## [Course Overview](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7)

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[Hi everyone my name is Ned Bellavance, and welcome to my course Terraform ‑](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=4.34) [Getting Started, an introductory course into the world of Terraform. Terraform](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=9.96) [is a tool used to automate the deployment of infrastructure across multiple](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=14.55) [providers in both public and private clouds.](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=18.51) [Within this course, you will learn the fundamentals of how Terraform functions,](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=21.42) [as well as work with a real world example to gain hands‑on experience with the](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=25.24) [tool. We will be focusing on a few topics within the course, including creating](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=29.89) [a basic configuration and updating it with new resources; understanding](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=35.13) [Terraform components like variables, provisioners,](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=39.84) [providers, and more; integrating multiple providers in a single](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=42.94) [configuration; and using abstraction and reusable components such as](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=47.02) [modules to make your configurations consistent and repeatable.](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=51.64) [By the end of this course, you will be able to dive into the world of](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=55.74) [automating infrastructure with Terraform by your side, enabling you to be](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=58.88) [more productive and do more with less. It's not necessary to know anything](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=63.08) [about coding or programming prior to starting the course. This is a getting](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=67.52) [started course, after all. The demonstrations utilize AWS, so a passing](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=72.14) [familiarity is recommended, but certainly not required. If you're interested](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=77.5) [in automating infrastructure with one of the most exciting tools out there, I](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=82.14) [invite you to dive into the Terraform ‑ Getting Started course on Pluralsight.](https://app.pluralsight.com/course-player?clipId=76c9a418-70e7-488e-b097-e4f9672f7cf7&startTime=86.3)

## [What You Need to Know About Infrastructure as Code](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690)

### [Overview](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690)

[Hey, everyone! Welcome to my course, Terraform‑ Getting Started. Before we](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=1.54) [dive into the wonderful world that is Terraform, first I wanted to level](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=5.56) [set a little bit about infrastructure as code.](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=10.29) [Throughout the course, we are going to be using a lot of terminology](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=13.74) [that comes from the concepts in infrastructure as code, and in order](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=16.63) [to get the most out of this course,](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=20.9) [I first want you to have a good idea of what I mean when I](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=22.81) [say infrastructure as code. Hey everyone,](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=26.67) [I'm Ned Bellavance. I'm a HashiCorp Ambassador and founder of Ned in the Cloud.](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=29.8) [Let's get into what you need to know about infrastructure as code.](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=34.44) [All right.](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=39.84) [In this module, we are first going to define infrastructure as code.](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=40.46) [Got to start with the definition, right? Need to start with first](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=45.24) [principles. What are we even talking about?](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=47.92) [And then we'll get into the core concepts of what](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=50.34) [infrastructure as code is, and then finally, we'll talk a](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=53.9) [little bit about the benefits of using infrastructure as code.](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=58.28) [Why would you even use this crazy thing? But first, a definition.](https://app.pluralsight.com/course-player?clipId=76a675cb-610f-4f2e-a551-2b63f8d73690&startTime=61.74)

### [Infrastructure as Code Defined](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537)

[Infrastructure as code is provisioning infrastructure through software](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=1.24) [to achieve consistent and predictable environments.](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=5.74) [There are a lot of important terms in this definition.](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=9.62) [A few that I want to call out is the fact that this](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=13.4) [is being done through software.](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=15.95) [It's not a manual process. And the goal is to achieve consistency.](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=17.95) [That means every time you use this software to deploy infrastructure,](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=23.45) [it does it in a consistent way and that the environment you](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=28.42) [get at the end is a predictable environment.](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=31.6) [It doesn't leave you guessing. It's going to look exactly like](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=35.07) [the configuration files say it should look.](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=38.48) [That's very important, especially when you have multiple environments](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=41.34) [that will be running the same version of an application. To achieve this](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=45.25) [goal, there are some core concepts I'd like to talk about. The first,](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=49.79) [and this should be fairly obvious, but I feel like I need to say it anyway,](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=54.24) [is infrastructure as code as defined in code. You're going to be](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=59.11) [creating files using some sort of software and coding mechanism to](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=63.66) [define your infrastructure, and whether that format is JSON, YAML,](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=68.18) [or HashiCorp configuration language, infrastructure as code is going](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=73.32) [to be defined in code.](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=77.63) [The next big concept is you should be storing that code somewhere in](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=80.34) [source control. You are using code, after all.](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=84.86) [You might as well treat it like code. The source control management that](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=88.39) [most people are familiar with is Git and GitHub. GitHub uses Git source](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=92.86) [control to store repositories of code. The code is versioned, and multiple](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=98.4) [developers can work on it simultaneously.](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=103.39) [Your infrastructure that you've defined in code should be](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=106.94) [stored in a versioned source control repository.](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=110.58) [When it comes to the actual code itself,](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=114.26) [there are two different approaches to implementing infrastructure as code.](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=117.36) [There is declarative or imperative.](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=121.7) [Let's dive into what I mean when I say declarative or imperative with a fun example.](https://app.pluralsight.com/course-player?clipId=0ed25dff-0522-409b-b2a3-47efd96f1537&startTime=124.54)

### [Declarative vs. Imperative](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2)

[So, I love tacos.](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=1.14) [My favorite day of the week is Taco Tuesday, and if I were to instruct](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=3.19) [software to make me a taco in an imperative way,](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=8.14) [I would do that by telling it what the exact steps are to make me a](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=12.64) [taco. First get me the ingredients for a taco.](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=17.54) [You need to get the shell, the beans, the cheese,](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=22.01) [the lettuce, and the salsa, or at least that's what I like in my taco.](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=25.47) [And then I need to tell the software how to assemble those](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=29.64) [ingredients to make me a taco. I would tell the software to](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=32.95) [put the beans in the shell, put the cheese on the beans,](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=36.22) [put the lettuce on the cheese, and the salsa on the lettuce, because that](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=39.33) [is the proper order that one should assemble a taco in.](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=42.89) [Now you can see this is very procedural in nature.](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=47.14) [I'm telling the software exactly what to do.](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=50.12) [Declarative takes a slightly different approach.](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=53.44) [Now let's say in a declarative world I also want software to make me a taco.](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=57.14) [That software is going to have a rudimentary idea of how](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=63.14) [to make food, kind of like a cook.](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=66.32) [Just like I can tell a cook I want a taco with the following toppings,](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=69.14) [I can use a configuration language like HashiCorp Configuration](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=73.84) [Language to declare what I want. In this case,](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=77.77) [I'm telling it I want something that is of type food and of the sub‑type](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=81.56) [taco, and I'm going to give it a name I can refer to it with, in this case](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=86.83) [bean‑taco. And then within my configuration block,](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=91.68) [I'm going to tell it the ingredients I want in my taco; beans,](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=96.11) [cheese, lettuce, and salsa.](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=100.67) [And that's all I have to tell the software.](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=103.24) [It already has a predefined routine for how to get ingredients and it has a](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=106.14) [predefined order in which to assemble those ingredients.](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=111.58) [If I want to change the defaults,](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=115.44) [I might put additional information in this configuration block, but the](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=117.31) [idea here is I'm declaring what I want. I want a bean taco with these](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=121.59) [ingredients, and then I'm leaving it up to the software to figure out](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=126.28) [exactly how to implement what I want.](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=130.07) [Terraform is an example of a declarative approach to deploying Infrastructure as Code.](https://app.pluralsight.com/course-player?clipId=b0a9cf55-d4f4-4467-bea3-e72778327ae2&startTime=133.44)

### [Idempotence and Consistency](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d)

[Another core concept is idempotence and consistency.](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=1.34) [You're probably already familiar with the idea of](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=6.04) [consistency. Each time you do something,](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=8.69) [the results should be the same. But idempotent is one of](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=11.89) [those words that gets thrown around, but you may not](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=15.75) [necessarily know what it means.](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=18.51) [Let's use another example to define it better.](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=20.63) [Let's say my niece, who also loves tacos, has asked me to make her a](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=23.53) [taco, and I do it. I say, "Here's your taco." Now, in an idempotent](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=28.13) [world, if she asks me again to make her a taco,](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=33.4) [I will go, "Um, you already have a taco." I'm not going to go ahead and make](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=37.11) [another taco because I'm aware of her state and the fact she already has a](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=42.69) [taco. If she gives me the same instruction again,](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=47.52) [I'm not going to do anything because her instruction already matches the](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=50.91) [state of the world she wants. She has the taco. In a non‑idempotent](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=55.01) [world, each time she told me to make her a taco,](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=60.78) [I would make and give her another taco. Terraform attempts to be](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=63.44) [idempotent in the sense that if you haven't changed anything about your](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=67.5) [code and you apply it again to the same environment,](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=71.23) [nothing will change in the environment because your defined](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=74.35) [code matches the reality of the infrastructure that exists. And that's what's meant by idempotent](https://app.pluralsight.com/course-player?clipId=7faadd98-1070-4c61-9e23-7ca718b3979d&startTime=77.7)

### [Push or Pull](https://app.pluralsight.com/course-player?clipId=4baf521a-8f58-4590-bb60-3719cacaf3a5)

[The last concept to look at with Infrastructure as Code is are you pushing or](https://app.pluralsight.com/course-player?clipId=4baf521a-8f58-4590-bb60-3719cacaf3a5&startTime=1.34) [pulling configurations to the target environment. So again,](https://app.pluralsight.com/course-player?clipId=4baf521a-8f58-4590-bb60-3719cacaf3a5&startTime=6.41) [to give a fun example of what I mean by push or pull, in a push‑type scenario,](https://app.pluralsight.com/course-player?clipId=4baf521a-8f58-4590-bb60-3719cacaf3a5&startTime=10.18) [once my niece has expressed her desire for a taco,](https://app.pluralsight.com/course-player?clipId=4baf521a-8f58-4590-bb60-3719cacaf3a5&startTime=15.52) [I would simply go, take this taco, and push the taco over to](https://app.pluralsight.com/course-player?clipId=4baf521a-8f58-4590-bb60-3719cacaf3a5&startTime=18.75) [her, and hopefully, if she's feeling polite,](https://app.pluralsight.com/course-player?clipId=4baf521a-8f58-4590-bb60-3719cacaf3a5&startTime=23.1) [she'll say thanks. In a pull‑type scenario, once she expresses that she wants](https://app.pluralsight.com/course-player?clipId=4baf521a-8f58-4590-bb60-3719cacaf3a5&startTime=26.03) [the taco, she'll take the taco from me and I'll say, sure,](https://app.pluralsight.com/course-player?clipId=4baf521a-8f58-4590-bb60-3719cacaf3a5&startTime=31.97) [here you go.](https://app.pluralsight.com/course-player?clipId=4baf521a-8f58-4590-bb60-3719cacaf3a5&startTime=35.69) [In the world of Infrastructure as Code, Terraform is a push‑type model.](https://app.pluralsight.com/course-player?clipId=4baf521a-8f58-4590-bb60-3719cacaf3a5&startTime=36.94) [The configuration that Terraform has is getting](https://app.pluralsight.com/course-player?clipId=4baf521a-8f58-4590-bb60-3719cacaf3a5&startTime=42.34) [pushed to the target environment.](https://app.pluralsight.com/course-player?clipId=4baf521a-8f58-4590-bb60-3719cacaf3a5&startTime=45.43) [An opposite example would be a situation where there's an agent](https://app.pluralsight.com/course-player?clipId=4baf521a-8f58-4590-bb60-3719cacaf3a5&startTime=47.74) [running in the target environment and it pulls its configuration from a central source on a regular basis.](https://app.pluralsight.com/course-player?clipId=4baf521a-8f58-4590-bb60-3719cacaf3a5&startTime=51.51)

