unique IP.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=205.74) [And yes, that is one IP per pod.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=210.39) [So if you're running multi‑container pods,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=213.79) [so pods with multiple containers in them,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=216.2) [all of those containers share the pod single IP.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=218.67) [Now I may be getting ahead of myself a bit here,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=223.24) [but this means you're going to have to use ports if you want to](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=225.64) [reach individual containers inside the same pod.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=229.69) [But like I say, I'm getting ahead of myself.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=232.84) [Though, actually, you know what?](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=235.03) [Yeah, let's do that.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=237.57) [Let's get a bit ahead of ourselves.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=238.64) [So the kube‑proxy does lightweight load balancing](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=240.84) [across all of the pods behind a service.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=243.87) [I can tell I'm going to regret this already, right?](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=247.54) [So a service is a way of hiding multiple pods behind](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=249.84) [a single stable network address, a bit like a load balancer.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=253.72) [So let's say we've got a bunch of web pod servers here,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=258.44) [and they're all talking to a back end down here.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=261.63) [Only we put the back end behind the server, so a single IP and the likes.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=264.32) [Well, we configure the front end to talk to the service,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=269.36) [and the service balances incoming requests across all pods behind it down here.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=272.69) [Well, the kube‑proxy plays a major role in load balancing that traffic.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=278.64) [And you know what?](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=284.34) [I reckon that's nodes.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=285.45) [So the kubelet is the main Kubernetes agent on every node.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=288.04) [It registers the node with a cluster,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=292.37) [and then it watches the API server on the master for new work assignments.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=294.72) [Sitting next to it is a container runtime that does all the heavy](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=300.14) [lifting of building and starting containers.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=303.92) [And for the most part, we said that's going to be containerd or maybe Docker,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=306.09) [but others do exist.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=309.74) [Now, oh actually, yeah.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=311.86) [While there's work running on the node,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=314.12) [it's the job of the kubelet to maintain a reporting](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=316.09) [channel back to the control plane.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=318.7) [But then last but not least, there's the kube‑proxy,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=320.84) [which does all the networking magic.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=323.38) [But there's actually something else, and this might blow your mind.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=327.04) [I know what did with mine when I first saw it.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=331.31) [And we'll talk about it actually a little bit more in the getting or](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=333.79) [installing Kubernetes section when we cover hosted Kubernetes.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=337.4) [But for now,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=341.04) [you need to know that some cloud services provide nodeless Kubernetes.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=342.04) [So that is Kubernetes without any nodes.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=347.72) [So yeah, nodeless Kubernetes.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=352.05) [And if you're like me, you'll be like you what?](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=354.99) [How is that going to work?](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=358.27) [I mean,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=360.26) [I've just spent the last few minutes telling you that nodes](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=360.62) [are where business apps actually run. Well,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=363.98) [a lot of cloud platforms these days already have a hosted](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=368.14) [container platform, so a service where you just run container](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=371.65) [workloads and you don't have to spin up any VM instance or](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=375.73) [anything like that to run your workloads on.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=379.12) [You literally just have a containerized workload, and the cloud](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=382.44) [runs it for you. And from a developer and an admin perspective, it](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=385.49) [can be a pretty sweet. You literally forget all about that](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=391.44) [low‑level infrastructure stuff,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=395.71) [and you just let your cloud provide a service to run your work.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=397.75) [And of course,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=401.54) [you only pay for what you run. So no more paying for nodes](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=402.46) [when they're not running any work on them.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=407.3) [Well, as I'm suggesting, some clouds provide that for Kubernetes.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=410.84) [You post your app configuration in standard Kubernetes YAML files to your](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=415.6) [Kubernetes API server on their cloud, and the cloud just runs them. And it](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=420.62) [most definitely can be brain melting stuff, right?](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=427.01) [But if it is hurting your head,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=430.87) [put it on your shelf for now. We'll come back to it when](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=432.64) [we look at how to build Kubernetes.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=435.94) [Oh yeah, good stuff.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=438.44) [Well, I reckon that's the clustery sort of infrastructure bit done,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=440.12) [and we're about to flip our attention to the stuff](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=445.7) [that actually runs our applications.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=448.08) [But I want to do kind of a halftime show first on desired state and](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=450.44) [the declarative model of Kubernetes users because,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=455.91) [let me tell you,](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=458.51) [this is absolutely vital to Kubernetes and all this](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=459.69) [cloud‑native microservices stuff. So here goes.](https://app.pluralsight.com/course-player?clipId=c10a58c4-861b-4743-be3b-0416b53cede7&startTime=464.04)

### [The Declarative Model and Desired State](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2)

[Right, like I said,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=1.24) [I want to stress the absolutely fundamental nature of two things in Kubernetes,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=2.53) [like without these, Kubernetes is nothing.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=7.94) [Well, I am talking about the declarative model, and the concept of desired state.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=11.64) [So, first and foremost, Kubernetes operates on a declarative model; I love it,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=18.34) [jargon,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=23.94) [but all this means at a high level is that we give the API server](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=23.99) [a manifest file that describes an end state.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=29.58) [Now, for us,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=34.04) [that's going to be what we want the cluster and our apps to look like,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=35.3) [and we call this end state desired state.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=39.06) [Now then,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=43.74) [it's important to understand this manifest is not a long list of](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=44.54) [commands to run to get to the desired state.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=48.71) [No!](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=50.95) [It is a description of what things should look like.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=51.05) [Now, I don't know how clear that is, right,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=55.19) [but it will become clear as we crack on.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=59.15) [For now, we post that manifest or the desired state, yeah, to the API server.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=61.09) [Then, it's up to Kubernetes to do whatever is necessary to](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=67.06) [get us to that desired state or end state,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=70.54) [yeah?](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=73.27) [Well, look, maybe a quick, cheesy analogy.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=73.68) [It's a bit like getting a building contractor in and saying,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=79.44) [right, we want, I don't know, a new kitchen at the back of the house.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=82.66) [We want it to be open plan to the eating area,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=87.15) [and let's hook it into the under floor heating.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=89.95) [We want a load of glass on the south‑facing wall overlooking the garden.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=92.05) [We want a door to the garage.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=95.95) [I don't know, we want a big island in the middle, and you know what?](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=97.97) [Let's have a roof garden on the top as well, right?](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=100.71) [I'm just making this up, right?](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=102.59) [But it's pretty high level, and it's describing what we want,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=104.05) [desired state, yeah.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=108.42) [Well, what it is not doing is saying, okay.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=109.81) [knock down this load‑bearing wall here and slap a steel support beam in,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=114.14) [and dig a foundation of like 3 feet deep or whatever,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=119.21) [we'll have 30 courses of bricks on a double‑skinned wall with pins every,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=122.1) [like 18 inches.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=126.72) [We'll have 25 ml pipes for the under floor heating; blah,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=127.95) [blah, blah, blah, blah, blah, blah.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=130.92) [It's not saying any of that.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=132.32) [It's just describing what we want.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=134.35) [In fact, long job lists like that are what we call the imperative way.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=137.84) [Anyway, look, that analogy only goes so far, right, but you get the point.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=142.74) [You describe what you want the cluster or the app to look like,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=147.6) [and Kubernetes takes care of all of the hard work of,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=150.2) [I don't know, choosing which node to run stuff on,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=153.73) [pulling and verifying images, starting containers,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=156.36) [building networks, protecting secrets, all of that jazz.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=158.66) [We don't have to care about that.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=161.77) [We know what we want, yeah?](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=163.62) [But we don't want to care about how to get there.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=165.1) [Now, this method of describing desired state is called the declarative method.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=168.07) [So you're declaring what you want.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=173.71) [The method, like we said,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=176.67) [of providing long lists of commands and actions to perform,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=177.74) [is called the imperative method.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=180.83) [Now, while Kubernetes does actually support both,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=182.56) [it strongly prefers the declarative method,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=185.61) [as do I, and you'll see why soon.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=188.05) [Anyway, right, look, to do all this declarative stuff,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=191.25) [we post manifest files to the API server that describe the](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=195.12) [desired state of applications in the cluster.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=198.74) [It's a record of intent, yeah, and that's good and all; only,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=200.64) [after things are up and running, things can still go wrong,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=205.34) [or maybe something changes, yeah, and when that happens,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=208.27) [it is totally possible for the actual observed state of the](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=211.4) [cluster to vary your drift from that desired state.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=214.69) [Who knows?](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=219.04) [I mean, maybe a node fails,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=220.06) [or maybe even we intentionally change the desired state.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=221.66) [The point is, any time observed state diverges from desired state,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=225.18) [Kubernetes gets all panicked, like, ah, this is not right,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=230.26) [I must reconcile!](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=234.03) [And it doesn't rest until observed state is back in sync with desired state.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=236.74) [So what you've got is what you want.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=241.17) [Now, maybe a quick example.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=244.11) [Let's say we've got a desired state that says we always want](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=247.14) [three instances of a web front end Pod running,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=250.61) [and right now we've got three nodes with one of those three](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=254.12) [Pods scheduled to each, and that's magic,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=256.93) [right?](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=259.69) [We want three and we've got three.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=259.93) [So Kubernetes is all relaxed and chilling out.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=261.64) [But, what if, horror of all horrors, one of those nodes goes](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=265.84) [down? Well, desired state still says three Pods,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=271.63) [please, but observed state is like, uh‑oh, only two Pods. And I'm telling you,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=275.42) [this is like torture for Kubernetes, because Kubernetes is](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=281.83) [obsessed about observed state matching desired state.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=285.57) [So, it leaps into action and fires up another Pod on one of](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=289.1) [the two surviving nodes, or maybe it brings up a new node,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=294.01) [and it puts the Pod on there.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=297.45) [The point being, observed state is brought back into sync with](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=299.3) [desired state, and Kubernetes can chillax again.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=303.21) [And look, I totally get that that probably sounds simple,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=308.14) [but I'm telling you, it is outrageously powerful,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=311.94) [and it's at the very core of how Kubernetes operates. So make sure it sinks in.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=314.89) [We never interact imperatively with Kubernetes, or we shouldn't,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=321.64) [right? We give it a declarative manifest that describes how we](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=324.53) [want the cluster and our apps to look.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=328.66) [This forms the basis of the cluster's desired state, it all gets](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=331.14) [persistently stored in a cluster store, and the work gets scheduled](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=334.72) [to the cluster. And boom! Desired state is both recorded and](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=338.02) [implemented, but then in the background,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=342.55) [the control planes running all of these controllers that](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=345.32) [are basically reconciliation loops,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=347.74) [constantly checking that the current observed state of the cluster](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=349.85) [matches the desired state, and when the two match,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=352.8) [it's all peace and bliss, but when they don't match,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=355.34) [it is all hands on deck until they do.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=360.06) [But, I mean,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=362.29) [all Kubernetes hands on deck, yeah, because the whole point](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=363.04) [is, Kubernetes does this without even involving us, and with](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=365.53) [that firmly stored in our heads,](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=370.04) [let's go and look at the most fundamental unit of working Kubernetes, the mighty Pod.](https://app.pluralsight.com/course-player?clipId=c1f31995-8921-4aea-819b-0976d4cea2d2&startTime=371.75)

### [Kubernetes Pods](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1)

[Right.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=1.24) [In the VMware world,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=1.45) [the atomic unit of deploying is the virtual machine; in the Docker world,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=3.25) [it's the container.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=7.64) [Well, in the Kubernetes world, it's the Pod.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=9.34) [Now let's be 100% clear about this.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=14.44) [Yes, Kubernetes runs or orchestrates containers,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=17.01) [only those containers must always run inside of Pods.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=21.35) [So thou canst not deploy a container directly onto Kubernetes.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=26.81) [You see, a container without a Pod in Kubernetes is a naked container,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=32.34) [and Kubernetes has pretty strict views on the nudity.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=37.74) [Now, obviously, I'm kidding, and I don't know, maybe I'll edit that out.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=41.46) [I just thought maybe it will help you remember.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=45.74) [Now anyway, look, you can absolutely run multiple containers in a single Pod,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=48.26) [and in fact,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=53.94) [you'll do this a lot as you increase in your experience and your skill.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=54.47) [In fact, look,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=58.48) [I've got this course here that goes into all of that in glorious depth,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=59.29) [right?](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=63.72) [So maybe take a note of the name of that course when](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=64.28) [you want to take your skills further, and I know,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=66.49) [literally the longest name ever for a course,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=70.26) [yeah?](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=73.07) [Don't ask.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=73.66) [Anyway, what is a Pod?](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=74.46) [Well, at a really high level,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=77.34) [it's just a thin wrapper that Kubernetes insists every container needs,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=79.66) [but more technically speaking, a Pod is a shared execution environment.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=84.13) [So let's unpick that.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=91.24) [An execution environment is basically a collection of](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=92.96) [things that an app needs in order to run.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=96.44) [So maybe an IP address in a network port,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=99.13) [and a file system, and I don't know, some shared memory.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=102.54) [Well, every Pod gets an execution environment,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=106.84) [or actually, every Pod is an execution environment.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=109.44) [Then, the containers running in it share that environment.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=113.37) [So if you do happen to be running multiple containers in a Pod,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=119.14) [they all share the Pod's environment.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=123.14) [So I don't know, let's say you have two containers in a Pod.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=125.74) [They both share the Pod's IP, so they have the very same IP address,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=130.2) [which means if you want to connect to either of them from the outside,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=136.14) [because they're both on the same IP,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=140.44) [you're going to have to map to them using unique ports.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=142.29) [And as well, inside of the Pod, if those containers need to talk to each other,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=146.08) [they can use those same unique ports over the Pod's localhost interface.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=151.53) [Look, the same obviously goes for volumes and everything else, yeah?](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=155.9) [All containers in the same Pod share the same resources.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=160.04) [So if you've got a use case where two containers need](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=164.84) [to share maybe the same volume, or maybe the same memory,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=168.25) [yeah, go ahead, whack them in the same Pod.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=171.07) [However, right, if they don't absolutely need to be tightly coupled like this,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=174.74) [then stick them in separate Pods and loosely couple them over the network.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=180.63) [And I'll say, for the most part, that's what you're going to do,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=186.64) [because running two containers in the same Pod is](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=190.44) [usually for specialist use cases.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=193.01) [Well, let me be extra crystal clear about something here, right?](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=196.74) [The unit of scaling in Kubernetes is the Pod,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=201.44) [so if you want a scale part of your app,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=204.77) [you do it by adding and removing Pods.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=207.28) [Like you never scale by adding more of the same containers to an existing Pod.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=210.35) [No, that's not how it works.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=216.54) [You want to scale up part of your app?](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=219.64) [Add more Pods.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=221.24) [Want to scale it down?](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=222.38) [Remove Pods.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=223.96) [So multi‑container Pods are for two different,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=226.49) [but complementary containers that need to be intimate.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=231.87) [In fact, a really common example these days is a service mesh,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=235.84) [which at a high level, typically injects an additional](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=239.39) [container into every Pod deployed to a cluster.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=243.3) [It's then the job of this injected service mesh container to sit in](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=247.24) [between the main app container and the network,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=251.1) [so that it can do things like encrypt and decrypt](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=254.31) [traffic coming in and out of the Pod.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=257.43) [Plus, it connects both telemetry and does other cool networking stuff.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=258.89) [Point being,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=263.54) [though it is all done by injecting an additional container into a regular](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=264.15) [application Pod for the purposes of providing enhanced services.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=269.23) [So, a different,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=274.04) [but complementary container that augments the main application container.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=275.91) [Well, let's tie this back to the idea of Pods being atomic,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=282.84) [and again, there are two things I want you to know here.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=286.9) [First up, Pod deployment is an atomic operation, so it's an all‑or‑nothing job,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=290.64) [and by that, right,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=296.9) [I mean that the Pod only shows up and running and available for service](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=297.83) [once all of the containers in it are up and running.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=302.22) [So it's never going to show as ready and start accepting connections](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=305.74) [while maybe only some of its containers are up.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=309) [Well, the second thing I wanted to mention, now I remember,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=312.34) [I nearly forgot; the second thing is that containers in a](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=318.56) [Pod are always scheduled to the same node,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=322.29) [and that makes sense, yeah?](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=325.09) [Remember, we've just said it is a shared execution environment.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=326.73) [So shared IP volumes, all of that stuff,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=329.63) [which would be kind of difficult if it was distributed over multiple nodes.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=332.34) [So, yeah, scheduling Pods is an all‑or‑nothing atomic operation to a single node,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=336.31) [just like a VM, actually, yeah.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=342.6) [Now as well, Pods are mortal, they're born,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=344.93) [they live, and they die, and that's it.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=350.52) [There's no Lazarus coming back to life fantastically going on, right?](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=353.33) [And I will say,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=357.99) [that's even true when we're deploying Pods through high‑level](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=358.83) [controllers like a deployment that does self‑healing.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=361.82) [See, in those cases, and look, I'm getting ahead of myself again,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=365.74) [but the deployment controller spins up a new Pod](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=369.84) [identical to the one that just died.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=373.32) [It's not the dead Pod brought back from the other side; it is](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=375.36) [a brand new Pod that just happens to look,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=378.3) [smell, and feel identical to the one that failed.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=380.97) [So Pods, they're atomic and mortal.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=385.44) [I love the lingo.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=389.71) [Now for the most part, we deploy Pods via some higher‑level controller,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=391.57) [like a deployment or a stateful set,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=396.2) [because these bring the really useful stuff like scaling and self‑healing,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=398.19) [and maybe ordered startup and persistent network IDs,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=402.79) [and we'll cover some of these later in the course,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=406.02) [so don't stress.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=408.2) [But it does beg the question,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=410.2) [like if Pods don't bring anything obviously valuable](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=413.74) [over and above a standard container, like we've just said,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=417.21) [they don't self‑heal or scale, right?](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=419.9) [Then why do we bother with them?](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=422.34) [Why don't we just deploy containers?](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=424.49) [Well, it's good question, actually. No, I'm just kidding.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=427.04) [See, Pods let Kubernetes do a bunch of accounting and management‑type stuff.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=433.54) [So, for example,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=438.47) [right, they're a great way to annotate and label apps with](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=439.35) [custom metadata that Kubernetes plus other applications can](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=442.37) [then use to add value. As well as that,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=445.94) [though, they're are a great way to apply policies and things](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=448.77) [like resource constraints and requirements.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=452.01) [So, no, Pods don't bring any of the blockbuster features of](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=454.61) [scaling and rolling updates and stuff,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=458.7) [but they do allow Kubernetes to augment containers in plenty of](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=460.72) [useful, almost behind‑the‑scenes ways, yeah? Well look,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=465.57) [remember, we're covering the theory here.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=472.1) [We've got plenty of examples coming up that put all](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=474.08) [of this theory into practice.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=476.97) [However,](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=478.84) [let's flip gears a little bit now, and we'll take a look at what Kubernetes service objects bring to the networking party.](https://app.pluralsight.com/course-player?clipId=5f01feda-ac53-4b53-8fbe-bd251ead12c1&startTime=479.72)

### [Stable Networking with Kubernetes Services](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8)

[So we've got applications, and we said that in a Kubernetes world,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=1.24) [they're going to be made up of containers running in Pods.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=5.76) [But, we just learned that Pods are mortal and can die.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=10.04) [And even if we bolster them with high‑level](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=13.94) [controllers that replace them when they die,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=16.59) [any new Pods arrive with new IPs,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=19.54) [which is obviously challenging from a networking perspective.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=22.56) [Only, you know what?](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=26.64) [It's worse than that, right?](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=27.29) [It's not only when they die.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=28.48) [Like if we're scaling up and we throw more Pods into the mix,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=30.8) [well, they all arrive with new IPs.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=35.15) [Then if we scale it down,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=38.08) [we're shutting down Pods with IPs that clients might be using.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=39.57) [And you know what?](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=44.34) [It doesn't even stop there because if we do like a rolling update or something,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=45.11) [you know,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=48.95) [where we iterate through shutting down the old Pods and](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=49.33) [replacing them with new ones on the new version,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=52.2) [well, it's an absolute buttload of IP churn.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=54.55) [So, the crux of the issue, we just can't rely on Pod IPs.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=59.54) [So, as an example,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=65.34) [let's assume you've got some microservices app with a service](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=67.29) [that other parts of the app connect to and use.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=70.44) [It's pretty standard.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=72.65) [Only, how's it going to work if you can't rely on these Pod IPs here?](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=74.04) [I mean,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=78.23) [it's pretty inconvenient if the IPs change every time that we push](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=78.56) [an update or do a scaling operation or something,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=82.66) [right?](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=84.98) [And, of course,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=86.24) [nobody wants to code the intelligence to track stuff](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=87.34) [like that directly into their app code.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=90.52) [Well, playing captain obvious here,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=94.44) [this is where Kubernetes service objects come into their own.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=97.24) [So at the highest level here, let's say this is a much simplified view of an app.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=102.84) [There's Pods hosting a web front end needing to talk](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=107.37) [to a couple of Pods down here.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=110.5) [Well, we slip a service object in front,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=112.54) [and a service object is just a Kubernetes API object like](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=115.15) [a Pod or deployment or anything else, meaning we define it in a YAML manifest,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=119.38) [and we create it by throwing that manifest at the API server.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=124.81) [But, once it's created, and we'll see what this looks like later,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=129.34) [but for now it sits in front of these Pods down here,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=133.84) [and it provides a stable IP and DNS name,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=137.37) [so,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=143.13) [a single IP and DNS name here that then load balancers](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=144.94) [requests it receives to the Pods down here.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=149.11) [Then if one of the Pods here dies or gets replaced by another,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=152.44) [it's all good, right?](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=156.12) [Because the service is watching,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=157.09) [and it just updates the list that it holds are valid,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=158.8) [healthy Pods.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=161.86) [But importantly, and I need to stress this,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=164.04) [it never changes the stable and reliable IP and DNS name here.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=167.54) [That never changes, right?](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=173.73) [In fact,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=175.71) [part of the contract we have with Kubernetes is](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=176.52) [that once this service is defined, that IP and DNS will never,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=179.09) [ever, ever, ever change.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=183.66) [Do I need another ever?](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=186.84) [I don't think so.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=188.4) [But look, obviously the same goes if we scale the Pods down here.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=189.51) [All the new Pods with the new IPs and the likes get added](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=193.15) [to the list of valid back‑end endpoints.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=196.45) [And look, as if by magic, we're now load balancing across four Pods.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=199.68) [Well, if we're rolling update the Pods,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=205.94) [the old ones get dropped from the service,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=208.46) [and the new ones get added, and it is all business as usual the entire time.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=210.64) [And, you know what?](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=217.34) [At a high level, that is the job of a service.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=218.63) [It is a high‑level stable abstraction point for multiple Pods.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=221.38) [Oh, and it provides basic load balancing.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=225.69) [Now then,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=229.34) [the way that a Pod belongs to a service or makes it onto the list of Pods](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=230.24) [that a service will forward traffic to is via labels.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=235.28) [And,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=239.27) [I'm going to take a second here just to pause and give a worthy tribute to](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=240.24) [the role of values and labels in the Kubernetes world.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=244.46) [Because let me tell you, labels are just the simplest,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=247.94) [yet most powerful thing in Kubernetes.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=251.1) [I mean, the power and flexibility that they bring is truly something to behold.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=254.04) [So labels, if you happen to be listening, thank you for all that you do.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=259.09) [I'm pretty sure that probably sounded weird, but you know what?](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=264.94) [When you've done a thing or two with Kubernetes,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=269.54) [trust me, you're going to have a moment where you're like,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=271.65) [yeah, alright, I see why he did that.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=274.62) [Anyway, look, time, time, time.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=279.04) [Let's move this on.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=280.72) [Okay, yeah.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=282.04) [We roll this picture back, and we'll throw some labels on as you do.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=283.57) [Yeah, everything in Kubernetes gets labels.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=286.81) [So we can see we've labeled the back‑end Pods down here as prod,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=289.53) [be is probably for back end, and the right version,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=293.82) [1.3.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=297.1) [And up here on the service, see how we've got the same labels.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=299.64) [Well, it's those labels that tie the two together.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=304.24) [In fact, like if we had some other Pod up here,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=307.94) [which was totally different,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=310.12) [like running some entirely different code nothing to do with the other two Pods,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=311.6) [right?](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=315.07) [But, if it was labeled the same,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=315.94) [then the service is going to balance traffic there as well.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=318.09) [Now, we wouldn't do that, obviously, okay?](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=321.14) [But you see where I'm going.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=323.58) [When deciding which Pods to load balance traffic to,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=325.25) [the service uses a label selector that says,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=328.48) [okay, all Pods on the cluster with these three labels are mine.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=330.65) [Well,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=338.44) [let's say we're going to update the application on the](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=339.07) [back end here to maybe version 1.4.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=341.46) [Well, one way to do that is to say, okay,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=344.44) [just these two labels here as the label selector.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=348.02) [Then, as we add new Pods here, these are going to match and get load balanced to.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=351.94) [So as the new versions come online on the old ones stick around,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=357.34) [we end up balancing across them all.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=361.3) [So now, of course, in this kind of a scenario,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=364.09) [connections are going to hit the new version,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=366.72) [as well as the old version.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=369.03) [So, you might not do it this way.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=370.85) [I'm just giving you an example.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=372.94) [But let's say,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=375.74) [then after a while you might be confident in the new version of the](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=376.8) [app and decide to remove the old 1.3 versions.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=380.03) [Now, you could just terminate those old Pods, yeah?](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=384.64) [But if that fails, I don't know, it may be a bit risky.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=388.03) [Another way might be just to change the label like this.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=391.11) [And then all of a sudden, only the new Pods will match,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=396.24) [and the older ones, even though they still exist in a running,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=398.8) [they won't be getting any traffic.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=402.38) [And I guess a good thing about doing it this way is that we can flip](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=405.54) [back easily enough just by dropping that label again,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=408.88) [yeah?](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=412) [Well, as well,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=413.84) [and I always struggle knowing where to draw the line on](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=415.87) [a getting started course like this,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=420.01) [but a couple of things that I'll throw at you just before we move on.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=422.94) [Services only send traffic to healthy Pods.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=426.83) [So,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=430.24) [if you've got health checks configured and they are](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=430.67) [failing for a particular Pod, no sweat.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=432.94) [Services are clever enough to drop it from the list and stop sending it traffic.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=435.89) [They can also be configured for session affinity.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=441.97) [You can configure them to send traffic to endpoints](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=445.67) [that are outside of the cluster.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=448.26) [And, oh yeah, they default to TCP, but UDP is totally supported as well.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=450.49) [So, yeah, services,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=457.94) [a cracking way to bring network stability to the](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=459.76) [turbulent and the unstable world of Pods.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=463.33) [Well, next up, oh yeah,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=467.34) [let's see how deployments bring the game changers like scaling,](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=469.3) [self‑healing, and zero‑downtime rolling updates.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=472.87) [Sounds good, yeah? Well, that's because it is.](https://app.pluralsight.com/course-player?clipId=39f1ba60-e538-4510-9c7a-bb3ef5195bf8&startTime=476.84)

### [Game Changing Deployments](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19)

[Okay, then. We've got our infrastructure at the bottom,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=1.34) [the masters and nodes, and we know that the smallest unit of](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=4.43) [work we can deploy on them is the pod and that every pod is](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=7.63) [running one or more containers.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=11.07) [But, I think we threw it out there that we don't](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=13.34) [usually work directly with pods.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=16.28) [I mean, on their own, they're just not that snazzy. Like, they don't](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=18.49) [self‑heal, they don't scale, none of that good stuff.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=23.08) [So, we normally deploy them via high‑level](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=27.04) [controllers that do do that good stuff.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=30.69) [Now, Kubernetes supports a bunch of high‑level controllers.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=35.04) [Now we'll be looking at deployment that are for stateless](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=38.54) [apps, and they do self‑healing, scaling,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=41.37) [rolling updates, rollbacks, and a bunch more.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=43.84) [But stateful sets are similar, only for stateful apps, and they add things](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=48.14) [like guaranteed startup ordering and persistent network IDs.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=52.57) [The thing is, though, there's loads more, DaemonSets, jobs,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=57.14) [cron jobs, you name it.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=61.52) [There's a bunch, and they're all for different use cases. Only, on the control](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=63.46) [plane back end, they're all implemented via controllers.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=69.18) [So, for us looking at deployments,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=73.48) [there is a deployment controller running on the control plane that watches](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=76.14) [for deployment configurations that we post to the cluster.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=80.15) [That's our desired state.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=83.64) [Well, anytime it sees one, it implements it, and then it sits in a loop,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=84.88) [and it makes sure that observed state matches the](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=90.44) [desired state, so a reconciliation loop,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=92.88) [basically.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=96.25) [But like I said,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=98.14) [the same goes for stateful sets in the REST. They all operate as](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=99.19) [reconciliation loops on the control plane. Anyway,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=103.15) [deployments.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=108.34) [As a quick example,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=110.24) [we might use one to deploy an app with the desired state of, let's just say,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=111.41) [four replicas.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=115.82) [So, desired state is that we always want four instances of the app up](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=117.02) [and running. Well, we define that in a YAML here,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=121.85) [and we throw it at the API server. And before you can say Kubernetes,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=125.98) [there will be four pods on the cluster running the app.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=131.13) [But then if a pod dies, for whatever reason,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=134.94) [the desired state is still 4, but observed state is down to 3. And](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=137.75) [the deployment controller that's sitting there, remember, closely](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=144.01) [watching things notices the discrepancy,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=147.48) [declares a DEFCON 1,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=150.84) [and everything kicks into action and gets to work rectifying.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=152.88) [And like we've said before, this is all hands on deck for](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=158.04) [Kubernetes You and me, as developers or IT people, we can](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=161.64) [just sleep through it all.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=166.12) [Now, behind the scenes,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=168.94) [deployments work together with another controller](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=171.09) [called a replica set controller,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=173.7) [and it's actually the job of the replica set to manage the number of replicas.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=175.97) [Then, the deployment kind of sits above or around](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=181.74) [the replica set and manages them.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=184.78) [So, we've got a bunch of nesting going on here.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=188.34) [There's the app in the container, which is in the pod,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=191.56) [which is managed by a replica set, which in turn is managed by a deployment,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=194.86) [which when I was first getting my head around this](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=200.34) [stuff was kind of brain melting.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=202.99) [But, you don't need to understand it all now.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=206.64) [I'm basically seeding the concept so that when we see it in action later on,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=208.87) [you'll be like, oh, I see.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=212.9) [Now I get it.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=214.82) [Anyway, a deployment object blocks something like this,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=217.54) [and for now,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=221.59) [all we care about is that it's asking for 5 replicas, and a replica is a pod](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=222.38) [and that we want each of those pods or replicas to be running containers based](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=227.49) [on this image here and then on this network port.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=232.21) [That's our desired state.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=235.33) [But you know what? As well as that, the whole thing is self‑documenting.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=238.34) [You can version it,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=242.51) [and it's great for repeatable deployment, so kind of spec once, deploy many. And](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=243.66) [that's a bit of a gold standard because it's just really transparent, and it's](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=249.46) [really easy to look at and get your head around.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=254.05) [And you know what?](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=256.54) [It can be massive for cross‑team collaboration and](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=257.37) [maybe even onboarding new hires.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=260.09) [But there's more.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=263.64) [Here in the Kubernetes world,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=264.97) [it makes rollouts and rollbacks game changingly simple.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=266.67) [And who doesn't want that, right?](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=271.22) [But you know what?](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=272.74) [Look,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=273.26) [I'm blabbering. Back on track. Just like pods and services, deployments](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=273.84) [are first‑class REST objects in the Kubernetes API.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=278.83) [So, we define, then any YAML files or JSON, if that's](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=282.94) [your thing. I'm just a YAML guy,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=286.9) [but we define them in these standard Kubernetes manifest files,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=289.04) [and then we deploy them by throwing those manifests at the API server.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=293.44) [Then, like we said a bunch of times already,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=299.64) [the desired state gets logged in the cluster store, the](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=302.08) [scheduler issues the work to the cluster nodes, then in the](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=304.83) [background, there's control loops,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=307.6) [making sure observed state matches desired state.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=309.35) [And I reckon that'll do for now,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=313.45) [right? Deployments are where it is at for stateless apps on Kubernetes.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=315.29) [Other controllers exist, yes, for stateful apps and other use cases.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=319.68) [But for deployments, they enable self‑healing,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=323.74) [scaling, versioning, rolling updates,](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=326.4) [concurrent releases, and simple version rollbacks. Have some of that.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=328.78) [But the good thing, we're only setting the scene here.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=335.78) [We'll be getting our hands dirty pretty soon. Though, time](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=339.73) [for one last thing before doing a recap.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=343.83) [I've mentioned the Kubernetes API and API server a few](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=346.34) [times now, and I've not defined it, so I feel it's only right to explain what I mean.](https://app.pluralsight.com/course-player?clipId=1857f328-dbf6-4693-b1aa-3eec3070fc19&startTime=349.36)