### [Benefits of Infrastructure as Code](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474)

[Now,](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=1.24) [all of this is great, and maybe you're feeling a bit](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=1.4) [hungry right now, but first let's talk about the benefits](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=4.09) [of using infrastructure as code.](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=7.28) [Why would you go through all the trouble of defining your](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=9.14) [infrastructure in code as opposed to just manually going out and](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=12.45) [deploying it? One, you've automated your deployment,](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=16.18) [which means that you don't have to go through the manual steps every time](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=20.37) [you need to build a new environment. That makes deployment faster, and](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=24.46) [faster is usually better in the world of technology.](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=28.87) [You've also created a repeatable process.](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=32.43) [Each time you need to build out or update the environment,](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=35.71) [you simply apply the configuration.](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=39.28) [Your new repeatable process can also be used to create](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=42.84) [multiple consistent environments.](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=46.39) [This is especially important if you want your dev, QA, staging,](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=48.92) [and production environments to all match. Your reputable process](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=53.65) [is defined in code, and code can be reused. Once you figured out](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=58.36) [how to properly deploy, say, a database server for a particular application,](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=63.79) [you can take the code for that database server deployment](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=68.94) [and reuse it in any other application that needs a](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=71.96) [similar database server backend.](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=75.21) [Having those reusable components will make your life a lot easier.](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=77.64) [It follows a principle that developers call Don't](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=82.17) [Repeat Yourself, or DRY programming.](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=85.74) [Once you write the code for a process,](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=88.45) [then you should make that process reusable so you don't have to repeat yourself.](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=90.7) [Lastly,](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=95.84) [one of the great things about defining your infrastructure as code](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=96.36) [is you've actually documented your architecture in the process of](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=99.82) [defining it within code. I've encountered situations where I thought](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=104.36) [I understood an architecture, but when I went to go define it as code,](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=108.32) [I realized there were components that I either didn't](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=113.23) [realize were part of the architecture,](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=116.33) [or I didn't understand how they actually worked.](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=118.33) [By defining my infrastructure deployment with code, I now had a deeper and](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=121.74) [better understanding of how my architecture was actually working. That's a huge benefit when everything is documented in code.](https://app.pluralsight.com/course-player?clipId=f74e7c9b-fb4a-45af-8e82-7ae440017474&startTime=126.66)

### [Summary](https://app.pluralsight.com/course-player?clipId=09f9530c-1584-451a-9b59-ab1c25a48787)

[Hopefully, in this first introductory module,](https://app.pluralsight.com/course-player?clipId=09f9530c-1584-451a-9b59-ab1c25a48787&startTime=1.24) [I've allayed some of your concerns about Infrastructure as Code.](https://app.pluralsight.com/course-player?clipId=09f9530c-1584-451a-9b59-ab1c25a48787&startTime=3.75) [It really isn't all that scary, and it does make your life easier.](https://app.pluralsight.com/course-player?clipId=09f9530c-1584-451a-9b59-ab1c25a48787&startTime=7.41) [At the end of the day, manual processes are generally the enemy.](https://app.pluralsight.com/course-player?clipId=09f9530c-1584-451a-9b59-ab1c25a48787&startTime=12.04) [Humans are fallible, we make mistakes, we forget things all the time, and](https://app.pluralsight.com/course-player?clipId=09f9530c-1584-451a-9b59-ab1c25a48787&startTime=15.81) [if you are relying on manual processes to deploy environments](https://app.pluralsight.com/course-player?clipId=09f9530c-1584-451a-9b59-ab1c25a48787&startTime=21.64) [consistently and repeatedly, at some point someone's going to miss a](https://app.pluralsight.com/course-player?clipId=09f9530c-1584-451a-9b59-ab1c25a48787&startTime=25.57) [step; it's just the nature of human beings. Automating your](https://app.pluralsight.com/course-player?clipId=09f9530c-1584-451a-9b59-ab1c25a48787&startTime=30.29) [infrastructure deployments makes a lot of sense.](https://app.pluralsight.com/course-player?clipId=09f9530c-1584-451a-9b59-ab1c25a48787&startTime=34.19) [Lastly, when in doubt, go have a taco and think about it.](https://app.pluralsight.com/course-player?clipId=09f9530c-1584-451a-9b59-ab1c25a48787&startTime=37.44) [I find that walking away for a moment on a particularly difficult project](https://app.pluralsight.com/course-player?clipId=09f9530c-1584-451a-9b59-ab1c25a48787&startTime=41.24) [and having something delicious, like a taco, really helps my thinking](https://app.pluralsight.com/course-player?clipId=09f9530c-1584-451a-9b59-ab1c25a48787&startTime=45.17) [process. And now, I kind of want a taco too.](https://app.pluralsight.com/course-player?clipId=09f9530c-1584-451a-9b59-ab1c25a48787&startTime=49.24) [Coming up in the next module,](https://app.pluralsight.com/course-player?clipId=09f9530c-1584-451a-9b59-ab1c25a48787&startTime=53.04) [we're going to dive into Terraform proper by deploying our first Terraform configuration, so I hope you'll join me there.](https://app.pluralsight.com/course-player?clipId=09f9530c-1584-451a-9b59-ab1c25a48787&startTime=54.22)

## [Deploying Your First Terraform Configuration](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d)

### [Overview](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d)

[Now that we've laid a solid foundation for what Infrastructure as Code is,](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=1.24) [it's time to dive into Terraform, and I find the best way to do that is](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=5.95) [to go right in and get something deployed so you can start getting your](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=10.13) [head around the core concepts that make up Terraform. That's what we're](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=13.6) [going to do in this module.](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=17.57) [Hey, everyone. This is Ned Bellavance. I'm HashiCorp](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=18.81) [ambassador and founder of Ned in the Cloud, and this is](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=21.22) [Deploying Your First Terraform Configuration.](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=24.2) [All right, what are we going to cover in this module?](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=27.84) [Well, first, we're going to talk about what Terraform even is. You probably](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=30.86) [already have some idea, but now we're going to get into the core components](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=35.89) [that make up Terraform, the basic workflow you'll use with Terraform to](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=40.18) [deploy infrastructure, and how to get Terraform installed on your](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=44.5) [workstation so you can follow along. Before we dive into actually deploying](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=48.28) [a Terraform configuration,](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=53.57) [I'd like to present you with a real‑world scenario that's going](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=55.02) [to help place some of the tasks and information you'll be](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=58.57) [learning into a real‑world context.](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=61.71) [I know as an IT practitioner I'm always eager to see where the rubber meets the](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=65.17) [road with any new tool, and I suspect you're going to feel the same way, and](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=70.59) [having a real‑world construct where you would be practicing these skills helps](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=75.18) [make sense of what might be just abstract concepts. And then finally, we're](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=79.84) [going to walk through a demonstration of deploying a basic configuration based](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=84.75) [on the requirements we define in the scenario. You can think of it as a](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=89.76) [Terraform: "Hello world", if you like,](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=93.89) [but I promise it's going to be a little more useful and practical than your usual hello world example.](https://app.pluralsight.com/course-player?clipId=06eda938-1045-47f6-ad9e-59cc773ad19d&startTime=96.11)

### [What Is Terraform?](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab)

[Let's explore what Terraform is, the core components that are used](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=1.04) [with Terraform, and how to get it installed.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=5.1) [Terraform is simply a tool to automate the deployment](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=8.14) [and management of infrastructure.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=11.76) [The term infrastructure can be a bit nebulous, but I like to](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=14.09) [think of it as any layer of technology that a developer consumes](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=18) [without having to deploy and manage it.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=21.76) [Networking, virtual machines,](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=24.32) [even containers all fall under the moniker of infrastructure.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=26.31) [The core of Terraform is an open‑source project maintained by](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=30.84) [HashiCorp. There are paid versions of Terraform available as either](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=34.72) [Terraform Cloud or Terraform Enterprise. We're not going to cover](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=39.93) [those services in this course. We'll be sticking with the core](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=43.81) [open‑source version only.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=46.71) [Terraform is also a vendor agnostic, meaning it doesn't](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=48.74) [prefer any particular cloud or service.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=51.54) [You can use it against AWS, Azure, DigitalOcean, VMware, etc.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=53.85) [Pretty much any infrastructure service you can think of](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=58.32) [probably works with Terraform The core software for Terraform](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=60.94) [is a single binary compiled from Go.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=65.68) [HashiCorp offers compiled versions for multiple operating systems, so](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=68.64) [chances are there is a Terraform binary that will work for you. As I](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=73.48) [covered in the previous module, Terraform configuration files use a](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=78.39) [declarative syntax rather than an imperative one. You are describing](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=82.47) [how you want the world to be, and Terraform is in charge of handling](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=87.14) [the heavy lifting.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=90.97) [The actual configuration files are written in either](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=92.84) [HashiCorp Configuration Language,](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=95.77) [a derivative of JSON, or in JSON directly. Unless you are using](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=98.14) [another programming language to create Terraform configuration](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=102.85) [files, I'd recommend sticking to HCL.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=106.32) [It's much more human readable and human writeable. Finally,](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=109.17) [Terraform uses a push style of deployment to create infrastructure.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=113.38) [Terraform is going to reach out to the API for any given](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=117.9) [service and tell it what to create.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=121.38) [There's no agent to install on a remote machine.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=123.35) [That's a relief for those of us who have developed agent fatigue over the years.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=126.2) [One less thing to patch and maintain is a positive in my book.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=130.41) [There are four core components you should be aware of in](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=134.15) [Terraform. The first is the executable itself.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=139.36) [This is the single binary file you invoke to run Terraform. It contains](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=143.07) [all the core Terraform functionality. The configuration that you're going](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=147.95) [to deploy will be contained in one or more Terraform files, which](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=153.19) [typically have the file extension .tf.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=157.13) [When Terraform sees one or more Terraform files in a directory,](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=160.34) [it will take all of those files and stitch them together into a configuration.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=164.76) [The next component is how Terraform talks to all the various services out there.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=169.44) [The provider plugins are executables invoked by Terraform to](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=174.44) [interact with a service's APIs. For instance,](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=178.46) [AWS would be considered a provider, and if Terraform wants](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=181.99) [to talk to AWS and provision resources,](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=185.82) [it uses a provider plugin to do so. The most common plugins are hosted on](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=189.1) [the public Terraform Registry at registry.terraform.io.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=194.41) [And then finally, once resources have been created,](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=199.64) [Terraform likes to keep track of what's going on, so it maintains state data](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=203.17) [which contains the current information about your deployment.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=207.69) [It's a mapping of what you've defined in your configuration](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=211.35) [to what exists in your target environment.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=214.72) [When you want to do an update of your environment,](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=217.77) [Terraform compares your updated configuration to what is in the state file,](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=220.94) [calculates the changes needed to make the two match, and then makes the changes and updates the state data.](https://app.pluralsight.com/course-player?clipId=2cb8ed9e-f769-4bbf-8665-ae04350ecfab&startTime=225.86)