### [The Kubernetes API and API Server](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3)

[Now then, and this can be especially true for people from an](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=1.24) [ops background, okay? But, the concept of an API and an API](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=5.07) [server can be a bit confusing.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=9.78) [So, here goes with a quick primer.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=12.18) [Kubernetes, under the hood, is lots of independent moving parts that](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=15.84) [work together to deliver the infrastructure and the features to](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=19.69) [deploy modern cloud‑native applications.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=23.61) [So far, we've mentioned pods, services, replica sets, deployments.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=26.84) [Pods provide the mechanism for running containers,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=31.27) [replica sets and deployments bring self‑healing,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=34.81) [rolling updates, and a bunch more, and services let us](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=37.58) [expose everything on various networks.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=40.58) [Well,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=43.84) [each one of these is an object in the Kubernetes API. Pods are an](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=44.84) [object, services are, deployments are. In fact,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=49.25) [you know what? Pretty much everything is an object in the Kubernetes API,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=52.03) [even a node.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=56.21) [So, you know what?](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=58.24) [Maybe think of the API as like a catalog of features or](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=59.58) [services with a definition of how each one works.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=63.93) [So, I don't know, if you need to expose a pod to a network or to the internet,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=67.44) [you pick and use a service object. If you need a stateful app](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=71.82) [component, no worries. That'll be a stateful set object.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=77.08) [Now each type of object has a bunch of features and capabilities](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=82.44) [that are defined in the API or the catalog.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=86.17) [So, look. We looked at this a minute ago.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=89.23) [It's the definition of a deployment object. We said it's asking](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=92.95) [for 5 pods running the app in this image,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=96.81) [and it's listening on this port. Magic. Well, all of these fields](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=99.92) [are properties of the Kubernetes deployment object as defined in](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=104.98) [version 1 of the apps API subgroup.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=109.98) [Oh, confusing, right?](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=113.94) [Anyway, listen.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=116.04) [Older versions of the deployment object defined in older versions of the API](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=117.54) [might not support all of these properties, and likewise,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=121.67) [future versions might support more.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=124.86) [But the point is,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=127.39) [the API contains the definition and feature set of every object in Kubernetes](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=128.56) [so that when we post this here manifest to the API server,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=135.09) [it knows we're defining a deployment object in this version of the API,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=139.36) [and it knows what all of these fields are and how to build what we need.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=143.78) [Now, the Kubernetes API is mahoosive, and it's a moving target,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=149.04) [though, to be fair,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=156.4) [all of the objects and things that we're looking at in this course are stable.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=157.57) [Well, anyway, look,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=162.84) [the API server is a control plane feature that exposes the API over a secure,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=164.03) [RESTful endpoint, which, of course, is more jargon.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=170.51) [So, in layperson terms,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=175.94) [the API server, it's just the way that we reach and communicate with the API.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=178.64) [So, when I've said things like before that we post maybe](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=184.44) [a manifest to the API server, well, for the most part,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=187.74) [we use the Kubernetes command line tool called kubectl to do that.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=191.66) [That's going to be all configured to know how to find the API server](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=195.61) [and authenticate and all that goodness.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=199.58) [But then, when we want to deploy new apps and the likes,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=202.64) [we use it to send manifests containing a new desired state to the API server.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=206.94) [So we use kubectl to send our new desired state to the API server.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=212.42) [And then, when things are scheduled and running,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=217.03) [we can use kubectl to query the API server for the state of our objects.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=219.48) [So, the API is where everything's defined, pod services,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=226.24) [deployments, you name it.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=230.1) [They're all objects in the API, and the API server](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=231.94) [is how we access the API. Well, like I said, it is a RESTful API over HTTPS.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=235.88) [So, it supports the major HTTP verbs like POST, and GET, and all of that.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=242.63) [And again,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=248.33) [just fancy jargon for saying it is a web‑native API that supports the](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=249.17) [common methods for making updates and querying state.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=254.08) [It is also versioned and split into multiple subgroups.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=259) [Now, I'm starting to think this might be getting pretty heavy going,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=263.94) [so I'm not expecting you to remember all of this.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=267.44) [But, do you know what?](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=270.01) [It's a video course, so you can rewind and rewatch as many times as you want,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=271.48) [but we will cover a bunch of all of this when we start](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=277.54) [working with the apps in the hands‑on bit.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=281.17) [So again, I'm just seeding ideas at the moment.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=282.88) [Well, in summary,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=287.74) [the Kubernetes API stores object definitions such as pods and services.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=289.79) [It's versioned, and it's divided into subgroups,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=294.63) [making it easier to find things and use them.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=297.25) [It's also exposed as a REST interface over a secure HTTPS endpoint](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=299.84) [via the API server. And that, I'm telling you,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=305.78) [will do for now.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=310.47) [And I'm fully aware, this has been a load of theory,](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=311.98) [so I do recommend you watch the recap next, and I promise I'll make it as concise as humanly possible.](https://app.pluralsight.com/course-player?clipId=8e5e5b7f-a4ab-434f-be49-0fc1883895f3&startTime=316.12)

### [Epic Recap](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9)

[All right then,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=1.34) [we started out by saying that Kubernetes is all about](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=2.19) [running and orchestrating containerized apps.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=6.04) [And we made the comparison to a football team or a soccer team,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=9.36) [depending where you from. But you remember, we said that football teams are just](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=12.67) [like modern cloud‑native apps in that both have individuals or specialized](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=17.88) [members that come together to form something useful.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=22.95) [Anyway, then we started getting into the weeds of how Kubernetes works.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=26.67) [We said that a Kubernetes cluster is made of masters and nodes.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=32.34) [The masters run the control plane, which is basically the brains of the cluster,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=37.31) [and the nodes are where we run our apps.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=41.27) [Masters have to be Linux, but you know what?](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=44.39) [These days nodes can be any mix of Windows and Linux.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=46.85) [In fact,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=50.55) [some of the cloud‑hosted Kubernetes solutions offer an](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=51.24) [entirely abstracted or virtualized back end.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=54.81) [Anyway look, as the control plane is the brains of the cluster,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=58.84) [it needs to be highly available.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=63.83) [Also, under the hood, it's actually a bunch of small, specialized components.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=66.22) [And first and foremost among those is the API server that exposes the API.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=71.2) [Jargon, jargon, jargon,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=78.03) [but we just said the API defines every possible Kubernetes object,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=79.55) [and the API server is the front door into the API.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=84.66) [There's also a cluster store,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=89.34) [which is where the state of the cluster and apps are stored.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=91.37) [This is the only stateful component on the control plane,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=94.39) [and you most definitely want to have plans for](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=97.27) [protecting it and recovering from failures.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=99.87) [As well as that, we mentioned the scheduler and a bunch of controllers.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=103.84) [So the scheduler does what it says on the tin.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=108.25) [It balances work across cluster nodes.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=111.08) [The controllers though,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=113.9) [these sit and watch the apps that we deploy and make sure](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=115.71) [that observed state matches desired state.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=119.29) [Well, then there's the nodes.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=123.04) [This is where user apps run, and they comprise a kubelet,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=124.64) [container runtime, and the kube‑proxy.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=127.84) [The kubelet is responsible for cluster membership,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=132.05) [and it does all of the talking with the API server.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=134.96) [So it watches the API for new work assignments,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=137.52) [and then it reports back on workload status.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=140.62) [The container runtime does these heavy lifting of interfacing with the](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=144.14) [operating system and starting and stopping containers,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=147.93) [and the kube‑proxy handles networking. And we kind of said that](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=150.32) [that's all of the sort of infrastructure bits. Well,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=155.32) [then we talked about workload objects, such as pods,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=160.62) [services, and deployments.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=163.78) [The pod is the atomic unit of scheduling in Kubernetes,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=165.57) [and in and off itself, it's not the star of the show.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=168.26) [I mean, yeah, it's important.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=171.69) [But it is not where the big money features are implemented.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=173.28) [Those tend to be in higher‑level controllers.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=176.71) [Speaking of which,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=180.94) [we said that deployments bring scaling, self‑healing, updates, and rollbacks.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=182.34) [Then services bring stable networking for pods, which by design are unreliable.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=188.14) [I think we said things like scaling, self‑healing, updates, and even](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=193.55) [rollbacks all add and remove pods from the network,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=197.09) [which can be kind of a pain for apps wanting to use them.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=201.04) [So we stick a service in front of them and then as if by magic,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=204.58) [we've got a reliable IP address and DNS name that we can](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=208.29) [reliably use to access a dynamic set of pods.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=212.22) [And I reckon that's the theory, and hopefully at least some of it is settling in.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=216.94) [But if it's not, that's totally fine.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=222.94) [It is absolutely normal for new stuff like this to take a while to](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=226.18) [settle in properly and especially as I know some of you hate my](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=229.9) [voice and crank me up to 1.5 speed.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=233.13) [Though just be aware of playing me faster, that obviously](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=235.98) [gives you less time for stuff to sink in.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=239.86) [So don't come to me saying, hey Nigel,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=242.54) [something's not clear and then say oh yeah,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=244.94) [I listened to you at 1.5 speed by the way.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=247.4) [I mean, come on.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=250.21) [But seriously, if this does all feel a bit vague,](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=251.54) [well I guess there's always the option of playing the module](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=254.84) [again, maybe at a slower speed so you've got more time for](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=258.49) [stuff to digest and sink in.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=261.38) [But you know what?](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=263.94) [Honestly, my advice is just crack on, and let's see if things clear up as we go.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=264.79) [But at the end of the day, the choice is yours.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=269.84) [Just don't stress out if you're feeling like you're](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=272.06) [drinking from a fire house right now.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=274.58) [We all feel like that at times. And if you persevere, it usually comes good.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=276.57) [So don't give up. Anyway, next on the cards, we're going to take a look at how to get Kubernetes.](https://app.pluralsight.com/course-player?clipId=1a7dd1c2-39fc-4d0d-a57b-47bb26eb72f9&startTime=281.19)

## [Getting Kubernetes](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c)

### [Module Overview](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c)

[All right, then.](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=1.34) [Videos are great.](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=2.44) [I mean, it goes without saying.](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=3.5) [But there is no substitute for hands‑on experience.](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=5.63) [So the aim here is to show you a few simple and easy ways to get](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=12.04) [a Kubernetes cluster so that if you want to,](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=16.38) [you can follow along with the examples that are coming later.](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=19.44) [Now this is going to be far from war and peace on getting Kubernetes.](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=23.54) [The aim is really just to show you some quick and easy ways.](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=28.81) [Anyway, I'll divide it like this.](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=33.94) [First up, we'll look at how to install and use kubectl,](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=36.24) [the Kubernetes command line tool.](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=39.84) [Then, we'll look at how to get a local development](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=42.04) [Kubernetes cluster on your desktop or laptop.](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=44.91) [Then, I'll show you a couple of easy options for](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=48.14) [getting Kubernetes on your cloud.](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=50.67) [And like I said,](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=52.49) [the idea being if you fancy following along in the](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=53.57) [examples that come later in the course,](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=56.4) [well then you can. Now I will say in some of the later examples, we'll](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=58.24) [be exposing apps to the internet through a cloud load balancer. And if](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=63.53) [you want to follow along with these, you'll need Kubernetes on a cloud.](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=69.19) [So local desktop clusters will not cut it for that.](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=73.4) [I mean, everything else in the demos will be fine,](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=77.52) [but hooking it into a cloud‑based load balancer and](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=80.17) [accessing the app from the internet, nah,](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=83.21) [that's not happening on a desktop install, just so you know. Anyway, look, let's go and get kubectl.](https://app.pluralsight.com/course-player?clipId=52cafc02-4ea0-46f4-9b68-0bb16c51ea0c&startTime=85.62)

### [Getting kubectl](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e)

[Alright then, the Kubernetes command line tool is called kubectl,](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=1.44) [though actually, you'll probably hear a million](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=5.92) [different ways of pronouncing it.](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=8.77) [Like I said,](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=10.55) [I say kubectl, but I've heard other people say kubectl, and](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=11.19) [kubectl, kubectl, even kubectl like it's some furry animal you](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=17.33) [want to stroke or cuddle, I don't know.](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=22.4) [The thing is, it doesn't matter.](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=24.35) [The point is,](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=26.14) [it's a program you can run on your laptop or wherever and](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=27.24) [access and manage your Kubernetes clusters.](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=31.01) [Now, of course, there is a million ways to install it.](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=34.94) [So, on a Mac with Homebrew, it is as simple as brew install kubectl.](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=40.34) [Give this a minute, of course, but then when it's done,](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=47.84) [you can verify the install with this command here.](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=51.16) [Oh,](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=56.24) [now the second line is just because I'm not](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=56.46) [configured to point to a cluster yet,](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=58.97) [but the top line shows that kubectl is installed. Now, of course,](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=60.81) [you can install it manually with cURL and all manner of different ways,](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=65.58) [right?](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=69.13) [But, for us, I don't know, Homebrew's just such an easy option.](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=69.67) [Well, on Windows,](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=74.44) [I reckon these are the three easiest options. Now the PowerShell one](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=75.45) [here works out of the box on any Windows install,](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=79.85) [right?](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=82.52) [Obviously, for chocolatey and scoop,](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=82.98) [you need to install the relevant package managers first.](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=85.33) [But, choose your poison, and then run the same](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=88.34) [command to verify. Now, again, yeah, I guess for both examples,](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=91.29) [we've not been connected to a cluster,](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=96.82) [and we'll see how to do that later in the upcoming sections.](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=99.24) [But I do want to point out now that kubectl has the concept of contexts.](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=102.43) [So it's got this config file in a hidden directory called kube in your profile.](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=108.54) [And it's a YAML file that lets you define a bunch of](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=113.54) [different Kubernetes clusters,](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=116.84) [plus a bunch of user accounts, and then it groups](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=118.34) [clusters and users into context.](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=121.23) [So, a context is basically a cluster to manage,](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=124.94) [plus a user account that is valid on that cluster.](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=128.45) [And there's loads of cool stuff we can do with this, right?](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=132.84) [But for now, that is how to install kubectl. Let's now move on and see how to get Kubernetes.](https://app.pluralsight.com/course-player?clipId=c17148b7-1d71-4d3c-9421-2278fd19378e&startTime=135.08)

### [Getting K8s on Your Laptop](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c)

[Okay, it's never been easier than it is now to get Kubernetes on your laptop.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=1.34) [Now for me, Docker Desktop is the slickest.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=7.14) [Of course, other options exist, most notably Minikube.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=10.37) [But for me, especially when you're just getting started like we are,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=14.44) [Docker Desktop is the smoothest.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=18.34) [However, three important things before we go any further.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=20.99) [Firstly, any desktop in store like this is for test and dev only.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=25.74) [So you generally get a single‑node cluster that is super convenient,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=30.63) [but it is most definitely not for production apps.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=35.33) [Also,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=39.14) [you're going to need virtualization enabling in your](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=40.03) [BIOS and on your operating system.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=42.47) [Now that's a given on most modern laptops and OS versions.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=44.98) [But if it's not the case for you and you have no way of enabling them,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=48.66) [then I'm sorry, this isn't for you,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=53.03) [and you're probably going to want to look a cloud option.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=54.94) [And then the last thing before we crack on,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=58.34) [over time the way that you install some of the stuff](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=60.85) [we're going to see is going to change,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=63.67) [meaning what I show you here might look a bit different to how it](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=65.8) [actually is when you're watching the video course.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=70.28) [But the thing is, the diffs are usually minimal.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=73.04) [You know, I'm talking maybe the installer UI looks a bit different or something.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=75.67) [But the thing is, they're usually minor changes, so don't stress.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=81.14) [Anyway, after all of that Docker Desktop.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=85.53) [Well,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=90.04) [look straightaway, we can see it's available for Mac and PC. So I](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=90.53) [recommend you just follow the latest links to the download. Right](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=95.73) [now we can see it's offering a stable and an edge channel for the](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=100.63) [different platforms.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=104.14) [I think the names say it all, and I'm a fan of edge.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=105.54) [But once you have downloaded that, it is literally a next, next, next, install.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=109.84) [You probably need to input some admin credentials, so be aware of that.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=115.64) [But that's it.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=120.14) [And when all said and done, you will have a whale icon in the bottom,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=122.14) [right of the task bar in Windows or the top right of the menu bar in a Mac.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=126.1) [And then whichever your platform is, clicking it gives](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=131.54) [you options like these. In fact,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=134.04) [Kubernetes down here let's you flip between contexts](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=137.32) [that we were just talking about.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=140.71) [So as we can see, right off the bat,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=142.74) [the installation has created a context for the local Docker Desktop install.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=145.29) [But then any other clusters you manage,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=150.64) [they will also appear in the list here as well. Anyway,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=153.89) [on to preferences.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=158.24) [Well, look,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=159.85) [you can say things like whether or not you want it to automatically start,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=160.61) [but also whether to even use Kubernetes.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=165.44) [And for us, that's obviously a yes.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=169.23) [Now at this point, we've installed Docker Desktop and enabled Kubernetes.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=173.04) [And actually, if this is the first time that you're enabling Kubernetes,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=178.7) [it can take a minute or two to spin up.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=182.33) [But once we are here,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=184.86) [you can fire up a terminal and you are ready to rock and roll with Kubernetes.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=186.93) [Now this is actually a good point to mention. The recommendation is that](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=192.44) [this middle number here, that it be no more than one version higher or lower](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=197) [than the version of Kubernetes you're managing.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=203.06) [So see how the versions here are 1.18 on the client and](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=205.94) [1.16 on the cluster. Not recommended of course. They](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=212.43) [should be just one version apart.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=216.69) [But you know what?](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=219.03) [For now,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=219.89) [I'm not bothered because I'm not actually using Docker Desktop for the demos.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=220.63) [So actually later on, I'll be spinning up something](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=225.79) [in the cloud on a newer version.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=228.56) [But do you know what?](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=232.14) [I just love it.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=233.94) [A few easy clicks, and you've got a full and certified](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=235.25) [Kubernetes environment on your local machine.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=238.5) [And if you've been following along, to be honest,](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=242.74) [now might be a good time to hit the Pause button and have a bit of a poke](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=245.72) [around with some of the different Docker Desktop options. Anyway, next up, we're going to look at a couple of cloud options.](https://app.pluralsight.com/course-player?clipId=bf421c1c-d767-408a-8c7e-ba5a122aee8c&startTime=249.15)

### [Getting K8s in the Cloud](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540)

[It's no secret that Kubernetes is everywhere,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=1.34) [and that obviously includes every cloud.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=5.05) [So what I'm going to show you here are just two examples.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=8.54) [We'll start out with a Linode Kubernetes Engine because I am telling you,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=13.04) [it is outrageously simple.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=17.71) [In fact, at the time of recording,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=19.79) [I would go so far as to say it is the easiest](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=21.67) [Kubernetes cloud service that I have seen.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=24.86) [And as well, I'm using it for the examples in the course.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=27.7) [Now, of course, you don't have to.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=31.58) [Kubernetes is Kubernetes.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=33.45) [So any of the cloud options and probably plenty of the](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=35.2) [non‑cloud ones will work just fine.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=38.3) [Now before diving in, in the last module,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=42.24) [we introduced the idea of a hosted Kubernetes service.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=44.36) [So this is where your cloud provider does all of the control plane](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=48.03) [stuff and presents you with an API server endpoint.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=51.61) [Plus it gives you control of the nodes.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=55.45) [Well, Linode Kubernetes Engine does just that.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=59.14) [So taking this route,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=62.38) [I'm basically saying that I trust Linode with my Kubernetes infrastructure.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=64.27) [So I suppose I'll manage the app‑related bits,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=71.14) [put the control plane magic like performance and high availability,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=75.02) [I can't be bothered with that.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=79.19) [So I'll just let my cloud provider do it.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=80.44) [Well, as long as we've got an account, this is what Linode looks like.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=84.14) [And on the left over here, I'll just go Kubernetes and Create Cluster.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=88.93) [And then it's literally whatever this is, four options.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=94.85) [Now, of course, this might look different in the future, but that's okay.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=99.11) [You'll still get the gist here.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=103.33) [So I'll give the cluster a name, I am based in the UK,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=105.6) [and obviously I'll be having the latest and greatest.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=112.84) [But you know what?](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=117.34) [That is it as far as the control plane goes.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=118.44) [So I don't have to make any hard decisions about performance or HA.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=120.85) [My cloud is taking care of all of that,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=125.28) [though down here I do get to decide the number and the](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=128.34) [spec of the nodes for running my apps.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=131.75) [And for the examples in this course,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=134.84) [I'm just going to go with three of the cheapest.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=136.37) [Now it is important to understand that this is a pool of three nodes,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=140.24) [and it forms part of my Kubernetes cluster spec,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=145.45) [meaning if any of these three nodes goes down or breaks or whatever,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=148.94) [Kubernetes and Linode will work together to fix things and make sure that](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=153.11) [I always have my desired state of three worker nodes.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=157.66) [And actually, I think we might see this in some of the demos later if I remember.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=161.54) [Anyway look, nothing is free in the cloud.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=167.54) [But I do like how obvious it is, how much this is going to cost me.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=171.08) [But then it's just Create Cluster.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=176.24) [Now Linode is pretty quick, actually.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=179.64) [Normally a couple of minutes to build a cluster.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=181.99) [But time is valuable, so let me bend some space time here, and there we go.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=184.05) [So a quick summary at the top and then a node pool with three nodes down here.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=191.45) [But actually interestingly,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=196.64) [this here is the kubeconfig file to hook up kubectl to talk to this cluster.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=198.94) [So this is the cluster itself defined here,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=205.14) [basically how kubectl can connect to it.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=208.68) [This is an admin user for the cluster.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=212.24) [And then down here, the two of those are defined in this context here,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=214.48) [so combining the cluster and user account into a context with this name.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=218.58) [Now you can either download that whole file,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=224.24) [or you can cut and paste the sections into a larger kubeconfig file that maybe](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=226.81) [you use to flip between various clusters that you manage.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=231.38) [Well on my machine here,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=235.3) [I have copied those sections into my own kubeconfig file so](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=238.74) [that if I use the Docker Desktop widget here,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=242.92) [see how I've now got two in the list. Well,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=246.24) [this one is the Linode one.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=249.22) [So just clicking that switches my context, meaning if I run this command](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=250.93) [here, boom. That is my three‑node Linode Kubernetes Engine cluster, and](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=255.84) [I am ready to crush it with some demos.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=261.5) [Though I will say there's like a million cloud‑based Kubernetes services.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=265.34) [And while they're all pretty similar,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=270.06) [some of them do offer more features and certainly](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=272.1) [more configurability than others.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=274.89) [So just as a quick example, this here is Google Kubernetes Engine.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=277.42) [Obviously, you need an account on the Google Cloud. But on the left again, I](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=282.04) [go Kubernetes Engine, Clusters, and I'll have a new one.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=286.68) [And then the options all look the same, right?](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=293.94) [Well,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=296.64) [I'll call this one gke‑1. I would like my redundancy to be](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=297.13) [regional, and I'll pick somewhere in Europe.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=301.57) [Now then, I want gke to manage my updates, please.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=306.57) [And of course, I'm feeling brave.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=312.37) [So I'll have the rapid channel because, well, what the heck?](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=314.23) [It sounds cool, doesn't it?](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=317.44) [And at this point, that could be it.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=320.44) [You could click Create right here.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=322.48) [Only over here, there's a bunch of configurability that](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=324.94) [you don't currently get with Linode. So just as an](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=328.33) [example, you can choose your nodes.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=331.5) [And honestly,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=334.05) [there's plenty of options to configure here. But I think](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=335.09) [as well under Features here, look,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=338.75) [you can enable the Istio service mesh with just the click of a button.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=342.58) [Now I don't actually want to, but although this was the Google Kubernetes Engine,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=346.54) [it was very similar to Linode. And what you'll find is](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=351.53) [that most of them are very similar.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=354.78) [Like I say, it's Kubernetes at the end of the day.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=356.83) [Well, do you know what?](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=360.74) [When all of this is complete,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=361.45) [if I click here and I copy this long command here, so long as](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=363.58) [I have the gcloud tool installed on my machine, if I run this](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=370.28) [command in my command prompt,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=374.31) [it automatically merges all of the cluster and the user](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=376.07) [details into my existing kubeconfig file.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=379.43) [So that if I click up here on Docker Desktop now, Kubernetes, there we go.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=382.19) [I've now got three clusters, so docker‑desktop, my Linode Kubernetes](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=387.31) [Engine cluster, and my Google Kubernetes Engine cluster.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=391.56) [I always use that. Well,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=395.2) [you know what? That is pretty much an intro to hosted Kubernetes. A really](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=398.91) [simple way to spin up Kubernetes clusters in the cloud.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=404.12) [But remember,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=407.84) [the cloud costs money. So anything you spin up is likely to](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=409.24) [have a set of associated running costs.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=413.58) [Now they're not usually a lot, but, and I'm speaking from experience here,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=416.56) [if you leave things turned on and forget to turn them off,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=422) [let's just say it's pretty effortless to rack up a decent‑sized bill. Anyway,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=425.64) [like I say, we're only scratching the surface here.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=432.32) [There are so many more ways to install Kubernetes,](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=435.12) [but what we've shown you should be enough to get you on your feet and ready for a few examples.](https://app.pluralsight.com/course-player?clipId=a70f5169-311e-45a7-a63f-c748c99b9540&startTime=438.26)

### [Recap](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4)

[Okay, super quick recap time.](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=1.14) [I think the big picture here is that there are just loads](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=3.5) [of ways to get and install Kubernetes, and we haven't got time to show them all.](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=6.92) [However, I am running Docker Desktop here, so a single‑node Kubernetes cluster.](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=11.84) [It is a pretty solid choice for DevTest. And I reckon if I'm being honest,](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=17.45) [I use it most days.](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=22.98) [In fact, I love this option up here just to be able to flick between clusters.](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=24.49) [It's so easy.](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=28.72) [I've also got a couple of three‑node clusters running in](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=30.84) [the cloud. For the examples in this course, I'm going](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=33.8) [with Linode Kubernetes Engine.](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=37.24) [But do you know what?](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=39.74) [For our purposes in a getting started course, they are all much of a muchness.](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=40.8) [I mean,](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=45.64) [I'm always saying Kubernetes is Kubernetes no matter whether you're running](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=46.04) [it on AWS or Azure or even in your on‑prem data center.](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=49.93) [The core fundamental bits are the same.](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=53.85) [Though I guess the one thing I would say is that Docker Desktop](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=57.54) [isn't going to let you hook up to a cloud‑based load balancer for](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=61.33) [some of the examples that we'll do later.](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=64.68) [So the easiest option for that is a Kubernetes cluster on one of the clouds.](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=66.94) [But do you know what?](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=71.85) [I'm desperate to get started. So strap yourself in and get ready to rock and roll with Kubernetes Pods.](https://app.pluralsight.com/course-player?clipId=ec01d8be-3b53-44d1-bf1b-5532ab0929c4&startTime=72.63)

## [Working with Pods](https://app.pluralsight.com/course-player?clipId=713a3492-3e28-4954-b83d-fe681010542b)

### [Module Overview](https://app.pluralsight.com/course-player?clipId=713a3492-3e28-4954-b83d-fe681010542b)

[Alright,](https://app.pluralsight.com/course-player?clipId=713a3492-3e28-4954-b83d-fe681010542b&startTime=1.24) [time for some proper hands‑on. And this is how we're](https://app.pluralsight.com/course-player?clipId=713a3492-3e28-4954-b83d-fe681010542b&startTime=2.01) [going to run with this module.](https://app.pluralsight.com/course-player?clipId=713a3492-3e28-4954-b83d-fe681010542b&startTime=5.23) [We'll start out by looking at the overall process for taking an app from source](https://app.pluralsight.com/course-player?clipId=713a3492-3e28-4954-b83d-fe681010542b&startTime=7.34) [code all the way through to running on a Kubernetes cluster.](https://app.pluralsight.com/course-player?clipId=713a3492-3e28-4954-b83d-fe681010542b&startTime=12.06) [Once we're cool with that overall picture, we'll look at how to](https://app.pluralsight.com/course-player?clipId=713a3492-3e28-4954-b83d-fe681010542b&startTime=16.54) [declaratively describe an app in a Kubernetes YAML file.](https://app.pluralsight.com/course-player?clipId=713a3492-3e28-4954-b83d-fe681010542b&startTime=19.85) [Then, we'll deploy that to the cluster and do some checks.](https://app.pluralsight.com/course-player?clipId=713a3492-3e28-4954-b83d-fe681010542b&startTime=25) [After that,](https://app.pluralsight.com/course-player?clipId=713a3492-3e28-4954-b83d-fe681010542b&startTime=29.04) [we'll take a really quick look at what a multi‑container pod looks like,](https://app.pluralsight.com/course-player?clipId=713a3492-3e28-4954-b83d-fe681010542b&startTime=29.99) [and then we'll do a quick recap. So come on, let's get this show on the road.](https://app.pluralsight.com/course-player?clipId=713a3492-3e28-4954-b83d-fe681010542b&startTime=34.59)

### [App Deployment Workflow](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d)

[Alright,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=1.44) [the process for building and deploying an app to Kubernetes is pretty much this.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=1.94) [You start out with app code, build it into a container image,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=8.14) [store that in a repo, define it in a Kubernetes manifest,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=12.78) [and then post that to the API server.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=16.93) [And at that point, that what's done.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=19.27) [Kubernetes, then does the rest.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=21.28) [Now, we're going to be focusing mainly on these latter parts in this course.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=24.24) [But you know what?](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=29.34) [I want to give you a proper rounded picture,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=30.64) [so I'm going to really quickly run through these earlier bits.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=33.33) [Now, listen, they are kind of out of the scope of this course,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=37.79) [so, for a proper look, I highly recommend these courses.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=41.39) [Right now, I am literally going to just fly through these bits.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=46.14) [So, the course, GitHub Repo, has this App folder here with some app code in it.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=52.14) [In fact, this here is the main piece of app code.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=57.46) [Now, look, we're not really bothered about the detail.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=60.26) [We just need to know that it is a node web app,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=62.77) [and it's listening on port 8080 here.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=65.68) [Oh, and I suppose it has a view or maybe a web page defined here.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=68.44) [Well, magic.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=75.84) [Look, that'll do, right?](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=76.74) [It's app code.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=77.96) [Well, I am going to clone this to my local computer, so I better get this link.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=79.84) [So let's get this cloning.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=87.94) [Now, look, if you've never done this before,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=89.62) [all I'm doing is making a local copy of the repo.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=91.86) [So I need to switch into the directory with the app code.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=97.04) [Okay, so that's the app code and this file here called Dockerfile,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=101.34) [which, actually, if we take a dead quick look here,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=105.65) [let's make this a bit bigger,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=112.84) [this is just a set of simple instructions that tell Docker how](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=115.04) [to build our app into a container image.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=119.88) [So, starting at the top, we will be grabbing this image here,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=123.54) [we'll ignore the label,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=127.11) [we'll copy everything in the current directory into src in the container.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=128.5) [So,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=134.67) [that'll be all of our app code from our local machine](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=135.25) [gets copied into the container.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=139.22) [Then we'll install the app in the container.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=141.13) [This is the port we'll be using,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=143.61) [and this will start the app whenever the container starts.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=146.02) [Now seriously, don't worry about this.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=150.74) [Check out these courses here, again remember, for the full detail.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=153.32) [Anyway, so from within the App directory,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=158.63) [okay, remember, I've cloned the app to my local machine,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=162.32) [and I've got all the source code here in this directory.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=164.94) [Well, I've also got Docker running here,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=167.94) [so I can just docker image build, so building a docker image,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=171.44) [yeah.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=175.71) [We'll tag this one as belonging to my repos,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=176.54) [and we'll call it getting‑started‑k8s.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=179.54) [Make it version 1,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=181.9) [and then this final period here says my Dockerfile plus all of the app](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=184.19) [code and dependencies I need is in my current directory.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=189.73) [Details, I know, but like I say, I wasn't planning to include this.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=193.84) [I just thought it might be useful, like, help round out the picture, yeah.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=198.56) [Anyway, look, that's building, but time is short,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=203.04) [so I'm going to mess with physics and bend some space time here,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=206.68) [and there's that done.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=211.44) [Okay, so we've taken some app code, and we have built it into a container image.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=213.24) [Now to push it to a registry.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=217.77) [And look, for these examples, I'm going to be using Docker Hub; however,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=219.84) [in the real world, probably especially production environments,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=225.64) [there's a pretty decent chance you'll be using your own private registry,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=229.17) [so either in your on‑prem data center or your own virtual private cloud.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=233.12) [Well, anyway, at this point in the flow,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=239.44) [the image is stored on Docker Hub and ready to be used.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=243.29) [In fact, do you know what?](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=247.84) [Here it is here on Docker Hub.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=249.24) [Now, from a developer and an ops perspective,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=252.64) [this image contains everything the app needs,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=255.49) [so all the code and dependencies to run the app,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=258.46) [like, literally everything's in there, code,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=261.94) [libraries, the whole shebang.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=264.02) [Well,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=267.34) [the next step is to declaratively define what we want this app to](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=267.97) [look like in a Kubernetes YAML manifest file.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=272.44) [Now, in this module, we're going to define it as a standalone Pod.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=276.14) [Later in the course, we'll give it superpowers through a deployment.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=280.74) [But yeah, we define it in a YAML file, post that to the API server,](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=284.44) [and at that point, we're done.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=288.59) [It's then over to Kubernetes to persist it to the cluster](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=290.48) [store and schedule it on the cluster.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=293.43) [Well, are you ready to do all that? Come on.](https://app.pluralsight.com/course-player?clipId=6e9ca383-d943-4138-91ec-f29534f0967d&startTime=297.44)