### [Installing Terraform](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846)

[Installing Terraform is exceedingly simple.](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=1.44) [You simply download the executable compiled for your operating system,](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=4.67) [make sure that it's added to your path variable, and start](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=9.24) [using Terraform. Terraform is also available in common](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=13.09) [package managers like apt, yum,](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=16.94) [Homebrew, and Chocolatey. You could even grab it as a Docker container.](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=19.12) [Why don't we go check it out? Woohoo, it is demo](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=22.89) [time y'all! In this demonstration,](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=26.79) [we're going to run through a couple quick items. First I'll show](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=28.93) [you where you can get Terraform installed.](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=32.64) [Once you've got it installed,](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=35.24) [we can try out some of the basic commands so you can learn the command](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=36.49) [structure favored by Terraform. If you would like to follow along, and I](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=40.09) [hope you do, you're going to need a system where you can install](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=44.7) [Terraform, a code editor to view the files, and the actual exercise files](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=48.18) [themselves. You can find those by going to the Exercise files tab in the](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=53.44) [course and following the link to my GitHub repository for Terraform ‑](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=58.15) [Getting Started.](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=62.34) [I like to keep the exercise files on GitHub so I can keep them up to date,](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=63.54) [and folks like you can file issues if you find them. Now let's jump over to the demo environment and get started.](https://app.pluralsight.com/course-player?clipId=2499b9ee-e0bc-4c90-b4e3-84d14b7e1846&startTime=67.35)

### [Using the CLI](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f)

[All right, here we are in Visual Studio Code.](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=1.34) [This is my preferred code editor of choice, but you use whatever works for you.](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=4.23) [I like this because I can see all of my files in the left pane,](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=8.52) [I can see the contents of those files in the center pane, and I can bring](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=11.77) [up a terminal from the bottom if I want to run commands all from within](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=15.38) [Visual Studio Code. I have the exercise files open in the left pane, so](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=19.67) [let's go over those very quickly.](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=24.44) [Again, if you're looking for these exercise files,](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=26.03) [you can find them by going to the Exercise files tab or going to my GitHub](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=28.5) [repository. In the top folder base\_web\_app, we have the base configuration](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=33.22) [that we'll be working with, and it's called main.tf.](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=38.65) [In the commands folder, we have the commands that you can run](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=42.54) [for each of the modules in this course.](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=46.22) [Then below the commands directory,](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=49.14) [we have a directory for the solution for each module beyond module three.](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=50.89) [Now don't worry about what's in those right now. We'll discuss](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=55.9) [that more when we get to module four. For now,](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=58.5) [let's expand commands and open up m3\_commands.](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=61.42) [Now if you want to play along, the first thing you're going to need to](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=66.14) [do is install Terraform if you don't already have it, and you can get](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=68.71) [it if you go to terraform.io/downloads.](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=72.74) [Let's take a look at that page right now. Here is the download page](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=76.71) [for Terraform. If we scroll down a little bit,](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=81.05) [we can see all the different operating systems and the downloads for](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=83.53) [each of those operating systems. This would be one way to install](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=87.22) [Terraform. If we scroll up a little bit, we can see that there are](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=91.44) [instructions for setting up the repository for APT or Yum if you wanted](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=94.83) [to install it that way. If you're using macOS, you can use Homebrew, and](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=99.34) [if you're using Windows,](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=103.82) [you could use Chocolatey to install Terraform. Let's head back to](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=104.89) [Visual Studio Code. Now I'm running Windows, so I used Chocolatey to](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=108.78) [install Terraform. Let's go ahead and bring up the terminal and see](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=113.24) [what version of Terraform I'm using.](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=116.95) [All right, first, I am going to run terraform version, and](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=119.44) [I am running Terraform version 1.0.8.](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=123.11) [That is the same as what we saw on the download page, so I'm running the](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=126.28) [current version on Windows AMD 64. And if I needed to upgrade my Terraform, I](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=130.17) [could run choco upgrade terraform ‑y, and that would upgrade my version, but](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=136.04) [I'm on the current one, so we're good. Now if we want to get some information](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=141.47) [about how to use the Terraform CLI, we could run either terraform ‑help or](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=145.25) [just type in terraform. The output from just running Terraform will list out](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=150.11) [the main commands you'll use, as well as other commands that are available.](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=155.29) [If we look at the general usage for the CLI, we can see it's](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=159.94) [terraform, followed by any global options, then the subcommand](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=163.63) [that you want to run, followed by arguments.](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=168.03) [If we scroll down to the bottom again,](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=170.78) [we can see the global options include things like ‑chdir to specify what](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=172.93) [directory to run these commands from, ‑help can be used to get more](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=178.84) [information about Terraform or a specified subcommand, and ‑version is](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=183.34) [an alias for the version subcommand.](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=188.28) [One other thing I want to point out is when you're](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=191.34) [specifying arguments with Terraform, even if the argument is multiple characters,](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=193.32) [you can still use a single dash instead of a double dash.](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=198.52) [Terraform will accept either, but the preferred syntax is a single dash.](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=201.92) [Now we have a base configuration in the base\_web\_app directory,](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=206.34) [but before we look at that base configuration, let's first get some context by introducing our real‑world scenario.](https://app.pluralsight.com/course-player?clipId=f4b77427-e0c1-494b-b742-e40bc5ca870f&startTime=210.41)

### [Globomantics Scenario](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc)

[To help put some context around what we're going to be doing in this](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=1.04) [course, I have a scenario involving the fictional company Globomantics. For](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=3.83) [our real‑world scenario, you have just started as an ITOps admin at](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=9.67) [Globomantics, a global risk assessment company.](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=14.18) [Congratulations! And welcome to the team! They're excited you're here and](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=17.35) [they already have a project lined up for you to work on. Your friend, Sally](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=21.33) [Sue the developer, has requested that you provision a development](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=25.68) [environment that's going to be part of a new line‑of‑business application](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=29.33) [Globomantics is developing to turn their existing product into a SaaS](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=33.95) [product for their clients.](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=38.22) [Now the application is a basic web application right now. It's got a web](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=39.94) [frontend that will serve up content to potential customers.](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=44.83) [It's nothing super complicated.](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=48.2) [Globomantics has recently started using the public cloud for](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=49.96) [deploying its new applications, and you've been asked to spin up](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=53.36) [this environment in AWS, Amazon Web Services.](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=56.53) [You could, of course, simply log into the AWS console and set up](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=60.44) [the environment manually, but someone told you about this new](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=64.03) [software called Terraform, and this seems like an ideal project to](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=67.63) [take Terraform for a test run.](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=71.59) [In fact,](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=73.22) [Sally Sue has found a really basic Terraform deployment file she thinks you](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=74.05) [could get started with. The base configuration Sally found includes the](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=79) [following. We're going to be deploying to the AWS us‑east‑1 region, and](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=83.11) [within that region we are creating a VPC with a single public subnet. And](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=88.6) [inside that subnet, we are creating a single EC2 instance that is running](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=94.4) [Nginx as a web server.](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=99.19) [We're also going to have to create routing resources and a security](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=101.14) [group to allow web traffic to reach that web server.](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=104.62) [You think this sounds like an excellent start.](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=108.34) [Before we dig into the configuration file,](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=110.29) [let's first talk a little bit about HCL syntax so you know what you're looking at.](https://app.pluralsight.com/course-player?clipId=078a50ed-ca98-4fbc-96e1-a7794d5c11bc&startTime=112.64)

### [Terraform Object Types](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac)

[Before we look at the configuration,](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=1.14) [there are three Terraform object types you need to know about.](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=2.88) [They are providers, resources, and data sources.](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=6.56) [Provider blocks define information about a provider you want to use.](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=10.54) [For instance,](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=14.92) [we are going to be using the AWS provider and that provider wants to](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=15.47) [know what AWS account and region you're going to be using. Resources](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=19.56) [are things you want to create in a target environment and they are the](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=25.06) [bulk of what you'll be writing. Each resource is associated with a](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=28.61) [provider and will usually require some additional information for a](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=32.5) [configuration.](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=36.62) [A resource could be an EC2 instance, a virtual network, or even a database.](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=37.56) [Data sources are a way to query information from a provider.](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=43.44) [You aren't creating anything,](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=47.74) [you're simply asking for information you might want to use](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=49.43) [in your configuration. Just like resources, data sources](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=52.52) [are associated with a provider.](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=56.62) [A data source could be a current list of availability zones](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=58.65) [in a region, an AMI to use for an EC2 instance, or a list of](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=62.04) [templates on a vSphere cluster. Now, what do these object configuration blocks look like?](https://app.pluralsight.com/course-player?clipId=fd1c5401-511b-4f0a-ba6d-2aac0d237bac&startTime=66.44)