### [Creating a Pod Manifest](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe)

[Okay, so straight to the good stuff.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=1.24) [This here is our very first Kubernetes manifest file.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=3.54) [And it's a nice, easy one to ease you in.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=7.58) [Well, going from the top, apiVersion is 1.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=10.18) [Now a couple of things worth knowing.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=15.56) [Anytime you see a 1 like this, it means the feature is GA and considered stable.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=18.64) [So pods are GA.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=24.75) [And you'd hope so, right?](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=26.58) [I mean,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=27.67) [they're a core construct, and they've been around since the very beginning.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=28.38) [But this is as good a time as any to mention the different](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=33.14) [stages that any object goes through before it is considered](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=36.56) [generally available and stable.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=40.29) [So new stuff comes in as alpha.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=43.04) [And believe me, this is the proper Wild West.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=46.11) [In fact,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=49.88) [you've got to manually enable a feature gate on your](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=50.31) [cluster just to even use an alpha feature.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=53.29) [So as you'd expect, they're mainly for testing and prototyping,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=56.47) [and you should definitely expect a lot of stuff to](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=59.75) [change before the feature goes GA.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=63.29) [So here's a couple of examples of what it might look like,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=66.84) [v1alpha1 and v1alpha2.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=70.75) [So the v1 bit at the beginning says that this particular alpha](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=74.04) [feature is being targeted for eventual releases of v1.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=77.93) [And then the 1 or the 2 at the end here tells you which iteration it is.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=82.61) [So in this case, v1alpha1 is the first alpha release,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=87.45) [and v1alpha2 is the next release.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=91.51) [Anyway, after alpha is beta or beta,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=94.2) [and this is where things are really starting to take shape.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=97.94) [So not only are they more stable at this point,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=101.54) [but there's also an expectation that the final GA release will](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=104.84) [look a lot like the later beta releases.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=108.65) [Well, after beta comes GA or stable.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=113.24) [And this is basically the Kubernetes project saying this feature](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=116.7) [is ready for production in the real world.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=120.35) [Now of course, as always,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=124.24) [you have to make your own decisions as to what is](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=126.05) [production ready in your environment.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=128.88) [Well, I think I said there were two things to say, right?](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=132.54) [So the second is that pods,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=135.24) [they are literally so old that they're in the original monolithic API.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=137.9) [And what the heck does that mean, Nigel?](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=143.57) [Well, in the early days of Kubernetes, the project was so small,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=149.04) [we literally just bundled everything in a single API group,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=153.26) [the core group.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=157.43) [Only back then, we didn't call it the core group.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=158.47) [We just called it the API.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=161.46) [Anyway look, as things grew like crazy,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=163.09) [it became obvious we'd need to partition things up.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=166.12) [Otherwise, it would just be a huge old mess.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=168.65) [So we started putting newer features into API subgroups.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=172.04) [And look, I'm not going to pretend this is simple if you're new to it,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=176.76) [but it doesn't take long to get used to.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=180.46) [So this here is the Kubernetes API, and it's fronted by the API server.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=183.54) [Well,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=188.84) [objects like deployments and stateful sets are](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=189.13) [defined in the app's API subgroup.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=192.27) [It's just a grouping of objects within the overall API.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=195.25) [And actually, quite nicely, these are all GA, so stable.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=199.69) [Well for any of these, we would define them in YAML files like this.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=204.41) [So for the top one here as a deployment, we say kind is Deployment.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=210.67) [And then it's defined in the app's API subgroup,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=214.8) [and we'll have the v1 version of the object.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=218.86) [Now the API might have older versions in there as](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=222.14) [well for backwards compatibility, but we'll have the v1 stable version,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=225.71) [thanks.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=229.69) [Now give this a second to sink in okay.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=230.84) [It is a deployment object in the app's API subgroup and well our version 1.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=234.49) [And look, it's the same for the others, right?](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=240.44) [It's pretty simple.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=242.38) [Well, there's also a batch API subgroup.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=244.14) [And look, the cron job is a decent example here.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=247.39) [So at the time of recording at least,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=250.99) [and this might be different when you're watching the course.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=253.23) [But right now, the cron job object is v1beta1.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=256.54) [So it is not GA yet, meaning we would define this one like this.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=260.87) [Again, that simple.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=266.52) [The kind is pretty obvious.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=268.35) [But this one is defined in the batch API subgroup, and it's currently v1beta1.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=271.14) [And look, you know what?](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=277.44) [There's the loads, right?](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=278.31) [And like we said,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=279.87) [they're just a way of grouping similar objects to partition the overall API.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=280.84) [Oh, and look.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=287.24) [You'll sometimes here us refer to even higher‑level](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=288) [groupings like the workloads API here.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=290.88) [But don't worry about that because it doesn't impact how we address objects.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=293.39) [However, the elephant in the room is this little monster here,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=297.94) [the original core group, which, to be fair,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=302.83) [isn't really a group.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=306.63) [So like I said before, when we were starting out on this journey,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=308.1) [all the early stuff just went in the API,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=311.53) [right?](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=314.33) [I mean, there was no grouping.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=314.76) [Well, then things exploded, and we figured we should start breaking things out.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=317.24) [But the problem was, by that point,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=322.34) [we already had a bunch of stable stuff just in there](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=324.63) [in the main API address space.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=327.15) [And the easiest option was really just to leave all of that in there,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=328.93) [but then start putting the new stuff in neat little subgroups.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=332.79) [So long story short.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=337.34) [We've got a ton of core features in what we now call the core API group.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=338.71) [And it's so original and hip, it doesn't even need a name.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=344.01) [So we're just referenced stuff in here like this.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=348.31) [So look at that, just v1, no need for a subgroup.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=351.12) [And remember, these are all just snippets of YAML files I've been showing you.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=355.64) [Well, as we are talking about pods, or at least we're supposed to be,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=360.87) [this is what the pod object definition looks like in the API.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=366.44) [Now any of these fields we can define in a pod YAML manifest,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=370.94) [which we're going to do in a second.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=377.54) [But before we did that, I wanted you to grok the relationship.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=379.84) [On the left here, we're looking at the object definition in the API.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=382.79) [And then on the right is how we define it in a YAML file.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=387.33) [So anything we define in the YAML on the right has to be defined](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=392.44) [in the v1 pod object in the API on the left.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=397.5) [You know what?](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=402.24) [I'm not kidding you.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=402.84) [That was like 50 times longer than I'd planned for.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=403.84) [But look, this here is the pod YAML that we'll be using in this example,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=407.34) [and it's called pod.yaml in the pods folder of the course's GitHub repo.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=410.79) [Anyway, we know by now that pods are stable in the core API group.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=416.02) [We're giving it a name.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=420.94) [And honestly, knock yourself out here. You can pretty much call it what you want.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=422.31) [It's got to label, which we'll use later.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=426.64) [And labels are just key value pairs.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=429.11) [But then this is the containers spec.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=432.26) [Now this pod is obviously a single container pod.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=435.65) [This is what we're calling the container, this will be the image we'd](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=439.84) [like it to run, and this is the port that it listens on.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=443.23) [Now tell you what,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=446.84) [bringing this back to some of the pictures we looked at before,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=448.05) [this block of code here is the container running our app.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=450.93) [This is our container.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=454.98) [But then we are wrapping the container in the,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=455.85) [whatever it is, five or six lines of pod code.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=460.12) [Marvelous.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=464.04) [So that's our nesting, the container inside the pod.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=464.74) [Now actually, just a couple of really quick things before we actually deploy it.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=468.33) [This port here has to match what the app listens on.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=473.14) [So actually, our example in the source code here on GitHub,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=476.82) [we can see, it's the same.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=480.91) [It's port 8080.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=482.18) [So if we set that to something different here in the pod manifest,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=483.56) [it's not going to work.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=487.46) [They've got to match.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=489.15) [And the other thing I wanted to say was how does](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=491.04) [Kubernetes know where to find this image?](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=493.99) [Well, by default, images are always pulled from Docker Hub.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=497.24) [So if you don't stick a DNS name on the front here like this,](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=502.02) [then I'm sorry. It is going to pull from Docker Hub.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=506.2) [In fact, if I swing over to Docker Hub here, look, this is the image.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=509.54) [All right, sweet.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=514.44) [But you know what?](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=515.4) [Talk is cheap. Let's do this.](https://app.pluralsight.com/course-player?clipId=18df36b4-2512-4516-82f4-4d49f8a6bfbe&startTime=516.01)

### [Deploying a Pod](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd)

[All right then,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=1.14) [I am on a machine here with kubectl installed and fully](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=1.79) [configured to talk to a Kubernetes cluster.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=5.59) [Now as I'm fond of saying,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=9.34) [Kubernetes is Kubernetes or at least for the most part,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=11.34) [so it literally doesn't matter where my cluster is.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=14.94) [All that matters is I have a Kubernetes cluster.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=18.43) [Now if you haven't been following along and you need to know how to get one,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=22.04) [go and see the Getting Kubernetes module.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=25.47) [As well though, in an earlier lesson, I cloned the GitHub repo locally.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=28.39) [So all that means is I've got all of the YAML files and](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=34.77) [stuff already here on my local machine.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=37.63) [If you have not done that step and you've got Git installed,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=40.12) [just run this command here and then switch into the Pods folder Anyway,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=43.62) [to post this pod.yaml file to the cluster and actually look,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=48.45) [the file could be called anything you want.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=52.39) [We don't have to include pod in the file name.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=54.76) [But look, to get this to the cluster, we just kubectl apply.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=57.55) [We go ‑f to tell it we're deploying declaratively from the manifest](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=63.04) [file, and then it's just the name of the file.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=67.32) [Now when I hit return,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=70.94) [kubectl is going to post that file there to the API server.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=73.44) [The request will be authenticated.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=78.54) [and authorized.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=80.1) [The config will get persisted to the cluster store,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=81.14) [and the scheduler will assign the Pod to a node.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=83.7) [Well, off it goes.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=87.44) [Now then look, two commands that will literally become your best friend's,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=88.98) [kubectl get and kubectl describe.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=93.48) [So kubectl get pods here with a watch on it.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=96.74) [This shows us the state of all of the Pods on our cluster or in our namespace.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=100.54) [And look, a namespace is just a way to logically partition a cluster.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=105.47) [Anyway,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=109.37) [we can see that the hello‑pod is currently in the ContainerCreating phase.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=110.03) [So I don't know, it's probably pulling the image from Docker Hub.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=115.94) [Well look, now that's running.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=119.25) [So if we run that command again, but this time I'll slap the ‑o wide flag on,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=122.34) [and we get these extra columns, which can be pretty useful, right? In fact,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=128.45) [actually, this node here is the node that the Pod is running on,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=133.46) [and this is the Pod's IP.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=138.28) [Now okay, real quick, just to be clear.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=140.29) [Nodes are virtual machines or cloud instances running Windows or Linux.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=143.24) [Pods are our applications.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=149.48) [So Pods run on the nodes.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=151.66) [In fact, think of Pods as apps and nodes as infrastructure.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=153.93) [Anyway, for really detailed info, kubectl describe is what I'm talking about.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=159.34) [Now look,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=166.14) [I'm not going to go through every line. Just trust me when I say this is](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=167.16) [the Pod in all its glory and in a nicely laid out format.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=171.74) [But the take home points are these.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=177.14) [We used kubectl apply to post the Pod definition to the cluster, and then as](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=179.89) [if by magic, Kubernetes just made everything else happen.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=185.85) [Only if you've been following along, you know it's not actually magic.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=189.34) [You've actually got a pretty decent idea of some of the](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=193.82) [stuff that went on in the background.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=196.48) [What else?](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=199.14) [Oh,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=200.12) [yeah. We also saw that kubectl get is great for getting](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=200.25) [the state of an object on a single line.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=204.27) [But the good stuff is behind kubectl describe. And well,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=206.94) [actually, we'll soon find this out.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=212.49) [But both of these commands work pretty much with all Kubernetes objects.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=214.03) [Anyway, that's how we run an application inside a container](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=219.44) [wrapped in a Pod on Kubernetes. Good stuff.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=223.54) [Well,](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=228.41) [I'll tell you what. We're going to leave that iPod running for something we'll do later on.](https://app.pluralsight.com/course-player?clipId=d01fe61d-f8e9-4745-b41f-83a903e32fbd&startTime=228.71)

### [Multi-container Pod Example](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc)

[Okay, so a super quick,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=1.24) [multi‑container pod example, and the YAML for this is in the Pods folder](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=2.67) [of the GitHub repo, and it's called multi‑pod.yaml.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=8.42) [Now, like I said earlier, though, for sure,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=11.66) [multi‑container pods offer more advanced scenarios than we're](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=14.43) [teaching in this getting started course.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=18.11) [So, I'm just going to rattle through this quickly to give you an idea.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=19.93) [Remember, I've got that more advanced course with the horrific name,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=23.54) [if you need more detail. Anyway,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=27.77) [this here is a multi‑container pod YAML file that I've](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=31.85) [literally lifted directly from that course. And straightaway,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=35.13) [we can see in the containers section here,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=39.53) [we've got two containers.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=41.38) [Now, there's loads of detail that we're not going to go into here,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=43.25) [but there is a main container here, and then down](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=46.54) [below, we've got a helper container.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=50.44) [Now, we can see the main container's listening on port 80 and the helper on](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=53.34) [9113. So, this means the main app container can talk to the helper by opening a](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=57.52) [connection to port 9113 on its localhost adaptor, and then vice versa, the](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=64.73) [helper can talk to the main app on localhost 80.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=70.8) [Now remember,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=74.44) [this is because both of the containers are wrapped by the same pod up here.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=75.5) [So I'll tell you what, if we throw a quick picture up](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=81.74) [here, this here is the pod definition,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=84.35) [which we have said is like a wrapper, and then we've got](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=86.4) [the main app container and the helper.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=89.09) [Now in this example, the main container here is running some nginx stuff.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=92.94) [I honestly can't remember the specifics,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=96.98) [but the helper here is taking the nginx logs,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=99.57) [and it's exposing them in a format required by a](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=103.2) [third‑party tool called Prometheus.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=106.46) [So, the important thing, it is a complementary relationship.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=109.54) [The nginx one here is the main container, but Prometheus,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=113.48) [which we may have running somewhere else in our cluster,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=117.73) [can't actually read nginx logs.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=120.66) [So we've got a sidecar container here that watches the nginx](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=122.92) [logs and then exposes them in a different format, so a format](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=126.89) [that Prometheus likes. And then, of course,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=130.64) [if you wanted to deploy it,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=134.09) [it's just the usual kubectl apply ‑f and then the](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=135.59) [name of the file. In fact, yeah, go on, why not?](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=139.29) [There we go.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=144.84) [So, if we look at kubectl get pod with a ‑‑watch, okay,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=145.49) [ContainerCreating, but look here, 0/2 ready.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=150.41) [So straightaway, a single line representing a single pod,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=155.36) [but it's got two containers. And, yeah,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=159.34) [I mean that is a multi‑container pod. Now loads more detail, of course.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=163.04) [We were just getting a big picture here.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=167.87) [But you know what?](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=170.44) [We don't need this one for later, so we'll clean that up. Now, we can go](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=171.14) [either kubectl delete pod and then the name of the pod,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=175.81) [or we can kubectl delete ‑f and give it the same file we deployed from.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=179.29) [That should be gone, but, yes, look. Remember,](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=186.54) [we've still got the old hello pod from earlier up and running, and](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=189.69) [we'll come back and use that one again in a second. But before we do that, though, let's do a quick recap.](https://app.pluralsight.com/course-player?clipId=68cceebb-2e13-4301-a2b9-865fd0cbabdc&startTime=193.15)

### [Recap](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32)

[Now I'm going to keep this quick because I am king to crack on.](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=1.24) [We know that Pods are the smallest deployable object in](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=4.84) [the entire Kubernetes API and that while Pods can](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=8.58) [absolutely have multiple containers,](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=11.94) [that Pod and all of its containers are always scheduled to a single node.](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=14.52) [We saw how to define them in a YAML manifest file,](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=20.34) [and we used the kubectl command to post those manifests to the API server.](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=23.41) [Now,](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=29.34) [while the kubectl command is the main way that you'll](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=29.84) [deploy and manage Pods and other objects,](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=32.56) [you can, obviously use other tools to talk to the API.](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=35.44) [I mean, after all, it is just a REST API over HTTPS.](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=38.86) [And that was those.](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=43.84) [But you know what?](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=45.14) [Even though we deployed a couple of Pods and we checked them with kubectl,](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=46.34) [we never actually connected to them to see if the apps](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=49.91) [inside them were actually working.](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=52.4) [Well,](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=55.14) [that's coming up next where we'll find out how Kubernetes apps are exposed](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=55.72) [to other apps on the internal Kubernetes Pod network,](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=60.24) [as well as to the internet through a load balancer. See you there.](https://app.pluralsight.com/course-player?clipId=7de5349f-5e5c-4745-a855-194402333f32&startTime=63.42)

## [Kubernetes Services](https://app.pluralsight.com/course-player?clipId=bc28033b-b135-4773-9f1e-06acb0390224)

### [Module Overview](https://app.pluralsight.com/course-player?clipId=bc28033b-b135-4773-9f1e-06acb0390224)

[Alright, then. In this module,](https://app.pluralsight.com/course-player?clipId=bc28033b-b135-4773-9f1e-06acb0390224&startTime=1.24) [we're going to look at the Kubernetes service object, so, the way](https://app.pluralsight.com/course-player?clipId=bc28033b-b135-4773-9f1e-06acb0390224&startTime=3.15) [in Kubernetes to expose applications, both on the network and to](https://app.pluralsight.com/course-player?clipId=bc28033b-b135-4773-9f1e-06acb0390224&startTime=8.08) [the outside world. And we'll slice it like this. We'll cover off](https://app.pluralsight.com/course-player?clipId=bc28033b-b135-4773-9f1e-06acb0390224&startTime=12.39) [the necessary theory.](https://app.pluralsight.com/course-player?clipId=bc28033b-b135-4773-9f1e-06acb0390224&startTime=16.97) [Then, we'll apply a service to an app that we've left running,](https://app.pluralsight.com/course-player?clipId=bc28033b-b135-4773-9f1e-06acb0390224&startTime=18.64) [and we'll do it two ways.](https://app.pluralsight.com/course-player?clipId=bc28033b-b135-4773-9f1e-06acb0390224&startTime=21.71) [First, the imperative way, so the way that Kubernetes does not prefer,](https://app.pluralsight.com/course-player?clipId=bc28033b-b135-4773-9f1e-06acb0390224&startTime=23.59) [but then we'll do the same again, but this time, the declarative way.](https://app.pluralsight.com/course-player?clipId=bc28033b-b135-4773-9f1e-06acb0390224&startTime=28.67) [And I'm going to do this because as much as you](https://app.pluralsight.com/course-player?clipId=bc28033b-b135-4773-9f1e-06acb0390224&startTime=32.29) [should prefer the declarative method,](https://app.pluralsight.com/course-player?clipId=bc28033b-b135-4773-9f1e-06acb0390224&startTime=35.43) [it is often useful to see multiple ways of doing things. Anyway,](https://app.pluralsight.com/course-player?clipId=bc28033b-b135-4773-9f1e-06acb0390224&startTime=37.44) [then we'll create an internet LoadBalancer service, and we'll wrap the module with a quick summary, so let's get cracking.](https://app.pluralsight.com/course-player?clipId=bc28033b-b135-4773-9f1e-06acb0390224&startTime=41.74)

### [Kubernetes Service Theory](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d)

[Okay, if you've been following along, you'll already have a Pod running.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=1.34) [If you've not been following, then clone the GitHub repo like this,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=5.42) [jump into the Pods directory,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=9.34) [and deploy the Pod from the pod.yml file with this command.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=11.14) [Now, obviously,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=15.54) [you'll need git installed and kubectl configured to talk to a valid cluster.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=16.77) [Anyway, look, I've got the Pod running here,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=23.44) [and it's running the code from in here, which is a web server,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=25.95) [right?](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=30.86) [Only, is it?](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=31.64) [I mean, you're taking my word for that right now.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=33.18) [Like, as good as kubectl commands are, we've not actually seen anything,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=36.44) [have we?](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=41.39) [Like, we've no evidence that it actually is a web server.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=41.73) [Well, okay, look, we can see that the Pod here has got an IP address,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=45.48) [but that is an internal cluster IP on the Pod network.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=50.77) [And my cluster happens to be several 100 miles away from me,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=55.73) [and this machine that I'm on right now is not part of that cluster.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=59.61) [Plus as well,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=64.24) [we've already had the conversation about Pod IPs not being reliable,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=65.17) [yeah?](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=69.31) [Well, how the actual heck then, Nigel, do we connect to our app?](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=70.35) [Answer, services.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=76.24) [Now, I want us to think about a couple of common scenarios.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=79.54) [One,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=82.65) [accessing the app from outside of the cluster like from a](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=83.19) [web browser on your lappy or something, but two,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=86.64) [accessing it from inside the cluster, so,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=89.78) [maybe another Pod or application on the same cluster that's talking to it.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=92.35) [Well, guess what?](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=97.44) [Yep, services nail both of these.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=99.05) [So, backing up a little bit,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=103.34) [a service in Kubernetes speak is a REST object in the API.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=105.2) [So just like Pods, and nodes, and deployments,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=110.31) [and we'll see it in a minute,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=113.39) [but we define services in YAML files that we post to the API server,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=114.27) [and Kubernetes does all the creating magic.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=119.82) [But the thing is, for us right now,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=123.34) [what we care about is that services are an abstraction.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=125.5) [And, of course, we're big picture at the moment,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=130.84) [but let's assume a bunch of Pods.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=132.85) [So they are deployed, and running, and they're happy, but us, we're not happy.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=134.79) [I mean, we've no reliable way of connecting to them because,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=140.29) [remember, here I go again, Pods are unreliable,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=143.44) [here today, gone tomorrow.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=148.05) [So,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=150.37) [we never connect to them directly because what if](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=150.93) [we're connecting to maybe this one, and then suddenly,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=153.79) [poof, it's gone.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=157.15) [Well, not ideal, no.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=160.34) [So, slap a service in front of them like this,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=161.95) [and boom, that is your reliable endpoint right there.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=164.65) [Now,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=170.84) [I always find it useful to think of services as](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=171.55) [having a front end and a back end.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=173.91) [The front end is a name, IP, and a port,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=176) [and the back end is a way for the service to know](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=178.35) [which Pods to send traffic onto.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=180.71) [Well, that front end gets an IP, a DNS name and a Pod,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=184.14) [and Kubernetes cast‑iron guarantees these will never change.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=188.67) [Now, for sure, it can be party time down here,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=194.84) [and the Pods can come and go as much as they want.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=197.63) [So, whatever, right?](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=200.43) [Some of them might crash.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=201.91) [We can scale them up and down.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=203.13) [Rolling updates, rollbacks pretty much all change,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=204.47) [but the service fronting them?](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=208.34) [Nuh‑uh, that never changes.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=209.9) [So obviously, then you throw your requests at this,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=214.64) [and no matter what kind of chaos and complexity is going on down below,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=217.81) [it is all hidden by the nice tidy service.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=221.46) [Now then, the IP on the front end is automatically assigned by Kubernetes,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=225.54) [and it is called a cluster IP.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=231.12) [And the name kind of gives it away.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=233.72) [It is only for use inside the cluster, cluster IP.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=236.34) [But then the name is the name of the service, and that gets registered with DNS.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=240.89) [So, backing up a bit again,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=247.19) [every cluster gets an internal DNS service based on a technology called CoreDNS.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=249.84) [Behind the scenes,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=256.14) [this is a control plane feature that runs a watch loop](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=257.12) [watching the API server for new services.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=260.59) [Anytime it sees one,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=263.02) [it registers the name of the service in DNS against the cluster IP.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=264.23) [Then every container and every Pod gets the details of the](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=268.77) [internal DNS in its own /etc/resolv.conf file.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=273.86) [Net net, every service name gets registered with DNS,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=278.54) [and every container knows about the clustered DNS.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=282.33) [So long story short, every container in every Pod can resolve service names.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=285.65) [Well, that's the front end.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=292.24) [On the back end,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=294.23) [services need a way of knowing which Pods to forward traffic onto.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=295.66) [And look, there is a bunch going on here, but it's mainly about labels.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=299.19) [So, in fact, see how this Pod manifest got a label.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=304.51) [Well, yeah,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=308.47) [just put the same label in the service manifest under the label selector,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=309.5) [and the service is going to send traffic to that Pod.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=313.94) [But, so much to go through.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=317.74) [As well, every time you create a service,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=320.15) [Kubernetes automatically creates an endpoint object or an endpoint slice,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=322.71) [depending on your version of Kubernetes.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=327.08) [Either way,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=329.74) [it's just a dynamic list of healthy Pods that match](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=330.24) [the service's label selector.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=334.08) [Yeah.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=336.44) [Anyway, look, bringing this back to the two access scenarios that I mentioned,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=337.54) [access from inside the cluster and access from out,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=342.16) [yeah, well, we'll look at internal first.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=344.27) [We already said that a service gets a cluster IP,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=348.24) [and as the name suggests, that is for inside the cluster.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=351.64) [And we also said that the name of the service gets](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=355.3) [registered with the internal DNS service,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=357.85) [and every container uses this DNS service when it is resolving names to IPs.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=359.68) [Well, four Pods inside the cluster wanting to talk to other Pods,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=364.8) [so long as they know the name of the service in front of the Pods,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=369.96) [and that's your job as a developer, okay?](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=373.44) [But as long as your app knows the name of the service,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=376) [it fires that off to the internal DNS service,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=379.44) [and it gets back the cluster IP.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=382.22) [And then from there, it just sends traffic to that cluster IP,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=385.04) [and the cluster takes care of getting it to individual Pods.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=388.31) [Now, there is more detail and machinery going on here.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=392.74) [For a very detailed look into the mechanics of it all, check out this blog post.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=395.98) [Okay, well, anyway,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=402.74) [accessing from outside the cluster comes in a few different shapes and sizes.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=404.12) [We've hinted that a service also gets a network port.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=408.84) [Well,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=412.2) [that port can be mapped on every cluster node to point back to the cluster IP.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=412.44) [So, in this example, the service has a port of 30001,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=418.05) [and that's mapped on every node in the cluster,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=421.36) [meaning we can sit outside of the cluster and send](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=424.67) [requests literally to any node on that port,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=428.03) [and Kubernetes makes sure that it's rooted to the cluster](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=432.44) [IP and eventually the Pods behind it.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=435.27) [And we call this a NodePort.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=439.24) [Again, it's in the name, yeah?](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=441.88) [Every node gets the port mapped.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=443.72) [As well, though, and this I'm telling you is a thing of sheer beauty,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=447.23) [there is a third type of service.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=454.14) [So,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=456.82) [so far we've seen cluster IP for internal access](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=457.33) [and NodePort for external access.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=460.21) [Well, this third type is LoadBalancer,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=462.84) [and it seamlessly integrates with your cloud provider's native load](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=465.84) [balancers to provide access from over the internet.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=470.48) [And the beautiful part, Kubernetes literally does all the heavy lifting,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=474.54) [and I mean all, right?](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=479.06) [You literally just define a YAML file that says type equals LoadBalancer,](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=480.32) [and Kubernetes does the rest.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=484.75) [Honestly, I promise, you will love it.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=486.87) [Now, look, there's a few more niche types of services, but that'll do for us.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=489.94) [The take‑home point is that services provide reliable networking for Pods. Time to see them in action.](https://app.pluralsight.com/course-player?clipId=1156a94e-eeb1-4658-915c-01009b81096d&startTime=494.45)

### [Creating Services Imperatively](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481)

[Okay, I know I said earlier that the imperative way is not the Kubernetes way,](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=1.24) [and it's not, but I do want you to see it,](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=5.65) [and I think you'll learn something.](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=8.63) [Anyway,](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=10.74) [we deployed this app in the last lesson, and it's running a web server](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=11.47) [packaged in this image here. Only, there's an element of trust,](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=15.16) [because we've not actually seen it, and the reason is it's just a pod](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=19.38) [right now, and we don't trust pods, do we?](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=23.5) [We need to front it with a service.](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=26.16) [Now, look, being honest,](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=29.74) [the simplest way to do that is just to go kubectl expose. We're](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=31.79) [exposing the hello‑pod, and let's call it hello‑svc, and this is the](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=36.82) [name that will be registered with DNS, remember. The target‑port is](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=45.99) [going to be 8080, that's what the container is listening on, and we'll](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=49.89) [expose it as a NodePort.](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=54.41) [Remember,](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=56.98) [NodePort is the option that creates a port for the](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=57.89) [service on every cluster node.](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=61.1) [Now,](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=65.44) [this is the imperative way because kubectl expose is the](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=66.34) [command to create the service, and then all the config options](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=69.79) [are listed here on the command line.](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=73.65) [We're not pulling them from a config file that we can keep and store](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=75.64) [in a code repository where it can be versioned.](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=78.56) [Anyway, kubectl get and kubectl describe are our friends again. Oh,](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=81.64) [not pods, what am I doing, services.](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=87.25) [So this kubernetes one here is a system service, right, it](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=91.54) [exposes the API inside of the cluster, but this one's ours, hello‑svc.](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=94.65) [Now we can see that it is a NodePort type, and I'm pretty sure I said this,](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=100.34) [NodePorts also create a cluster IP that they build on top of, because traffic](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=105.67) [hitting the NodePort here, this 31 whatever 1000 number, eventually gets](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=110.94) [passed on to the cluster IP. But anyway,](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=116.26) [we can now hit any node in the cluster on this port and reach the web server.](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=119.91) [And this is the cloud back end for my particular cluster.](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=125.64) [Yours is going to be different depending on where your cluster](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=129.02) [is, but all you're looking for is the public IP of any of your](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=131.64) [cluster nodes, and by public IP,](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=137.05) [I mean any IP address associated with one of your nodes that you can](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=139.14) [reach from wherever you're running your browser.](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=143.15) [Now,](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=146.74) [if you're running on Docker Desktop or minikube maybe, you](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=147.06) [can probably just use localhost. Anyway,](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=149.99) [a reachable IP of any node plus the NodePort, and there we are.](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=153.82) [It is actually a proper running web server.](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=159.79) [Now one quick thing, by default NodePorts are allocated by](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=164.24) [Kubernetes between the range of 30000 and 32767, and then that](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=168.14) [port is mapped cluster‑wide on every node so you can hit any node](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=173.99) [on the NodePort. Magic! Well,](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=179.42) [coming up next we're going to see how to do it all again,](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=182.32) [but this time with a declarative YAML file, so the proper way.](https://app.pluralsight.com/course-player?clipId=0ea334db-74e8-4579-b8df-5913a20bc481&startTime=184.74)

### [Creating Services Declaratively](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836)

[Alright, no more messing about, let's do this properly.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=1.24) [Well, let's get rid of this one first.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=5.44) [Did we call it?](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=9.34) [Oh, yeah, of course, anyway, please go away. Alright, now,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=11.04) [obviously, actually, we've still got the app running.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=19.68) [Yeah.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=22.88) [So, this here is a Service manifest.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=23.49) [Now, this isn't our first rodeo, we've seen a YAML or two already,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=27.04) [so I'm kind of hoping you might be getting comfortable with the structure.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=30.85) [So services, like pods, have been around since forever, so](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=36.14) [they are defined in the v1 core API.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=40.76) [We're telling Kubernetes we're defining a service object,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=44.94) [and then we're giving it a name.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=47.68) [But do you know what, look, that's all meta stuff.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=48.96) [This is where we start defining it.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=51) [So, we set the type to NodePort.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=53.54) [Now,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=57.04) [I suppose this is a pretty good time to mention the](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=57.84) [three types of service again.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=60.29) [I mean, repetition is the mother of learning. Well,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=61.91) [yes, there's three major service types,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=65.58) [and each one is useful for a different requirement.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=67.68) [At the bottom is ClusterIP, and this is the default,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=71.61) [right, so if you don't explicitly set a type,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=74.27) [that's what you'll get. Now, it is a stable IP within a cluster, so a ClusterIP](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=76.72) [only makes the service available from inside the cluster.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=83.97) [Next up, there's the NodePort that we're going with.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=88.84) [This takes this ClusterIP, which is needed for routing within the](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=91.94) [cluster, and it adds a cluster‑wide TCP or UDP port on top.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=95.13) [In fact,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=100.36) [it's what we just saw when we assigned it a random port above 30000 and tied](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=100.69) [the service to that port on every node in the cluster.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=105.33) [And, to be brutally honest, it's pretty crude,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=109.44) [right,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=112.7) [because the port numbers are long and you need to know the](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=112.92) [name or the IP of a healthy cluster node.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=115.65) [Yeah, a bit of a pain.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=119.44) [Anyway, last up,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=121.44) [we've got LoadBalancer, and these are the piece de resistance of services.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=122.35) [So these build on top of ClusterIP and NodePorts, and they add an](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=129.79) [extra layer that seamlessly integrates that with your cloud](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=134.61) [provider's load‑balancers. And, believe me,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=138.54) [they are slick as heck, and we'll say one in a minute.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=141.94) [But, I do want us to understand the layered nature of the three on](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=147.84) [the screen and how they build on top of each other.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=151.27) [So at the core or at the lowest level is ClusterIP.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=154.24) [That's how you get to a set of pods from inside the cluster](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=157.3) [or once the traffic is inside the cluster.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=160.47) [On top of that,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=162.66) [we can add a NodePort that allows access from outside the cluster, and then](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=163.55) [you can add a LoadBalancer type on top of that to expose your pods to the](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=167.2) [internet via one of your cloud's load‑balancers.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=171.52) [But, I've got to be super clear about this. If you're going with](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=176.04) [a LoadBalancer service or even a NodePort,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=180.91) [you don't need to create the ClusterIP in anything else below it first.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=183.45) [No,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=187.48) [you just create the service type that you want, and](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=188.16) [Kubernetes does the hard work of stitching everything back](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=191.1) [to the ClusterIP and then to the pods.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=193.61) [Super simple.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=195.67) [We're going to see it in a second anyway.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=196.47) [Well, yeah, we're going with NodePort, and then,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=199.74) [okay, what are these ports all about?](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=202.98) [Well, first up,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=206.44) [the port value is the port that the service listens on inside the](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=206.97) [cluster, so tied to the ClusterIP, meaning, if another app on the](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=210.56) [same cluster is connecting via the name here, which is registered](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=215.15) [with DNS, yeah, well,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=218.9) [this is the port it needs to use. TargetPort here is the port that the app](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=220.62) [inside the container is listening on, and the nodePort is the external](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=226.37) [port that'll be mapped on every cluster node.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=230.37) [Now we're picking an explicit value here,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=233.14) [but it's got to be between 30000 and 32767. And, look,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=235.31) [honestly, I know that's quite a lot. So the picture here shows our cluster nodes.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=240.17) [They expose the NodePort, which we can hit from an external client.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=246.74) [Traffic arriving on that NodePort gets forwarded to the ClusterIP](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=251.34) [on port 80 inside the cluster, but the app itself is working on](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=255.51) [port 8080 inside the pods and containers.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=260.75) [Whoo! Give that a second to settle in. And you know what, maybe do](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=264.27) [it in your own environment and then replay the clip, because it is](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=269.85) [important that you understand this.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=273.06) [Anyway, we're telling it TCP, which is the default actually,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=276.64) [so we could have left that out, but yes you can tell it UDP](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=280.06) [here if you need to. And then last, but most definitely not](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=282.87) [least, is the label selector.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=286.68) [Now this is the list of labels that has to match the labels on the pod that](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=289.04) [we deployed earlier, but hopefully we're good with that.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=293.52) [So before we deploy it,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=297.38) [let's just run this here to make sure our selector is](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=299.06) [going to match the label on our pod.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=302.23) [So if I run this command with the ‑‑show‑labels flag, yeah, okay,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=305.74) [so we both got app=web. Well,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=311.84) [then it's just the usual kubectl apply, we're deploying from a file this time,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=316.67) [and we'll give it that svc‑nodeport file, and we're good.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=322.64) [So we can throw our usual get and describe commands at it, and I](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=327.04) [think we'll go with the describe this time.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=330.51) [Right, yeah,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=335.94) [that's pretty sweet actually. So this is a nicely formatted](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=336.42) [view of what we put in the YAML file.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=339.89) [But we can see the type is NodePort, this is the ClusterIP,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=343.64) [and this one is the internal cluster port if you're](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=349.85) [accessing from inside the cluster.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=353.57) [This one is what the app is listening on inside the pods and containers, and](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=355.74) [then this is the port we can hit nodes on from the outside.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=359.99) [Ports, ports, ports, too many, my head's going to explode.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=364.07) [Well, oh, actually, yeah, look,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=367.84) [we can see the Endpoints here as well. So, this is a list of healthy pod IPs](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=369.96) [that the service will send traffic to, so it's basically any pod in the](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=375.85) [cluster that matches the label selector. Now, yeah,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=379.9) [for us right now it's just one, but later on maybe we'll look back](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=383.48) [at this when we've deployed multiple replicas.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=386.68) [Anyway, look, see how the port here matches the TargetPort as well? Marvelous.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=390.04) [Well, same as last time, we grab the name or the IP of a cluster node.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=394.94) [Yours is going to look different, and if you're on Docker Desktop and](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=399.29) [minikube, then it's probably going to be localhost again.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=402.87) [But we just whack that in a browser on the NodePort,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=405.84) [which was 3 and then all the 1's. And the same as last time, yeah, only this](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=409.94) [time we did things the proper Kubernetes declarative way.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=415.49) [Alright, pretty sweet.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=419.84) [Well,](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=421.93) [last but most definitely not least, let's see how unbelievably simple it is to hook all of this into a cloud LoadBalancer.](https://app.pluralsight.com/course-player?clipId=1bb2e201-30da-4db3-b09f-7bb62c6c0836&startTime=422.4)