### [General Block Syntax](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef)

[HashiCorp configuration language uses block syntax for everything in the file,](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=1.14) [it's a simplified version of JSON that is easier to](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=5.94) [read and it supports inline comments.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=8.89) [Each block is going to start with the block type keyword that describes](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=12.44) [what type of object is being described in the block.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=16.7) [Next is going to be a series of labels that are dependent on](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=20.24) [what type of object we're working with.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=24.17) [The last label in the series is usually the name label,](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=27.04) [which provides a way to refer back to the object in](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=30.85) [the rest of the configuration.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=33.96) [Within that block,](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=36.24) [we are going to have one or more key value pairs that make use](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=37.52) [of available arguments for the object type.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=41.52) [Each key will be a string and the value could be any of](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=44.84) [Terraform's different data types, which we'll get into in a later module.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=48.87) [You can also have nested blocks inside of the main block.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=52.91) [Nested blocks will start with the name of the nested block and curly braces.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=56.84) [Inside the nested block will be more key value pairs.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=61.97) [This might seem a little too abstract so let's see how the syntax](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=66.54) [would be applied to an EC2 instance in AWS.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=70.81) [The object type we're describing here is a resource.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=75.44) [We're creating an EC2 instance so we use the keyword resource,](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=78.57) [the type of resource is an EC2 instance,](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=82.9) [which based on the documentation for the AWS](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=86.19) [provider, uses the label aws\_instance.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=89.23) [Finally,](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=94.14) [the name label for our resource is web\_server. This](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=94.7) [gives us a way to refer to it,](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=99.41) [especially if we've got multiple EC2 instances in our configuration.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=101.26) [Inside the block, we can specify a name for our EC2 instance. This](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=106.44) [is the name that we will see in the AWS console.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=110.71) [Finally,](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=114.24) [we could use a nested block to specify an ebs\_volume to attach to our EC2](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=114.72) [instance, and inside that block, we could specify the size of the](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=120.19) [ebs\_volume we want. If we have multiple ebs\_volumes to attach, we can](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=124.03) [repeat the nested block multiple times.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=129.48) [I've mentioned a few times the ability to refer to other](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=132.64) [objects inside of a Terraform configuration.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=136.06) [HCL has a defined syntax for doing so.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=139.24) [The general format to refer to a resource is the resource type,](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=142.88) [the name label, and then the attributes you want to reference](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=147.54) [from the resource. If you want the whole resource, you can](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=151.18) [skip the attribute. As an example,](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=154.36) [let's say we want to reference the name of our web server.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=157.26) [The syntax would be the resource type aws\_instance,](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=160.94) [the name label, web\_server, and the attribute, name. By](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=165.94) [doing this, we can get the value that is stored in the](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=170.95) [name attribute of our web server.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=173.7) [Now that we have a little background about reading HCL syntax, let's take a look at that base configuration.](https://app.pluralsight.com/course-player?clipId=258c888a-921b-42ae-a89e-8f81f0d54fef&startTime=176.74)

### [Reviewing the Base Configuration](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9)

[All right,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=1.14) [let's go ahead and open up the configuration that's stored in the main.tf file.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=1.57) [There we go.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=7.44) [Comments in HCL are supported by using the pound sign,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=8.29) [and in this file, we've used comments to break up the file into providers,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=11.63) [data, and resources.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=16.26) [Let's first look at the provider block.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=18.01) [In our provider block,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=20.45) [we're using the provider keyword to say this is a provider object,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=22.07) [and then we're specifying the type of provider,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=25.62) [in this case, AWS.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=28.39) [This will let Terraform know we're using the AWS provider.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=30.21) [Inside of the block, we have a set of key‑value pairs.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=34.04) [We're telling the provider what AWS account we want to use and how we are going](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=37.35) [to access it by specifying our access key and secret key.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=42.21) [And we're also telling it what region we want to use by specifying the](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=46.27) [argument region and setting it equal to us‑east‑1.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=50.04) [If we scroll down into the data area, we have a single data source here.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=54.44) [We use the data keyword to specify that it is a data source.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=59.41) [The data source type is aws\_ssm\_parameter.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=64.18) [So, this is a service manager parameter,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=68.94) [and we're giving it a name label of AMI.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=71.57) [Within the configuration block, we have a single argument name,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=74.72) [and we're setting it equal to a path to a parameter.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=78.95) [This particular parameter grabs the latest Amazon Linux to AMI](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=81.99) [ID for the region we're currently using.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=86.55) [We will make use of this value later when we create our AWS instance.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=89.11) [Scrolling down a little bit more,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=93.88) [we get into the resources portion of our configuration,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=95.49) [and we start with networking.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=98.38) [We're going to create an AWS VPC,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=100.45) [and we start the block by specifying the resource](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=103.35) [keyword followed by the resource type, in this case,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=106.34) [aws\_vpc, and then we're giving it a name label of vpc.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=109.72) [Inside of the configuration block,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=115.19) [we're setting the CIDR block that should be used by the VPC,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=117.45) [and we're also enabling DNS hostnames.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=120.46) [Looking at the next block, we are going to create an aws\_internet\_gateway,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=123.96) [and we want to associate that internet gateway with the VPC we just created.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=129.36) [To do that, inside the configuration block,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=133.77) [we have the single argument vpc\_id,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=136.45) [and then we're using the reference syntax to reference the ID of our VPC.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=140.54) [So that is aws\_vpc.vpc,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=145.52) [because that's the name label we assigned to our VPC resource,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=148.44) [and then .id is the attribute that we want from that resource.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=154.15) [Now you might be wondering,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=158.69) [how do I know what arguments and attributes are available for a resource?](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=160.1) [And the short answer is you have to read the](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=164.47) [documentation for the provider and the resource.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=166.95) [The longer answer is what we're going to explore in a future module as](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=169.84) [we add additional resources to this configuration.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=173.49) [Scrolling down a little bit more,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=176.48) [we can see that we are creating an aws\_subnet with the name label subnet1.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=178.09) [We're assigning it a cidr\_block,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=183.07) [and we're referencing the same vpc\_id that we just](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=185.84) [used for the internet gateway, and we're setting map\_public\_ip\_on\_launch to true,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=189.49) [so when we spin up an EC2 instance in this subnet,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=194.59) [it gets a public IP address.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=198.23) [Scrolling down a little bit more,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=200.14) [we are going to create an aws\_route\_table called rtb.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=201.76) [We're going to associate it with our vpc, and here is our first nested block.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=206.54) [In our nested block, we can specify a route to add to that route table.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=211.7) [In this case,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=216.59) [we're creating a default route and pointing it at our internet gateway.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=217.26) [In this way, traffic can get out of our VPC through that internet gateway.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=221.69) [The last portion of the networking is associating our](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=226.44) [route table with our single subnet,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=229.17) [and we will do that by creating an](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=231.3) [aws\_route\_table\_association called rta‑subnet1.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=233.2) [Within that configuration block,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=237.08) [we're going to specify the subnet\_id of our single subnet,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=240.14) [and the route\_table\_id of the route table we just created,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=244.42) [and now there's an association between those two objects.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=248.01) [Scrolling down a little bit more,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=251.43) [we are going to create an aws\_security\_group that allows port 80](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=252.94) [from anywhere to talk to our EC2 instance.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=257.02) [We are associating this security group with our VPC,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=261.04) [and we're creating a single ingress group using a nested block,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=265.34) [and inside of that ingress nested block,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=268.89) [we're setting the from\_port and to\_port to port 80 to allow port 80 in,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=271.15) [we're setting the protocol to tcp, and the cidr\_block is set to all 0's /0,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=276.03) [which means allow traffic from anywhere on port 80.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=281.49) [And then below, that we have an egress block,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=285.54) [and this egress nested block allows outbound traffic to anywhere.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=288.37) [Lastly, we have our EC2 instance.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=293.45) [We're creating a resource of aws\_instance type and naming it nginx1.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=296.53) [For the AMI ID, we are now going to be referencing our data source,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=302.15) [and we can see the syntax for that is a little different than regular resources.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=307.38) [We first have to specify it is a data source by saying data dot](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=311.63) [the type of data source dot the name label and then the attribute](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=316.25) [that we want from that data source, in this case,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=320.25) [value.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=322.52) [So this will return the AMI ID for Amazon Linux 2 in the](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=323.21) [region we're currently working in.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=327.57) [If you're curious about what the non‑sensitive term is,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=329.26) [that is a function, and we're going to cover functions a little bit later,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=332.42) [so don't worry about that for now.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=335.5) [Instance\_type sets the instance type to t2.micro.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=337.86) [We are trying to keep this thing as small as possible to stay on the free tier.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=340.77) [The subnet\_id will reference the single subnet that we have created,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=344.86) [and then the argument vpc\_security\_group\_ids,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=348.31) [you see that's plural, that's expecting a list of security group IDs.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=351.98) [We only have a single security group ID to give it,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=356.97) [but we still need to put it in a list.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=360.03) [Lists are enclosed in square brackets,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=361.94) [and then the elements in the list are separated by commas.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=364.57) [We only have a single element for the list,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=367.6) [which is the security group we created to allow port 80.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=370.41) [And then lastly, we are sending some user data to our instance,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=374.14) [and this is simply a script that will run when the](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=378.17) [instance starts up for the first time.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=381.09) [In the script, we are installing nginx and starting it up,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=383.17) [we're deleting the default index.html file,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=387.17) [and replacing it with something else.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=390.41) [If you're not familiar with the EOF syntax that you're seeing right there,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=392.81) [that is a way of specifying a block of text that should](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=397.34) [not be interpreted in any way; it should just be passed](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=400.43) [directly to the argument as is.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=403.62) [And this is an easy way for you to specify a script without](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=406.49) [having Terraform try to interpolate it.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=410.02) [The syntax is simply two of the less signs followed by a keyword,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=412.24) [in this case, EOF, the text you want, and then closing it with that same keyword,](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=416.08) [EOF again.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=420.98) [That is everything that's in the configuration.](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=422.04) [Now we need to deploy our configuration. But how do we go about doing that?](https://app.pluralsight.com/course-player?clipId=1f9500da-691d-4dcb-bb64-9d877fe0e7e9&startTime=424.45)

### [Terraform Workflow](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c)

[Terraform has a basic workflow that allows you to provision,](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=1.34) [update, and remove infrastructure.](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=5.1) [Let's dig into that workflow now. If you'll recall from earlier,](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=7.6) [Terraform makes use of provider plugins to interact with services](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=12.11) [like AWS. Before it can use those plugins, it needs to get them.](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=16.32) [This is done as part of the initialization process, and the command](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=20.33) [to do so is terraform init.](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=24.73) [Terraform init looks for configuration files inside of the current working](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=28.34) [directory and examines them to see if they need any provider plugins. If they](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=32.85) [do, it will try and download those plugins from the public Terraform Registry,](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=38.59) [unless you specify an alternate location.](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=43.34) [Terraform will also need to store state data about your configuration somewhere.](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=46.74) [Part of the initialization process is getting a state data back end ready.](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=51.54) [If you don't specify a back end,](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=56.24) [Terraform will create a state data file in the current working directory.](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=58.26) [Once initialization is complete, Terraform is ready](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=62.44) [to deploy some infrastructure.](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=65.37) [The next step in the workflow is to plan out your deployment](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=68.84) [with terraform plan. In this case, Terraform will take a look](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=71.55) [at your current configuration, the contents of your state data,](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=75.79) [determine the differences between the two, and make a plan to update your](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=80.44) [target environment to match the desired configuration.](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=84.98) [Terraform will print out the plan for you to look at, and you can verify](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=88.67) [the changes Terraform wants to make. You don't have to run a terraform](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=92.56) [plan, but it is pretty useful to know what Terraform is planning to do](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=96.75) [before it does it. You can save the plan changes to a file and then feed](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=100.67) [that back to Terraform in the next step. It's now time to actually make](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=105.04) [changes in the target environment, and you do that by running terraform](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=110.07) [apply. Assuming you ran terraform plan and saved the changes to a file,](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=114.19) [Terraform will simply execute those changes using the provider plugins. The](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=119.39) [resources will be created or modified in the target environment, and then](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=124.33) [the state data will be updated to reflect the changes.](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=128.82) [If we run terraform plan or apply again without making any](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=132.54) [changes, Terraform will tell us no changes are necessary since](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=136.49) [the configuration and the state data match.](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=140.8) [There is one more command I want to bring up, which might seem a](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=144.44) [little strange, and that's terraform destroy.](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=148.07) [If you are done with the environment,](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=152.04) [the command terraform destroy will do exactly that, destroy everything in](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=154.17) [the target environment based off of what is in state data.](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=159.82) [This is a dangerous command, and Terraform will ask you if you're](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=164.34) [sure. We're going to use this command in the course to save money](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=168.18) [when we're done with the module, but in the real world, please take care. Here there be dragons.](https://app.pluralsight.com/course-player?clipId=6050518e-f36c-48b8-a5f5-01c1c97d070c&startTime=172.04)

### [Deploying the Base Configuration](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300)

[With the basic workflow fresh in our brains,](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=1.54) [let's get our base configuration deployed.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=4.23) [We'll start by initializing the configuration, then we'll plan our](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=6.83) [deployment, and finally, we'll apply the plan to create resources.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=10.99) [If you're following along, and again,](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=15.12) [I hope that you are, you're going to need an AWS account and AWS access keys.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=17.11) [I'd recommend creating a separate AWS account to use for](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=24.24) [this course so it doesn't conflict with anything else, but](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=27.62) [that's entirely up to you.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=30.63) [Quick disclaimer. Some of the resources deployed in AWS may cost you money.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=32.34) [I tried to use the smallest instances possible, but there is a chance you](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=38.14) [will be charged some small amount of money for what you're provisioning in](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=42.04) [AWS, so consider yourself suitably warned.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=45.57) [Alright, let's get our basic configuration deployed. Now before we do that,](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=49.54) [let's make a copy of our base configuration and edit that copy.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=54.22) [So first I'm going to open up the terminal. I'll go ahead and do that now.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=58.33) [Alright, and we are going to create a directory called globo\_web\_app](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=62.84) [and copy our main.tf file over to that directory.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=67.66) [So I'm going to copy those two commands now, and paste them down below.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=71.37) [There we go, I have successfully created a directory and copied the](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=76.29) [main.tf file to it. So we can see that over here on the left. There's](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=79.74) [the main.tf file. And let's switch to that directory so that we can](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=84.62) [work in that directory with Terraform. Now before we run through the](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=90.85) [actual workflow, there is one tiny change we need to make in the main.tf file.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=94.58) [Go ahead and open that now.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=99.94) [You can see the AWS access\_key and secret\_key have placeholders in them.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=101.33) [I'm going to update those values with a valid AWS access key and](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=106.79) [secret key. Now while I am filling this out,](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=111.85) [I want to provide a quick disclaimer. You should never hardcode your](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=114.13) [access key and secret key into a Terraform configuration.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=118.09) [We're doing it right now because we haven't yet learned a better way of](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=122.04) [doing it, but rest assured, in the next module we are going to remove this](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=125.65) [from the configuration and never do it again.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=129.13) [This is purely for demonstration purposes.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=131.9) [In fact, I've already invalidated this access\_key and secret\_key by](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=134.44) [the time you watch this video. With that being said,](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=138.4) [I'll go ahead and save this file, and now we can run through the](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=141.81) [initialization process, and I'll do that by running terraform init.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=145.02) [It's going to go ahead and initialize the backend it will](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=151.04) [use for state data and download any provider plugins that](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=154.26) [it needs for our configuration.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=157.75) [And lastly, it will create a special lock file called](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=159.62) [.terraform.lock.hcl. So if we scroll up a little bit, we can](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=162.72) [see where it initializes the backend,](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=167.67) [initializes the provider plugins by downloading the latest plugin from the](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=170.24) [public Terraform registry, and creating that lock file as the last thing. And](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=174.74) [if we look over in our globo\_web\_app directory,](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=179.42) [we can see there's that .terraform.lock file, and there's also a](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=182.66) [new directory called .terraform, and inside that,](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=186.35) [if we expand it,](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=189.97) [that is where it downloads the provider executable that will be used](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=191.04) [to talk to AWS. Now that our Terraform configuration is initialized,](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=195.56) [we can go ahead and run terraform plan.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=200.17) [So I will run terraform plan, and I'm going to add a new](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=203.64) [argument here, ‑out. This will write the plan out to a file,](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=207.2) [and I'm specifying the file as m3.tfplan.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=211.46) [So I'll go ahead and run that now. And as part of the plan, it is](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=215.39) [going to reach out to AWS and determine what it needs to create](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=219.94) [to match our AWS environment to what's in the configuration. And](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=224.87) [that ran pretty quickly.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=229.2) [We can see that it's saying in the plan there are seven resources to](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=230.17) [add. And if we go ahead and expand this all the way up,](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=234.18) [we can scroll up and review what's in the plan.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=237.77) [So let's scroll up to the top, and we can see it starts with the instance](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=240.82) [that's going to be created. You should note, anything with a green plus](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=245.08) [sign indicates that the resource or attribute is going to be created. So](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=248.91) [we can see there is our AWS instance.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=254.24) [If we scroll down a bit more, we can see the internet\_gateway,](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=257.03) [the route\_table, etc.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=261.26) [So it's going to create seven resources in total.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=263.25) [It's not going to change any, and it's not going to destroy any.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=266.33) [Now if we want to apply our plan,](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=269.7) [we can simply run terraform apply and feed it our file, m3.tfplan.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=272.64) [So I'll go ahead and do that now.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=278.62) [There we go. And if we had run terraform apply without specifying a plan file,](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=281.54) [it would first print a plan of what it's going to do and then](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=286.36) [ask for confirmation of the changes that it's going to make.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=289.32) [Because we supplied a tfplan file,](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=292.89) [it doesn't have to confirm those changes because it](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=295.48) [assumes we've already reviewed that plan.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=297.7) [So this could take a few minutes, so I'll go ahead and jump to where the deployment has completed successfully.](https://app.pluralsight.com/course-player?clipId=f252781e-1cef-4c4e-8286-ba5139ca0300&startTime=300.54)

### [Validating the Deployment](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df)

[Okay, our deployment has completed successfully.](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=1.14) [We can see seven resources were successfully added.](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=3.56) [Let's go over to the AWS console and get the public IP address of our EC2](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=7.2) [instance and validate that the web page is available.](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=12.12) [Okay, here we are in the EC2 console. I'll go ahead and refresh our view](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=15.09) [of instances. There is our instance that has been created. I can click on](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=19.67) [that and see that it does have a public DNS. So we can go ahead and grab](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=24.21) [that address, and I'll open up a new browser tab, and we can go to that](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=29.33) [address. And there you go.](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=35.9) [It has successfully loaded our web page. Congratulations! You did it.](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=37.95) [Have a taco. Going back to Visual Studio Code, since this was simply a](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=42.69) [demonstration environment, the last thing we can do is destroy the](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=47.73) [environment so it doesn't cost us any money, and we'll do that by](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=51.84) [running terraform destroy.](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=54.63) [Once you run terraform destroy,](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=56.15) [it will plan out the changes it needs to make to destroy everything that's](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=58.08) [in your environment, and then it will ask for confirmation. In the read](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=62.42) [out, the red dash indicates that something is going to be destroyed or](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=66.56) [removed, and now it's asking if we're sure we really want to do this. And](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=70.87) [we do, so I will type in yes, and now it will go through the process of](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=75.04) [removing all of those resources, and we no longer have to worry about](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=79.3) [paying for them.](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=82.8) [I encourage you to do this when you finish any exercise and you know you](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=83.94) [won't be coming back to the environment for a while.](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=88) [It's very simple to stand it back up by simply running terraform plan and apply again when you're ready to work with the environment.](https://app.pluralsight.com/course-player?clipId=37524b68-8671-43e9-967d-a792c0f9c7df&startTime=90.19)

### [Summary](https://app.pluralsight.com/course-player?clipId=a685d027-9fd9-45eb-b45d-ac7dafb86f60)

[Alright, let's sum up what we've learned in this module.](https://app.pluralsight.com/course-player?clipId=a685d027-9fd9-45eb-b45d-ac7dafb86f60&startTime=1.24) [Terraform is a tool used to automate infrastructure,](https://app.pluralsight.com/course-player?clipId=a685d027-9fd9-45eb-b45d-ac7dafb86f60&startTime=4.39) [which is way more fun than manually deploying stuff.](https://app.pluralsight.com/course-player?clipId=a685d027-9fd9-45eb-b45d-ac7dafb86f60&startTime=7.63) [Terraform itself is a single binary available for just](https://app.pluralsight.com/course-player?clipId=a685d027-9fd9-45eb-b45d-ac7dafb86f60&startTime=11.04) [about any operating system out there.](https://app.pluralsight.com/course-player?clipId=a685d027-9fd9-45eb-b45d-ac7dafb86f60&startTime=14.4) [The configurations Terraform uses are written in either HCL or JSON,](https://app.pluralsight.com/course-player?clipId=a685d027-9fd9-45eb-b45d-ac7dafb86f60&startTime=16.72) [although HCL is way more popular. And finally,](https://app.pluralsight.com/course-player?clipId=a685d027-9fd9-45eb-b45d-ac7dafb86f60&startTime=21.36) [the basic workflow for Terraform is initialization, plan, and then apply.](https://app.pluralsight.com/course-player?clipId=a685d027-9fd9-45eb-b45d-ac7dafb86f60&startTime=25.1) [The base configuration we just deployed is pretty simple and it leaves lots](https://app.pluralsight.com/course-player?clipId=a685d027-9fd9-45eb-b45d-ac7dafb86f60&startTime=30.94) [of room for improvement. In the next module,](https://app.pluralsight.com/course-player?clipId=a685d027-9fd9-45eb-b45d-ac7dafb86f60&startTime=34.97) [we're going to take a look at how we can use variables and](https://app.pluralsight.com/course-player?clipId=a685d027-9fd9-45eb-b45d-ac7dafb86f60&startTime=37.69) [outputs to improve our configuration. I'll see you there.](https://app.pluralsight.com/course-player?clipId=a685d027-9fd9-45eb-b45d-ac7dafb86f60&startTime=40.47)