### [Creating Internet LoadBalancer Services](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb)

[Okay, we're about to integrate a service with a cloud load balancer,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=1.24) [so create an internet‑facing load balancer with a](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=5.74) [high‑performance and highly available public IP,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=9.25) [and have it route traffic all the way back to our app,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=12.52) [running in a cluster inside a pod.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=16.14) [And I promise you, it is the easiest of the three service types.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=19.27) [It is proper magic.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=23.53) [However, it's only going to work if you're following along on a supported cloud.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=26.74) [So if you're on Docker Desktop or minikube or something,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=33.54) [sorry, I mean, just take a break from following along and watch.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=36.94) [Well, of course, we're going to go YAML style again.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=42.14) [This stuff at the top, we already know, but then for type,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=45.44) [we're saying LoadBalancer.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=48.55) [Then configure the LoadBalancer to listen on port 80 and map traffic](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=51.24) [all the way back to the app listening on port 8080,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=55.72) [and then, of course, these selectors are the same.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=59.16) [So, we're configuring another service object,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=62.72) [but we're pointing it back to the same set of pods,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=67.64) [only this one's exposing them over the Internet.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=70.37) [So, let's see it in all of its glory.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=74.64) [Okay, quick check here.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=82.54) [Alright, now,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=86.84) [because I'm running this on a public cloud with a supported load balancer,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=87.98) [this here shows the public IP of the LoadBalancer that's already created,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=91.89) [and I promise you, on this particular cloud back end,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=97.61) [it's fast, so there was no video editing to make that go quicker.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=100.72) [Now wait, hold up just one freaking second here, right.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=106.24) [From this outrageously simple yml we've already got a fully configured,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=110.89) [all‑singing, all‑dancing LoadBalancer with a public IP?](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=115.99) [Yeah we have.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=119.21) [How outrageous is that?](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=120.37) [I'll tell you what, let's have that IP and see if it works.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=122.64) [Oh my goodness!](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=127.43) [Now let me be clear about a couple of things, actually.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=132.34) [This only works on clouds with supported loud balancers,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=135.49) [but all the major clouds work, AKS, EKS,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=138.82) [GKE, DigitalOcean, Linode, you name it, right,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=142.6) [they all work.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=146.06) [And what's happening is that you post that yml to Kubernetes,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=148.24) [Kubernetes sees that it's requesting a load balancer service,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=152.54) [so it goes and talks to the cloud it's running on,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=156.34) [and then it does all the hard work of provisioning the load](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=159.94) [balancer with the public address and all.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=163.43) [And that includes building everything required so that traffic](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=166.26) [hitting the load balancer on the right port,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=171.1) [which for us was port 80,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=173.23) [gets routed all the way to the app running on our private Kubernetes cluster.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=175.04) [In fact, flipping heck, yeah,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=182.14) [let's go and have a look at my cloud back end actually.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=184.52) [I am on Linode Kubernetes engine here, but like I keep saying all the time,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=187.54) [it could be anywhere, GKE, EKS, you name it.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=191.23) [Anyway, this is my LoadBalancer here, and I did not create this, Kubernetes did.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=195.24) [And I'm glad, actually, because if we look at the config,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=201.7) [I'd rather Kubernetes do all of this than me.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=205.17) [But you know what, actually, we see stuff that we know.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=208.34) [So we come in on port 80, and, I don't know,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=210.81) [some health check stuff there, but then down here,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=215.6) [these are my three cluster nodes.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=218.6) [I'll make this a bit smaller, yeah, three nodes, and all three on port 31972.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=222.29) [Well, guess what, that'll be a node port.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=231.34) [So the LoadBalancer has this highly available public IP,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=234.4) [we hit that,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=239.04) [traffic gets forwarded on to any one of these nodes on the node port,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=240.54) [and then from there, it's to the cluster IP,](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=244.97) [in the cluster, and onto the pod.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=247.61) [And like I said before, I freaking love it.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=250.64) [And something else I love, we are done with services, but stick around while I do a quick recap.](https://app.pluralsight.com/course-player?clipId=e9deb057-c233-471a-9e18-a21bdbeec0cb&startTime=254.61)

### [Recap](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e)

[Okay, what have we learned?](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=1.24) [Well,](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=3.34) [I think the two take‑home points are that services provide](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=3.44) [a reliable network endpoint for unreliable pods and that](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=6.25) [they're an abstraction layer.](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=11.01) [So we know that every service gets a name, IP, and a port,](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=13.34) [and that Kubernetes gives us this cast‑iron guarantee that these](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=16.42) [will be stable and never change. Fabulous.](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=19.71) [But, we also know that pods are unreliable, and they](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=23.34) [can be coming and going like crazy.](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=27.05) [So instead of pointing clients and other apps directly at pods,](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=30.14) [we point them to the service, and then the service is clever](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=33.44) [enough to watch the pods and know which ones are present and](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=37.09) [healthy and send traffic to just those.](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=39.99) [And the beauty is you never have to think about the pods down here.](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=43.84) [In fact,](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=48.74) [it's all hidden like there's all kinds of crazy going on in the](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=49.39) [unreliable pod world, but the service here hides all of that and](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=53.01) [presents us with a calm and peaceful view of the world.](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=56.59) [Now,](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=62.54) [we also said that there's a few types of service, ClusterIP is for](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=62.99) [accessing pods from within the cluster, NodePort enables external access](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=67.01) [via a report on any cluster node, and then LoadBalancer exposes pods to](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=71.48) [the internet via cloud‑based load balancers.](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=76.33) [And I'm telling you, that's us done for now on services.](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=80.14) [Next up, though,](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=83.36) [the last module, and we have definitely saved the best for last, Kubernetes deployments.](https://app.pluralsight.com/course-player?clipId=2c0e3e96-fc3e-442e-95b0-36ccb61d008e&startTime=84.42)

## [Kubernetes Deployments](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3)

### [Module Overview](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3)

[All right, then.](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=1.34) [This is the good stuff.](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=2.11) [This is where I think we really start to see what Kubernetes is about.](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=3.92) [Anyway, so far, we've nailed the theory and architecture of Kubernetes.](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=8.94) [We know how to run containerized apps in pods and expose them to the world.](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=13.94) [And I suppose we've talked about as well about the](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=19.34) [declarative model and desired state.](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=21.92) [Well look, that's all good and important, and honestly it is.](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=25.54) [But this right here is where the rubber meets the road or where we put the pedal](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=29.6) [to the metal and see all the self‑healing and scaling and rolling update magic](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=35.19) [that I have been hinting at throughout the course.](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=40.07) [But I'm waffling.](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=43.74) [This is how we're going to do this.](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=44.99) [We'll do a quick bit of how does this all work theory?](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=46.52) [Then we'll be into the examples.](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=49.47) [I reckon we'll start out with a proper look at a](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=52.14) [deployment YAML, and then we'll deploy it.](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=54.87) [Then we'll break some stuff, and we'll see what this](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=58.14) [self‑healing and scaling is all about.](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=60.67) [And then we'll go out in a blaze of glory,](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=63.64) [performing a zero downtime rolling update and a version rollback. And then, oh,](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=66.47) [I'm telling you,](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=74.11) [we will celebrate and power into a future filled with endless containers. Sound like a plan? Let's rock and roll.](https://app.pluralsight.com/course-player?clipId=232497e4-aa41-4d72-992e-02732740cbf3&startTime=74.98)

### [Kubernetes Deployment Theory](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9)

[So, Kubernetes deployments.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=1.24) [We've talked a bit already about Pods and services and things](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=4.14) [being objects defined in the Kubernetes API.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=7.39) [Well, the same goes for deployments.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=11.14) [They are full‑on objects in the Kubernetes API.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=13.47) [In fact, they're in the apps API subgroup.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=17.64) [Anyway,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=22.14) [the reason for them is the stuff that I've been](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=22.94) [banging on about throughout the course, so self‑healing,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=25.66) [scaling, updates, and rollbacks.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=29.87) [Okay, well, at the center of everything is the application.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=33.54) [Like it breaks my heart to say it because I just love](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=36.97) [technology for the sake of technology,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=40.53) [but there is actually no point to any of this amazing stuff if we](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=42.84) [don't have an app that does something useful.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=47.12) [So, everything revolves around the app.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=50.74) [We wrap the app in a container, wrap that in a Pod,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=53.67) [then we wrap Pods in deployments.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=57.12) [Only, actually, like we've hinted at before,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=61.04) [in between the Pod and the deployment is another object called a replica set,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=64.78) [and the responsibilities are divided like this.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=70.48) [So,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=74.14) [it is actually the replica set that does the self‑healing and the scaling stuff,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=74.99) [and I think it's in the name, yeah?](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=78.63) [The replica set takes care of Pod replicas with basically the deployment,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=81.11) [then being in charge of updates and rollbacks.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=86.33) [But, the thing is, oh, actually, before I say that,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=90.24) [though replica sets are also full‑on API objects.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=93.19) [So there's a replica set controller on the masters,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=97.34) [running a watch loop, and taking care of all of the self‑healing and scaling.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=100.67) [So it's like, hey, Kubernetes, I need five replicas of such and such a Pod,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=105.04) [no matter what, and it's the replica set controller that makes that happen.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=109.81) [And we know the drill by now.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=114.3) [It's reconciling observed state with desired state.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=116.19) [But, the thing is,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=121.54) [we'd have to deal directly with replica sets because the](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=122.72) [way a deployment wraps around them, we just deal with the deployment.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=126.08) [So, then the deployment handles all the replica set stuff behind the scenes.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=131.74) [And it is kind of easy to forget that replica sets even exist.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=137.28) [So, in a way,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=143.04) [replica sets are an unsung hero in the Kubernetes world](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=144.13) [with the deployment taking all the glory.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=148.04) [Anyway, look,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=151.14) [this is what the architecture looks like with replica](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=151.95) [sets doing stuff behind the scenes, but we interact with the deployment.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=154.78) [Alright, well, look, this is the flow.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=159.64) [We create a deployment YAML with the desired state of an app.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=163.34) [We post that as a request to the API server where it's](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=167.18) [authenticated and authorized and maybe some policies](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=170.07) [checked and applied and the likes, right?](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=173.25) [But once that's done,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=175.34) [the config is stored in the cluster store as a record of desired state,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=177.34) [and then the five Pods, or whatever we asked for,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=181.36) [get scheduled to nodes in the cluster.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=184.14) [Then, in the background, there's a replica set controller watching the cluster,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=187.74) [making sure that there is always five Pods of the right spec.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=192.82) [And when there are, we know the drill by now, it's all peace and harmony.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=196.86) [Only, things always change, right?](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=200.74) [Maybe you want to push an update like a new image or](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=202.92) [something with an update to the app.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=205.91) [Well,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=208.04) [all you do is you make changes to the same deployment YAML](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=208.44) [file and you post it to the API server again,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=213.04) [and we'll do all of this in a minute, so bear with me.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=215.46) [But in the background, Kubernetes creates a new replica set,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=218.34) [so we've got two now, right?](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=222.32) [One defines five Pods with the old version of the image and the](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=223.54) [other defines five Pods with the new version.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=227.32) [Then,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=230.54) [Kubernetes winds the new one up while at the same](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=231.21) [time it winds the old one down, maybe one Pod at a time.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=234.05) [And what we get is a nice, smooth rolling update.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=238.05) [And then, you can keep doing that with more and more updates.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=242.64) [Just keep updating that same deployment YAML,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=245.93) [which in the real world,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=249.15) [you're going to want to be managing in a source code repository.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=250.66) [But, and this is important, in the background,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=255.74) [all the old replica sets stick around so they don't get deleted.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=260.01) [I mean, they're not managing any Pods anymore.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=264.94) [They're wound down, remember.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=267.61) [But,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=269.36) [the fact that they still exist means they're a great way](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=269.75) [for us to revert to previous versions.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=273.21) [So, real quick, for a rollback, we just do the opposite.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=276.54) [We wind up one of the old replica sets, and we wind the current one down.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=281.01) [It's magic.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=284.9) [And, look, there's loads more, right?](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=287.04) [Like you can say,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=290.14) [wait 10 minutes or whatever after each new pod's up before marking it](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=291.59) [as healthy and moving on to update the next one on.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=295.88) [And then, there's liveness probes, readiness probes,](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=298.78) [startup probes, all kinds of things, and all proper good stuff.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=301.24) [But that's enough talking. Let's go and do this.](https://app.pluralsight.com/course-player?clipId=7d774153-2a43-42cf-b6f6-ac25132159a9&startTime=305.34)

### [Creating a Deployment YAML](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680)

[Okay, we're going to create a brand‑new Kubernetes deployment from a YAML file.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=1.24) [Now, we've already got some stuff running.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=7.64) [So, there's two services here that are ours, and then we've still got the Pod.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=10.36) [Now, actually, I want the services for this demo,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=17.34) [so we'll keep them, but I'm going to get rid of the Pod.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=20.44) [Okay, well, we've got a YAML file again,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=25.84) [and it's in the course repo called deploy.yml in the Deployments folder.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=30.34) [But look, it's same old, same old.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=37.74) [We've got that.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=40.74) [We're creating a deployment here from the v1 spec in the apps API subgroup.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=42.48) [If you've been following along, you'll recognize that, yeah?](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=48.88) [Now, actually, older versions of Kubernetes,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=52.74) [like much older versions,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=55.96) [might have the API version as something like](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=58.05) [extensions/v1beta1 or maybe extensions/v1beta2.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=61.33) [But you know what?](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=66.64) [That is super old stuff.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=67.47) [Now I reckon anything more recent than maybe as far back as like 1.9 or 1.10,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=69.66) [that'll have it like how we've got it in the apps API subgroup.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=75.53) [Anyway, we're giving it a name and a label.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=80.44) [Now,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=84.2) [this label here that I'm highlighting doesn't actually have](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=84.65) [anything to do with selecting on Pods.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=88.13) [We'll get to all of that in a minute.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=90.52) [Next up, though, replicas.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=93.24) [Now this is how many Pods this deployment should create.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=95.47) [We're saying 5, and to be clear,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=99.62) [that is going to be creating five Pods running this image here,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=102.93) [so five identical Pods running the same application.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=107.07) [And actually,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=111.94) [it's just the same one that we've been using throughout the course so far.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=112.91) [Oh, interestingly, actually,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=117.04) [this line here says to always pull the image from the registry.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=118.69) [So, if you know any Docker, you might know that any time a node runs a container,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=123.54) [it makes a local copy of the image, which can be good in development scenarios,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=128.79) [and, I don't know, it can save network bandwidth and probably download times,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=133.83) [right?](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=138.14) [But, it opens you up to malicious code.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=138.82) [So, think about it.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=142.94) [Anyone could've put an image locally on a node and given](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=144.44) [it this name that we're trying to use, right?](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=148.16) [So by saying always go and pull it from the registry,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=151.04) [we're a little bit more sure that we're getting the right software,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=154.83) [especially if you're signing and verifying images when you pull them.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=157.97) [In fact, yeah, see this course here for information on doing that.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=161.9) [Anyway, we were saying, oh, yeah, labels, weren't we?](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=167.74) [Well, deployments have a label selected just like services.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=172.44) [And again,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=176.61) [this is how the deployment knows which Pods to work on when it](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=177.39) [comes to do things like rolling updates.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=181.18) [Now we'll see all of this in a second, but right now,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=184.04) [we need to know that the selector here has to match](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=187.53) [the labels in the template here,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=190.99) [which can be kind of confusing when you're new to it.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=194.14) [I know that, so let me, in fact, we'll make this a bit smaller.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=196.94) [Okay, so the container section down here, this is our containers spec.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=202.44) [These few lines above it are the Pod spec,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=207.94) [and then everything up here is the deployment spec.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=211.69) [And if you compare that to the image that we've just drawn,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=215.24) [that's our nesting or wrapping that we've been banging](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=217.78) [on about all throughout the course.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=220.38) [So, anyway,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=223.14) [the labels selector here in the deployment spec must match](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=224.72) [the labels down here in the Pod spec.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=229.38) [The whole point is that the deployment knows which Pods](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=233.34) [it's managing when it comes to do, I don't know,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=237.13) [like we said, updates and rollbacks and stuff.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=239.4) [Whereas, this label up here, I mean,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=242.74) [it's great if we want to like filter command line stuff or maybe](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=247.35) [high‑level tools use it for grouping and the likes,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=250.92) [but for us in our demos, we don't care about this label.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=253.63) [In fact, you can delete it if you like.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=257.49) [Well, from the top real quick, we're defining a deployment,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=261.04) [giving it a name and a label.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=264.87) [We'll have five Pod replicas, please.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=266.77) [This bit tells the deployment which Pods on the](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=270.84) [cluster that's going to be managing it,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=273.66) [and then the labels here have to match the selector,](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=275.95) [and then this is the app or the container to run.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=279.05) [Boom, love it. Let's go and deploy it.](https://app.pluralsight.com/course-player?clipId=167e2bb2-44c4-4a2c-895f-db32e56dd680&startTime=282.74)