## [Using Input Variables and Outputs](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f)

### [Overview](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f)

[All programming languages have a way to submit information](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=1.24) [into the software and retrieve output.](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=4.8) [Terraform is no different. In this module,](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=7.84) [we are going to explore how to use input variables,](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=10.29) [local values, and outputs to improve our Terraform code](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=13.64) [making it more dynamic and reusable.](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=17.87) [Everyone this is Ned Bellavance. I'm a HashiCorp](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=20.94) [ambassador and founder of Ned in the Cloud.](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=23.22) [Let's dig into using input variables and outputs. The base](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=25.64) [configuration we deployed to AWS had all of its values](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=31.21) [hardcoded and provided us with no output.](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=35.34) [It's time to change that. We'll first start with learning how to supply input](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=38.94) [values to Terraform for use in a configuration, and then we'll learn how we](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=43.26) [can construct internal values inside the configuration for reuse. We'd also](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=48.62) [like to get some information out of our configuration once it's deployed and](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=54.43) [that is done through outputs.](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=58.24) [Finally, we are going to make a bunch of changes to our](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=60.64) [configuration, but what if we get something wrong?](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=63.69) [It sure would be nice to validate our config before we try and deploy it, and we'll see how Terraform has some built‑in tools to help.](https://app.pluralsight.com/course-player?clipId=c553bf44-b051-4779-91fd-ecdc990a716f&startTime=66.74)

### [Working with Data in Terraform](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302)

[Terraform can accept values as input,](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=1.24) [transform values inside a configuration, and return values as output. With that](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=4.3) [context, let's explore how to work with data inside Terraform. There are three](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=10.01) [different concepts to consider when working with data in a Terraform](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=15.56) [configuration. The first is called input variables,](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=19.85) [or just variables for short. Input variables are used to pass](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=23.63) [information to a Terraform configuration.](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=28.31) [The variables are defined inside the configuration, and the](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=31.74) [values are supplied when Terraform is executed.](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=35.12) [Local values, sometimes just called locals, are computed values](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=39.24) [inside the configuration that can be referenced throughout the](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=43.96) [config. In other programming languages, these would usually be called variables.](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=47.47) [The values for locals are not submitted directly from an external input, but](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=52.84) [they can be computed based on input variables and internal references. Data](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=57.78) [is returned by Terraform with output values.](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=63.33) [The outputs are defined in the configuration, and the value of each](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=66.98) [output will depend on what it references inside the configuration. Just](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=71.12) [like locals, the output value can be constructed from one or more](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=76.02) [elements. Since everything starts with inputs, let's take a closer look at input variables.](https://app.pluralsight.com/course-player?clipId=c31dedc4-4c5f-4056-840a-d04f5a7f8302&startTime=80.43)

### [Input Variable Syntax](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e)

[Variables are defined inside of a block just like everything else in](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=1.24) [Terraform. A variable block starts with the variable keyword followed](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=4.91) [by a single label, that is the name label.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=9.79) [All the other properties of the variable are defined inside the](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=13.74) [block and all of those properties are optional.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=17.2) [You can have a variable with no arguments and that's](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=20.64) [acceptable, although it's not really preferred.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=23.63) [Let's take a look at the optional arguments inside the variable block.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=26.63) [The type argument defines the data type associated with your](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=31.54) [variable and it provides a certain level of error checking. If you](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=35.66) [say the variables should be a number and someone submits a string,](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=39.94) [Terraform will throw an error.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=43.53) [Now you might be wondering what data types are available to me.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=45.35) [Don't worry, we'll cover that in the next section.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=48.8) [The description argument helps provide some context for the user when they get](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=51.78) [an error and it will also be useful when we package configurations up in](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=56.24) [modules, but we'll cover that later in the course.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=60.6) [The default argument allows you to set a default value for the variable.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=64.14) [If no value is submitted for the variable,](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=68.56) [Terraform will use this default value. If you don't set a default value and](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=71.48) [none is submitted when the configuration is invoked, Terraform will prompt](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=76.33) [you at the command line to supply a value.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=80.72) [The last argument I will cover is the sensitive argument.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=83.74) [It accepts a Boolean value of true or false. If it's set to](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=87.34) [true, Terraform will not show the value of the variable in](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=91.65) [its logs or the terminal output.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=95.51) [This argument is useful when you have to submit potentially sensitive](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=98.04) [values like a password or an API key and you don't want them showing up](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=101.98) [in clear text in your logs or terminal output.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=106.99) [Let's take a look at a few examples of actual variables and how to](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=110.34) [refer to their value inside a configuration.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=114.35) [The first example shows a variable with the name label,](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=117.44) [billing\_tag. No arguments are provided and none are needed.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=120.55) [This is a quick and dirty way of adding a variable to a configuration.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=124.52) [Since no default value is specified,](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=128.51) [you'll need to provide one at execution time.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=130.89) [Our second variable has the name label aws\_region, and this time, we have](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=133.94) [some arguments. We're going to set the type to string since the value will](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=139.76) [be one of the AWS regions and those are strings. We've got a helpful](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=143.79) [description here and we're setting a default value of us‑east‑1. So if no](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=148.34) [value is specified at execution time, Terraform will use us‑east‑1.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=153.89) [Finally. this is not a sensitive value so we've set it to false.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=159.94) [We don't actually have to set sensitive to false as it is false by default. To](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=164.24) [refer to the value stored in the variable, we simply use the var identifier](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=169.84) [dot the name\_label. For instance, to refer to the value stored in our](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=175.15) [aws\_region variable, the syntax would be var.aws\_region and you would get back](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=179.86) [the string stored in the variable.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=187.17) [Speaking of strings and data types, let's talk about the different data types that exist in Terraform.](https://app.pluralsight.com/course-player?clipId=f421793a-a0b0-422e-8496-0c44a7a13e6e&startTime=189.64)

### [Terraform Data Types](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6)

[We can group the data types supported by Terraform into three categories.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=1.34) [The most basic are the primitive data types.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=5.94) [These are string, number, and Boolean.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=9.08) [A string is a sequence of Unicode characters, a number can be an integer](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=12.21) [or a decimal, and Boolean is either true or false.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=17.36) [The next category is collection data types, and they](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=21.64) [represent a grouping of the primitive data types.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=25.01) [A list is an ordered group of elements, a set is an an unordered group](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=28.64) [of elements, and a map is a group of key‑value pairs.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=33.76) [In each case,](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=37.94) [the values stored in any of these collection data](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=39.13) [types must be of the same data type.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=41.96) [The last group is structural data types, and they're very](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=45.44) [similar to collection data types, except they allow you to mix](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=48.86) [the data types stored in each grouping.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=52.92) [Aside from that difference,](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=55.38) [tuples are functionally equivalent to lists and objects](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=57.44) [are basically equivalent to maps.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=61.36) [It's useful to be aware of structural data types, but chances are](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=63.95) [you're not going to use them for basic configurations.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=68.22) [They're more of an advanced topic.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=71.25) [Let's take a look at some examples of the collection](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=73.34) [data types to help clarify things.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=75.98) [Here's a couple examples of lists.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=78.74) [Notice that each element of the list is of the same data type,](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=81.64) [all numbers in the first list and all strings in the second. The](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=85.46) [third list mixes data types, which would be invalid for a list,](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=90.52) [but valid for a tuple.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=94.82) [Our Map example has three key‑value pairs.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=97.34) [The keys are going to be strings, and the values must all be the same](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=101.14) [data type. In this case, they are all of type string.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=105.95) [You can create more complex structures using the object data type,](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=110.24) [but as I said, that's really beyond the scope of this course.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=113.93) [If you want to use a collection for a variable,](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=118.04) [how do you construct it, and how do you reference the values inside?](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=120.85) [Let's take a look.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=124.34) [Let's say we'd like to have a variable with a list of AWS regions.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=126.14) [The type argument takes the form of the collection type we'd like](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=130.64) [to use and what data type will be stored in it.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=133.92) [In this case, we have a list collection type that will be](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=137.11) [storing string values. For our default value, we have provided a](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=140.75) [list of four regions, each as strings.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=145.59) [Lists are an ordered data type.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=149.44) [We can refer to an element by number, starting with 0. If](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=152.34) [we want the first element in our list,](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=156.66) [which is us‑east‑1, our syntax would be var.aws\_regions and a 0 for](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=158.87) [the first element enclosed in square brackets.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=166.86) [We can get the whole list by only specifying the name](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=170.14) [label and skipping the square brackets.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=173.22) [What if we want a map holding AWS instance sizes? The](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=176.14) [type argument is basically the same.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=179.99) [We want to have a map with strings as the value held in the map.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=182.44) [For the default, we can define the keys as small,](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=186.4) [medium, or large and associate an EC2 instance size with each key. If we](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=190.33) [want to refer to the value stored in one of those keys,](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=196.27) [there are actually two ways of doing so.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=199.25) [The first is var.<name\_label>.<key\_name>.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=201.71) [The second is var.<name\_label>,](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=205.74) [followed by the key\_name in quotes inside of square brackets.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=208.46) [We can retrieve the value stored in the small key by writing](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=212.4) [var.aws\_instance\_sizes.small or var.aws\_instance\_sizes, then](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=216.4) [small in quotes and brackets.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=227.64) [Armed with our new knowledge of using variables, let's](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=230.34) [check in with the folks at Globomantics and see how we can improve our base configuration.](https://app.pluralsight.com/course-player?clipId=897f9cc7-dcb4-4c3e-9575-6416a5027bd6&startTime=233.19)