### [Deploying a Deployment](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761)

[Okay, I'm in the Deployments folder of the repo with the deploy.yml](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=1.34) [file here. Run this command here if you need to get the code, and then](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=6.42) [cd into the Deployments folder. Anyway, look, same old,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=12.43) [same old, we'll just kubectl apply that file, and away it goes.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=16.54) [Now, it's a pretty small image,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=23.34) [so it won't take long before we've got five pod replicas running our app.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=25.73) [Magic. But you know what?](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=31.44) [Deployments themselves are full‑on objects in the API,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=34.75) [so we can inspect them as well.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=38.03) [Great, so five copies or pods running.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=41.74) [But remember we mentioned replica sets, well, check this out.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=45.84) [There's our replica set.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=51.44) [We want five replicas, we've got five and five already, only we](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=52.85) [didn't create this, or we didn't create it directly.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=58.08) [The deployment did that.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=61.17) [In fact, look, see how its name is based on the name of the](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=63.64) [deployment. And then this bit on the end here is a](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=66.81) [cryptographic hash of the pod spec.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=70.63) [So, actually, yeah,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=73.38) [and see here in the YAML, this bit is what we call the pod spec,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=75.44) [right?](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=80.1) [It defines the image in the pod and all that kind of stuff.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=80.45) [Well,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=83.94) [this bit here is a cryptohash of that pod spec, but you know what,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=84.35) [complex stuff, we'll come back to that a bit later.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=88.62) [Right now we have got five pods running,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=91.84) [but to connect to them, we know that we need a service.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=94.83) [Well, lucky for us we kept ours running.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=98.08) [Actually, if you've not been following along, shame on you, no, just kidding.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=102.04) [If you've not been following along,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=106.77) [you won't have the services running, so just run this command here. And](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=108.44) [it's assuming that you're running it from within the Deployments folder](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=113.2) [where I am currently at the moment, so this bit here at the end is](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=116.52) [saying just back up the folder a bit and then use the file from within](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=119.34) [the Services folder.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=122.71) [Anyway, look, that is going to get you this service here.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=124.84) [We've got other ones, right,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=128.44) [but I'm only interested in the LoadBalancer one for this lab.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=129.49) [So if we describe that, the Selector line here says,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=134.34) [send traffic on to all pods in the cluster with the app=web label.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=141.89) [So if we check the labels on the five replicas we've got running,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=148.84) [we've got app=web here as well. So, long story short,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=153.87) [even though the service was running, like way before we deployed](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=158.84) [the pods, labels are dynamic, so the service,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=162.11) [by watching the API server, yeah, saw the new pods arrive and added them to](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=165.08) [the list of healthy endpoints in the endpoints object here.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=169.97) [Actually, this will look better if I describe it. Right, there we go, boom.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=174.74) [So, we said before that any time you create a service,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=181.84) [you automatically get an associated endpoint object or endpoint slice object.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=186.31) [Basically, it's a list of healthy pods that match the label selector.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=191.47) [Well, that's this here, and these are the IPs of our pods, our five replicas.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=196.14) [Anyway, let's have that service's public IP,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=202.94) [and we should be able to reach our web service again.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=209.34) [Magic.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=213.54) [Okay, so we deployed five web servers via a Deployment object.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=214.74) [We saw that we got five,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=219.3) [and we've also proved that the old services from the previous lessons](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=221.24) [worked with the new pods because the labels matched.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=225.48) [Well,](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=228.94) [top stuff, only, nah, no really, we've not actually seen](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=229.2) [anything cool yet, have we? So let's change that by looking at some self‑healing and scaling.](https://app.pluralsight.com/course-player?clipId=c107e4e3-e3b2-42d0-a296-0446817e4761&startTime=233.32)

### [Self-healing and Scaling](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b)

[Okay,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=1.34) [so by now I'm thinking that you grok the fundamentals and](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=1.95) [we can start rattling through things.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=5.88) [So we've got five running pods, and they're managed by a](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=8.74) [deployment controller and a replica set controller, so stuff on](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=12.53) [the control plane watching cluster and making sure it matches](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=16.99) [our desired state of five pods.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=20.99) [Lovely, but you know what, let's turn the world on its](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=24.04) [head and obliterate one of those pods.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=27.85) [Okay,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=33.64) [so desired state says 5 pods please, but we just wiped one off the face of](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=34.32) [the cluster, so we're down to 4, and like we've said,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=39.96) [that is nightmare time for Kubernetes.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=43.41) [Only, if we run the get pods again, I don't know about you,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=46.44) [but that looks like five to me.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=50.55) [And you know what, it is. That replica set controller is](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=53.14) [literally no slouch, so it observed the actual state of the](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=56.52) [cluster varied from desired state, and it fixed it, dead simple. In fact,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=60.33) [if we look close, this pod here has been running way shorter than the other pods.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=66.18) [So those other four are the originals, and this one here is the](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=72.04) [new one that the replica set just spun up. And that, ladies and](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=75.55) [gentlemen, is called self‑healing.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=79.77) [Now the thing is, right, the same goes for all kinds](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=82.74) [of other scenarios, pod crashes,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=85.69) [you name it, right? So I tell you what, what if I take a node out of the game?](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=87.33) [Well, tell you what, first up,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=92.44) [this command here shows us which nodes the pods are running on.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=93.85) [Now, here on my cloud back end, yours will look different of course,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=100.04) [but the point is, on my back end I am about to drop a node](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=104.74) [that's running some pods from my cluster.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=109.21) [Now, it'll take a few seconds for this to process,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=113.24) [but in enough time, that node's going to disappear and](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=115.84) [we'll drop to less pods than we asked for.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=120.16) [Well, we know the crack by now, the replica set controller is going to see that,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=123.34) [and it's going to fire up however many new pods it needs to get](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=127.63) [us back to five running the desired config.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=131.51) [And look, there we go, we asked for five and we have got five.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=135.54) [And if we look at the nodes here as well, we're back to three.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=141.04) [So Kubernetes and my cloud platform worked together to recover my](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=145.94) [desired state of three nodes. And look, I did nothing.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=150.64) [Well, I mean, I broke some stuff, but breaking stuff's easy.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=156.5) [Kubernetes did all the hard bits of fixing.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=160.17) [Well, okay,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=164.24) [switching gears a little bit. On the topic of](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=164.83) [scaling, we've got five pods right now, but if we're about to run,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=167.92) [I don't know, right,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=172.85) [a promotion or something, and we know that we'll need more capacity, dead easy.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=173.83) [We' just open up the deployment yml file here,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=178.84) [which, of course,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=182.34) [we should be keeping in source control in the real world, right?](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=183.3) [But we crack that open, change this value here to](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=187.17) [whatever you want, I'll go with 10.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=190.57) [Give it a quick save and we will repost that to the cluster. And as if by magic,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=193.14) [this better work after I've said that, yeah,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=205.23) [we are at 10 pods. And, you know what, the same goes for scaling down.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=207.94) [Edit the same file again, maybe drop things to just a couple, save and](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=214.41) [reapply again, and there we go, two replicas.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=221.09) [And it couldn't be easier.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=231.64) [Only, actually,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=233.18) [it could, and it is. So Kubernetes supports auto](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=234.29) [scaling based on various metrics.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=239.26) [The simplest metrics are CPU and memory usage,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=241.84) [but you know what, you set upper and lower limits, and](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=245.3) [you have Kubernetes react to demand.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=248.57) [Now, unfortunately this is beyond the scope of this course,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=251.34) [but the Horizontal Pod Autoscaler and the Cluster Autoscaler let us](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=255.14) [scale pods and nodes up and down depending on need. And the beauty,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=261.43) [after some initial configuration,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=267.6) [we just sit back and let Kubernetes do the work.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=270.24) [I mean, that's becoming a theme, but yeah,](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=273.11) [self‑healing and scaling are baked right into Kubernetes, and they](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=277.43) [are simple enough for a getting started course. But, time for one last demo, rolling updates and version rollbacks.](https://app.pluralsight.com/course-player?clipId=b56d1285-fe88-47e2-b646-2be12e8cd07b&startTime=281.61)

### [Rolling Updates and Rollbacks](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e)

[Right then, let's finish in style.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=1.24) [We've currently only got two replicas of a Pod based](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=4.74) [on this 1.0 image version here.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=8.31) [So first things first,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=12.04) [to help with the demos I'm going to crank this up to](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=13.26) [10 replicas and then redeploy.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=16.05) [Give me a second.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=21.04) [Okay, back to this YAML file here.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=24.14) [I said a while back that ReplicaSets handle replicas and self‑healing,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=27.13) [and then that deployments are in charge of like update stuff.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=31.82) [Well, in the Deployment YAML file here,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=36.14) [I'm going to add a chunk of code right at the bottom of the](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=39.46) [deployment spec above the Pod template.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=42.09) [Okay, now, actually,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=46.64) [the full code is already in the repo in a file called deploy‑complete.yml,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=48.22) [if you don't fancy cutting and pasting text.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=53.18) [Anyway, you know what, I'll start with the strategy RollingUpdate here.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=56.87) [This basically says any time we update the image down here,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=64.31) [or I think anything in this container spec,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=69.87) [actually, but instead of deleting all the existing Pods and replacing them lock,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=72) [stock in one go with 10 new ones, instead of that,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=77.79) [let's do it in a more methodical rolling update fashion,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=81.41) [which, actually, with these settings here says,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=85.54) [well, actually, we need this value here.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=89.89) [This is our desired state of 10 Pods, so that's our baseline.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=92.71) [Well, maxUnavailable here says when doing an update,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=97.84) [we can have at the most 0 less than 10, so never drop below 10.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=102.65) [And maxSurge: 1 says during an update, again,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=110.44) [remember, these are all about controlling updates.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=114.8) [But during an update, we're allowed to surge 1 more than desired state,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=117.99) [so we can go up to 11, but just during the update.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=122.84) [So what'll happen is, Kubernetes will deploy 1 new Pod on the new version,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=127.74) [taking us from 10 to 11.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=133.44) [Once that's up and running for minReadySeconds: 5 here,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=135.33) [so up and running for 5 seconds, after that,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=139.81) [it'll terminate an old Pod and take us back down to 10.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=142.72) [Then it'll fire up a new one, taking us to 11 again,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=146.14) [wait for 5 seconds, delete an old one.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=148.69) [And it'll rinse and repeat that process until it cycles through all 10 Pods.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=151.29) [Magic.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=157.84) [Well, let's rev this image down here from 1.0 to 2.0 and give that a cheeky save.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=158.7) [Okay, so let's deploy it.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=166.94) [Oh, actually, no, first up, I've got another terminal here with a split view.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=169.03) [At the top we're running a watch on Pods,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=174.63) [so we'll see old Pods terminating and new ones creating.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=178.13) [Then at the bottom here,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=181.98) [I will run this command and we'll see the update through the](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=184.24) [eyes of the kubectl rollout status command.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=187.83) [And apologies if this is a bit small on some devices.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=191.1) [There's not really a lot I can do about that.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=194.2) [Anyway, back here as always, we post this with kubectl.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=197.44) [And if I jump straight over here, fire this off, okay, wheels are in motion.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=202.05) [And yeah, there's kind of a lot to take in here.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=208.77) [In the top half, we're seeing new Pods creating and old ones terminating.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=212.74) [Then in the bottom,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=218.44) [we've got a rolling ticker of sorts of how many out of the 10 Pods are finished.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=220.24) [So if you look closely, and I know there's kind of a lot going on,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=226.34) [but Kubernetes is going through that cycle of adding a new Pod,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=229.73) [wait for 5 seconds, terminate the old one,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=234.48) [add another new one, wait 5 and terminate the old one.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=237.37) [And it keeps going until they're all up to date.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=240.71) [And actually, if I refresh this browser page here,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=245.64) [we'll start seeing responses from the new version,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=249.28) [like this.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=252.94) [Clearly a different version.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=253.9) [And that's rolling updates.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=255.58) [Only, haha, we are not done yet.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=258.29) [Remember we said before that old ReplicaSets from the old Pod versions](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=262.24) [stick around and make it easy for us to roll back?](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=266.88) [Well, here we are here.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=270.24) [Now,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=272.94) [this one is obviously managing the 10 new replicas and](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=273.52) [this one managed the old replicas.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=277.56) [And even though it's got no Pods under management right now,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=279.63) [it is still present on the cluster.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=283) [So, actually, if we grab its name here and describe it,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=286.04) [well, oh,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=291.8) [scroll up a bit to this bit here, this is the full config of the](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=295.43) [ReplicaSet, by the way, but this line shows us which version of](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=303.32) [the image it was managing replicas for.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=307.69) [It's the old 1.0 version, making it super simple for us just to flip back.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=311.01) [So, actually, yeah,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=318.14) [a quick look at the rollout history here shows us two revisions.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=319.77) [We're on the latest, and the old one is the previous, or the original version.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=324.98) [And to roll back, it is as simple as kubectl rollout undo this time,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=330.11) [and give it the name of the deployment and then ‑‑to‑revision=1,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=336.94) [and away that goes.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=342.8) [And the process is just a rollout in reverse.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=345.44) [So these commands here again, let's get them going.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=349.22) [We can see the same process of adding one new Pod of the desired version.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=353.17) [Now, this time that desired version is going to be the old one.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=359.22) [That'll take us to 11, we'll be waiting 5 seconds and then shutting one down.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=362.35) [And like we said before, rinse and repeat,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=367.74) [and in the fullness of time, thanks to my powers of bending space time,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=370.64) [we've got 10 Pods back on the previous version.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=375.28) [Although actually, let's just make sure, yeah.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=378.65) [And one last thing, if we run that get ReplicaSets again,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=383.4) [see how this time it's all flipped with this one having all the](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=391.04) [Pods under management and this one having none?](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=394.25) [Well, yeah,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=397.24) [that's because rolling back was a simple case of winding this one down,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=397.97) [one at a time and then this one up, one at a time,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=402.48) [dead easy.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=406.74) [Then, of course, right back in the YAML here.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=409.24) [If we set these values differently,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=412.18) [we can get it to do all kinds of different things like roll through the](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=414.7) [update faster or slower or more or less Pods at a time.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=418.24) [And that, legends, is rolling updates and versioned rollbacks.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=423.02) [And of course, look, there's literally so much more.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=428.49) [We're just exploring the tip of the iceberg here.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=432.82) [But that said,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=436.04) [for sure you've got the gist now and definitely enough to take in next steps.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=437.5) [Speaking of which, coming up next,](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=443.24) [we've got a quick module on where you might want to go](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=445.28) [next in your epic Kubernetes journey. Don't miss it.](https://app.pluralsight.com/course-player?clipId=2cdd96c2-61ae-4c8b-be6b-ad6ece11467e&startTime=448.19)

## [What Next?](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af)

### [What Next?](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af)

[Wooooo, haha! We have done it! We've reached the end.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=1.54) [And, for me, this has been months of hard work,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=7.62) [so I feel like lying down and sleeping for a week.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=12.02) [But I'm hoping you're the exact opposite.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=15.64) [Like, I'm hoping you're stoked and all fired up to keep](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=18.71) [powering ahead with containers in Kubernetes.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=21.94) [But, before we talk about how you might do that, right at the outset,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=25.74) [I said that when you get to this point,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=30.11) [your mind would be blown with how much you've learned.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=32.35) [And I genuinely hope that is the case, and it should be because if you](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=37.14) [came into this with little or no Kubernetes knowledge,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=42) [well, now you know all the theory of what Kubernetes is,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=45.34) [what desired state and declarative methods are all about.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=49.54) [You've learned about masters and nodes and even a bit about](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=53.24) [hosted Kubernetes, and that's not to mention pods, and services,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=57.5) [and everything that deployments bring.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=61.59) [But the thing is, we didn't learn just the theory.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=64.54) [We've also done a bunch of demos,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=67.11) [and what a ride it was. So, seriously, pat yourself on the](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=69.87) [back for making it this far. And actually, I'd love to know](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=76.5) [if it's lived up to expectations, so let me know.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=79.89) [But, although it's the end of the course,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=84.04) [I am hoping that this is only the start for you.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=86.09) [And, you know what?](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=90.14) [Taking your next steps could not be easier.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=91.66) [Now, more than anything, I always recommend getting your hands on.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=96.24) [And actually, a great part of hands on is making mistakes](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=100.95) [and fixing stuff. Like, I've got this mindset these days](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=104.5) [that making mistakes is good.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=108.15) [Well, as long as they're not in production,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=110.28) [of course, but mistakes are opportunities to learn, and the more you make,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=112.07) [the more you learn. As well,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=117.93) [though, check out the other Kubernetes courses and paths here on Pluralsight.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=121.21) [We've got more and more great content all the time.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=126.1) [I've got this course here, but you know what?](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=129.46) [There's so many more.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=131.95) [Honestly,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=133.31) [a Pluralsight account is like a ticket to the golden age of](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=134.26) [learning Kubernetes, so make the most of it.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=138.95) [Now,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=142.94) [if books are your thing, I've got this one here you might](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=143.61) [like, and there's even an audible version.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=146.28) [But, of course,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=149.01) [only if you feel like punishing your ears with more of my voice. Now](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=149.9) [actually, I am reliably informed it's pretty decent,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=154.02) [which I never thought I'd say about a technical book. I also](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=157.62) [recommend you attend and support your local cloud native meetups and](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=162.46) [things like KubeCon, if you can get there.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=166.39) [You see,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=169.64) [these events are literally packed to the rafters with great](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=170.42) [people that are passionate about this stuff.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=174.18) [And I'm always there at things like KubeCon,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=176.54) [which, actually, if you see me somewhere,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=178.8) [please come and say hi.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=181.82) [I mean it.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=184.28) [I don't want any more of this messaging me after the event saying,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=185.27) [hey, Nigel, we saw you at KubeCon or whatever,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=188.91) [but we didn't really want to bother you. Sack that! Come and say hi. I'm](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=191.66) [honestly not as miserable as I might sometimes look.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=197.59) [And, I reckon that's probably about it.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=202.04) [So let me finish out by saying it has been my absolute pleasure](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=205.94) [teaching you, and feel free to reach out and connect.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=210.45) [I am genuinely grateful that you've spent your time with me,](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=213.73) [so the least I can do is say hi and thanks. But on that note, go and rock the world with Kubernetes.](https://app.pluralsight.com/course-player?clipId=d93b0b93-9ba0-42ec-9ef5-7f53479229af&startTime=217.19)