### [Globomantics Configuration Updates](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05)

[Sally Sue is excited that you got the environment up so](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=1.54) [quickly, but the folks over in ops have some requests about](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=4.83) [how the environment is deployed.](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=8.72) [Let's review the current architecture and the requests for improvement.](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=10.94) [The current deployment architecture is a single EC2 instance in a public](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=15.44) [subnet inside a VPC in the us‑east‑1 region of AWS.](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=19.98) [The ops team doesn't want you to change the architecture yet, but](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=25.14) [they do want you to make some code improvements.](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=28.64) [John is from the ops team, and he has a little experience](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=32.24) [with Terraform. He's come up with a list of possible](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=35.49) [improvements for your code. For starters,](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=38.52) [those AWS credentials can't live in the code file. It's just](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=41.45) [not safe to throw those things around.](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=44.9) [John would like you to find a better way,](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=46.58) [preferably a way that doesn't store the credentials in a file at all.](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=49.04) [Speaking of hard‑coded values,](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=53.34) [John would like you to use variables wherever possible so the](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=55.32) [configuration can be more dynamic and possibly reusable.](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=59.39) [Globomantics is also instituting default tags for their AWS resources, and](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=64.14) [John would like an easy way to apply default tags to all the resources in the](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=69.79) [config without doing a lot of find and replace.](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=74.35) [Finally, it would be nice to know the public DNS hostname of the EC2](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=78.04) [instance without having to go to the AWS console. You tell John, no problem. We'll start by adding some variables.](https://app.pluralsight.com/course-player?clipId=173b83ed-9e51-422b-ba56-fff11e5f9f05&startTime=82.24)

### [Adding Variables to the Configuration](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed)

[Now it's time to start adding some variables to our configuration.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=1.14) [Now before you get started,](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=5.2) [if you destroyed the environment from the previous module,](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=6.64) [go ahead and recreate it now because we're going to be making](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=9.94) [changes to the configuration and then seeing how those changes](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=13.08) [apply to what's been deployed already.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=16.27) [With that in mind,](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=19.54) [let's take a look at our current configuration by opening](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=20.49) [up the main.tf file in globo\_web\_app.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=23.84) [There we go.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=28.24) [This is our current main.tf file.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=29.28) [Now, we wanted to find some variables for this configuration](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=32.44) [and the first thing we can do is create a file called](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=36.94) [variables.tf in the same directory.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=39.76) [Remember, Terraform will put together any .tf files it finds in](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=42.84) [the same directory. By keeping the variables in a separate file,](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=47.22) [we can easily look between the main.tf file and the variables.tf](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=51) [file as we add new variables.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=54.86) [I'm going to go ahead and hide the file tree and we'll split the](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=58.14) [view between variables.tf and the main.tf file.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=62.12) [Now we can add variables in the variables.tf file and](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=66.34) [make the changes in the main file.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=70.14) [Let's first start by getting rid of those AWS access key and secret key values.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=72.74) [We'll start by creating a new variable, and remember, this starts with](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=78.24) [the variable keyword. We'll give it the name label,](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=81.74) [aws\_access\_key.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=84.73) [This is going to be of type string.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=86.84) [We can add a description of aws\_access\_key.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=90.74) [We're not going to set a default for this variable because the](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=95.04) [whole point is getting the access key out of the configuration,](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=97.37) [but we should set one more argument in here and that's setting](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=100.85) [sensitive to true. After all,](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=104.01) [we don't want this access key to be exposed in the](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=106.47) [logs or in the terminal output.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=109.04) [Alright, now that we have our first variable,](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=111.57) [let's go ahead and replace the hardcoded string](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=114.26) [with a reference to this variable.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=117.16) [We'll do that by removing the current value and now](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=118.98) [we'll add a reference to our variable.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=121.79) [Remember that goes var. the name of the variable, which is](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=123.56) [aws\_access\_key. If you're using VS Code or something that has similar](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=127.54) [plugins. it might even helpfully finish that for you.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=132.95) [Now let's go ahead and do the same with the AWS secret key.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=136.14) [So I'm going to copy this variable and paste it down below, and I'm](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=139.73) [going to change the name from access key to secret key, I'll change](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=144.05) [the description, and now we'll replace the secret key value with a](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=147.89) [reference to our variable.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=152.94) [There we go.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=154.74) [Now our access key and our secret key are no longer](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=155.18) [hardcoded into our configuration.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=158.61) [Let's also take this opportunity to add a variable for our region in](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=161.02) [case we wanted to deploy to a different AWS region.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=165.17) [We'll start with the variable keyword and we'll set this variable to](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=169.04) [aws\_region. Just like the keys, this is going to be of type string.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=173.52) [We'll set a description of AWS Region to use for resources, and](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=179.04) [let's set a default value for this variable of us‑east‑1. Now this](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=184.27) [is not a sensitive value, so we won't set the sensitive argument](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=189.41) [since it defaults to false.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=192.93) [Let's go ahead and replace the region with our variable.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=195.14) [We'll set it to var.aws\_region.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=199.44) [Alright, our provider is now using all variables for its values.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=203.64) [That's great.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=207.11) [Let's scroll down a little bit more and see where else we could use](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=208.1) [variables. In our networking configuration, we can see the CIDR block has a](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=211.11) [hardcoded value, enable DNS hostnames has a hardcoded value, and in the](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=215.48) [subnet, the CIDR block and the map\_public\_ip\_on\_launch both have hardcoded](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=220.45) [values. Scrolling down a bit more, in the security groups, you could](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=225.52) [potentially set variables for the port numbers if you would like to, and](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=228.89) [scrolling down beyond that, there is an instance type which is hardcoded](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=232.71) [for the AWS instance, that's another good place where we could add a](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=236.71) [variable.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=241.22) [What I'd like you to do now is pause the video and try to add all these](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=242.24) [variables to your configuration. When you're done, you can go ahead and](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=246.74) [look in the file layout for the M for solution and that will show you](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=251.24) [the variables that I added to the configuration and how I reference them](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=255.47) [in the main.tf file.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=259.46) [So go ahead and pause now, try to add the](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=261.64) [variables, and we'll resume in a moment.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=263.8) [Alright, let's see how you did. Looking in the](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=266.94) [variables file, we've got our access key,](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=270.09) [secret key, and region that we created. Scrolling down some](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=272.76) [more, we've got enable\_dns\_hostnames, the vpc\_cidr\_block,](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=276.31) [the vpc\_subnet1\_cidr\_block, and map\_public\_ip\_on\_launch. And scrolling down](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=281.14) [a bit more, we have the instance type and there should be references in the](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=287.31) [main.tf file for each of these variables.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=291.41) [The next thing that we're going to talk about is local values and how we can use those to add those common tags that John was asking for.](https://app.pluralsight.com/course-player?clipId=b55347b0-09b1-4094-b768-d0be2a5d49ed&startTime=294.94)

### [Local Values Syntax](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe)

[As I mentioned earlier, local values are values](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=1.34) [computed inside of the configuration.](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=4.24) [You can't submit values directly to them, unlike input](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=6.78) [variables. The syntax for locals starts with the keyword](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=10.12) [locals, and that's it for labels on the block. The rest of the](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=13.93) [information goes inside of the block.](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=17.97) [Inside the block are key value pairs.](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=20.49) [The value can be any supported Terraform data type,](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=23.24) [string,](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=26.2) [list, object, the sky is the limit, or more accurately,](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=26.85) [the supported data types are the limit.](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=30.51) [Here's an example of a locals block.](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=32.94) [The first key value pair defines a local with the name](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=35.54) [instance\_prefix and the value globo.](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=38.98) [The next key is common\_tags, and its value is a map defining some common tags.](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=42.64) [You can refer to other values inside of your configuration](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=49.23) [for the values on local. For instance,](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=53.37) [the project key is being assigned the value in the variable project.](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=56.12) [Hey, this seems pretty useful for our Globomantics requirements.](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=60.59) [You can specify the locals block multiple times in your configuration if](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=65.34) [you want to, but the name of each key must be unique within the](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=69.59) [configuration since that is how you reference a locals value. To refer](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=73.51) [to the value stored in a local, the syntax starts with the local](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=78.53) [keyword. Note that local is singular,](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=82.78) [not plural, that kind of threw me off the first time I saw it, followed by dot](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=85.83) [and the name\_label. To get the value in the instance prefix,](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=90.57) [the syntax would be local.instance\_prefix. If we've got a](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=94.81) [collection data type in our local, the same syntax we saw](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=100.3) [from the variable example applies.](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=104.13) [We could get the value stored in company by writing local.common\_tags.company.](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=106.33) [If we'd rather get the entire map, we only need to write local.common\_tags.](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=112.94) [Let's head back to our configuration and update it based on this new information.](https://app.pluralsight.com/course-player?clipId=860d3d50-32b9-45ca-9eaa-d757e6745bbe&startTime=119.24)

### [Adding Locals to the Configuration](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201)

[Globomantics is looking to add three common tags to start to all](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=1.34) [resources we've defined in our configuration.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=5.95) [We can define the common tags in a locals value and then use](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=8.68) [that value throughout our configuration.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=12.97) [Let's start by creating a new file called locals.tf.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=15.31) [All right, and in our locals.tf, we will start by defining](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=19.09) [a locals block. Within our locals block, let's go ahead and](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=23.16) [define a map of common tags.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=27.28) [We'll start with common\_tags =, and then we'll use the curly](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=31.64) [braces to specify a map data type, and then we'll add our](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=35.69) [key‑value pairs. The three values they want to start are](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=40.24) [company, project, and billing\_code.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=44.19) [Now where are we going to get this information from?](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=46.7) [Let's use variables to get this information.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=49.54) [Let's open up our variables file and add three variables for company,](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=51.99) [project, and billing\_code. We'll scroll down to the bottom of our variables](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=57.44) [file, and we'll go ahead and add those three variables.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=62.07) [Now here's a chance for you to take the wheel again.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=65.97) [Why don't you pause the video and add those three variables. Again,](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=67.82) [they are company, project, and billing\_code. All right, I have added](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=71.62) [those variables to my configuration, and as you can see,](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=79.14) [I set a default of Globomantics for the company and specified no](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=82.54) [default value for the project or the billing\_code.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=86.57) [Now let's go ahead and add these variable values to our locals.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=89.66) [And we can do the same thing we did before,](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=93.1) [which is hide the File Explorer.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=95.19) [We'll split variables out to the right side so it's easier to](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=97.04) [work with and showed the locals on the left side so we remember](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=100.08) [exactly what we're working with.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=103.5) [We'll start by adding company. Next, we'll add project. And for](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=105.07) [this one, John has requested that the project be the company name](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=109.16) [dash the project name for the value.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=113.16) [Now how do we go about referencing a variable inside a larger](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=116.14) [string? We're going to use interpolation syntax,](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=119.62) [which sounds real fancy, but it's actually quite easy.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=122.83) [We start by adding quotes to indicate that this is going to be a](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=125.84) [string, and then we need to reference our variable.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=129.23) [We start with a dollar sign followed by curly braces.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=131.94) [This let's Terraform know that we're going to be referencing a value from a](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=135.08) [variable or some other object within our configuration.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=139.2) [Now we can add the variable reference, which will be var.company.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=142.73) [Next, we're going to add a dash after the curly braces and another](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=147.24) [reference to the project value stored in the variable project.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=151.16) [Now we've created a string from our two variables](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=154.87) [that is of the form company‑project.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=157.82) [Lastly, let's add our billing\_code. And there we go.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=160.58) [We have successfully created our common\_tags local value.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=163.63) [The next thing to do is add this common\_tags value to our main.tf](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=168.14) [file for each AWS resource that supports tags.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=172.35) [Let's go ahead and add the first one together.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=175.93) [So I'll switch over to the main.tf file, and let's](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=178.22) [go down to our first resource,](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=181.76) [which is the aws\_vpc. Within the configuration block, I'll go ahead and add](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=183.36) [tags, and I'm going to set tags equal to local.common\_tags.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=188.97) [Now this map will be submitted to the tags argument,](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=195.14) [which expects a data type of map, and those tags will be applied to the VPC.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=198.54) [My challenge to you now is to pause the video and add this](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=204.34) [tags argument to all the other resources in our](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=207.55) [configuration that support a tags argument.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=210.41) [The only resource that does not is the](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=213.84) [aws\_route\_table\_association, so you can add the tags](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=216.02) [argument to all the other resources in the configuration.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=219.47) [All right, I have successfully added the tags argument to all](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=223.14) [of my resources, and hopefully you have too.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=226.12) [The last thing we're going to do is add an output so that we](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=228.84) [know what the public DNS hostname is for our EC2 instance. So let's talk about outputs now.](https://app.pluralsight.com/course-player?clipId=76e2053b-622f-4f06-820d-5878dc0f9201&startTime=231.82)

### [Output Values Syntax](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c)

[Output values are how we get information out of Terraform. Outputs are printed](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=1.14) [out to the terminal window at the end of a configuration run.](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=6.29) [It also exposes values when a configuration is placed inside a](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=10.04) [module, something we'll cover later in the course.](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=13.65) [The syntax for an output starts with the output keyword followed by the](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=17.24) [name\_label for the output. Inside the configuration block,](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=21.34) [the only required argument is the value of the output.](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=25) [Just like the value of a local, the value of an output can](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=29.44) [be any supported Terraform data type. You can return a](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=33.11) [simple string or a complex object.](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=36.5) [Optional arguments include the description, which is only seen when looking at](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=39.64) [the code for a configuration, so it's not all that useful.](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=43.83) [The sensitive argument will set an output to sensitive, meaning that](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=47.48) [the actual value will not be printed in the terminal.](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=51.29) [This is useful when you want to pass a value from one](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=54.09) [module to another and avoid having it printed in clear](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=56.68) [text in the logs or the terminal.](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=59.75) [Trust me, that will make more sense when we get to modules.](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=61.77) [Here's our example of an output with the name\_label public\_dns\_hostname.](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=65.11) [We're setting the value equal to the public\_dns attribute of our](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=70.54) [web\_server EC2 instance using the same reference syntax we saw in](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=74.83) [the previous module. We've included a description of the output,](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=79.35) [too, for our own personal reference. Sensitive is not set, so it](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=83.13) [defaults to a value of false.](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=87.62) [That's good, because we want this value printed to the](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=89.62) [terminal window so we can use it. Let's head back to the configuration and add an output.](https://app.pluralsight.com/course-player?clipId=b3e55f6a-242b-48a0-bdc2-233fb3e2653c&startTime=92.41)

### [Adding Outputs to the Configuration](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156)

[Just as we did with the locals and with the variables, let's go ahead](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=1.24) [and add a file for the outputs. Within the outputs, we are going to](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=4.85) [define a single output. We'll start with the output keyword, and we'll](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=9.44) [set the name to aws\_instance\_public\_dns. For the value, we're going to](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=13.59) [reference our EC2 instance.](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=20.75) [So let's go ahead and go back into split‑screen mode here and bring up](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=22.61) [our main.tf file. We'll scroll down to our instance definition, and for](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=26.25) [that we'll go ahead and copy the type, paste it in,](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=31.69) [we'll add the name\_label, nginx1, and we'll add the property of public\_dns.](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=34.69) [You can see that because we've initialized our configuration previously and I](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=41.4) [have the Terraform extension installed in VS Code, it knows all the attributes](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=46.22) [that are available for the aws\_instance resource type, and so I don't have to](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=51.05) [remember all of them or look them up.](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=56) [I'll go ahead and save the file, and now we've added](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=57.88) [our single output that we wanted.](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=60.52) [Now you might be wondering, how do I know that I got all](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=63.14) [of this configuration syntax correct?](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=65.53) [Well,](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=68.31) [your code editor should help you a little bit by highlighting improper syntax,](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=68.67) [but Terraform can also help you with the validate command. Let's learn more about that now.](https://app.pluralsight.com/course-player?clipId=43da6c4b-9b8e-4ed0-9110-9c3dff77a156&startTime=72.78)

### [Validate the Configuration](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc)

[Before we try to apply our update, it would be nice to know if](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=1.04) [the configuration is syntactically correct.](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=4.23) [Our linter does its best to help, but Terraform can also lend a helping hand.](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=6.68) [Terraform has a command called validate that will help you](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=11.54) [make sure your configuration is correct.](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=14.48) [Before you run the command, you'll need to run Terraform init.](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=17.34) [That's because it's checking the syntax and arguments of the resources in](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=21.34) [the providers, and it needs the provider plugins to do so.](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=25.33) [When you run validate, it will check the syntax and the logic of your](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=29.44) [configuration to make sure everything looks good.](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=33.15) [If it finds any errors, it will print out the error and](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=36.04) [the line where it found the issue.](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=39.17) [Sometimes it will even make a suggestion.](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=41.16) [Terraform validate does not check the current state of your deployment;](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=44.04) [it's just verifying the contents of your configuration.](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=47.26) [It also carries no guarantee that your updated deployment will be successful.](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=50.94) [Your syntax and logic might be correct, but the deployment could](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=55.74) [still fail for any number of reasons; insufficient capacity,](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=59.49) [incorrect instance size, overlapping address space. Validate does](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=62.94) [what it can, but it can't do everything. Why don't we try to use validate against our updated configuration?](https://app.pluralsight.com/course-player?clipId=98f866b6-4fa0-4422-ba5c-cca2f099d8dc&startTime=67.81)

### [Using the Validate Command](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa)

[The configuration we have now should pass validation, but we want to see](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=1.24) [what validation does, so let's go ahead and add a couple errors to our](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=5.25) [main.tf file and then see how Terraform catches them.](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=9.6) [Let's start by scrolling down, and we'll put some square brackets around](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=12.92) [enable\_dns\_hostnames as if it were a list and not a Boolean value.](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=16.41) [That should definitely throw an error.](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=20.74) [We can also use a variable reference that does not exist,](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=22.44) [so let's go ahead and delete block off var.vpc\_cidr, and](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=25.53) [that should also throw an error.](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=31.7) [Now that we've made those changes, we'll go ahead and save the file and](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=33.61) [we'll bring up the terminal to run terraform validate.](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=36.99) [I'm already in the globo\_web\_app working directory, and I've](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=40.14) [run terraform init, so all I should need to do is run](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=43.94) [terraform validate. And as you can see, Terraform has come back with an error.](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=46.65) [Let's go ahead and expand the window so we can see the full](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=51.62) [error. Here it's telling us that we have a reference to an](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=54.28) [undeclared input variable, vpc\_cidr.](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=57.24) [Okay, well, we knew that, so let's go ahead and fix that problem.](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=60.57) [We'll scroll down here and we'll add \_block back to our variable name label.](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=64.24) [There we go.](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=69.14) [I'll go ahead and save the file, and now we can run terraform validate again.](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=69.77) [Now we can see that Terraform says we have an incorrect attribute value](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=75.14) [type. The value attribute for enable\_dns\_hostnames should be a Boolean, and](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=78.96) [we've supplied a list, so let's go ahead and take those square brackets off](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=83.66) [and save our file once more, and we'll go ahead and run terraform validate](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=88.14) [a third time. Success.](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=92.5) [Our configuration is valid. Now you may find that you have other issues in](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=94.38) [your configuration if you've been working on your own,](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=97.94) [so go ahead and remediate those now.](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=100.49) [The next step in our process is to supply values for the](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=102.99) [variables we've defined in our configuration.](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=106.54) [But how do we go about doing that? Let's find out.](https://app.pluralsight.com/course-player?clipId=8fa0cf4d-4cb1-46d6-9a07-c739fd477ffa&startTime=108.83)

### [Supplying Variable Values](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7)

[When it comes to setting the value for a variable,](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=1.24) [there are at least six ways of doing so.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=3.37) [That's a lot!](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=6.07) [The easiest way to set a value is to set the value with the default argument.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=8.04) [We've already seen that in our configuration.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=12.15) [You can also set the variable at the command line](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=14.44) [when executing a terraform run.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=17.45) [You can use the ‑var flag followed by the name of the variable](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=19.38) [and the value you want to set it equal to.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=23.74) [You can repeat this flag for each variable you'd like to set.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=26.04) [You can also have all your variable values in a file and](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=30.24) [submit that file with the ‑var‑file argument.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=33.84) [Inside the file will be each variable name label as a key,](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=37.31) [followed by an equal sign and the value for the variable.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=41.73) [There are two other ways to submit values from a file.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=45.44) [If there is a file in the same directory as the configuration](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=48.84) [named terraform.tfvars or terraform.tfvars.json,](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=52.17) [which needs to be properly formatted JSON,](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=57.8) [Terraform will use the values it finds in that file.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=60.77) [Additionally,](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=64.14) [if there is a file in the same directory as the configuration](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=65.11) [ending in .auto.tfvars or .auto.tfvars.json,](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=68.45) [Terraform will use those values as well.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=74.59) [The final option is to use environment variables.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=77.44) [Terraform will look for any environment variables that start](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=80.91) [with TF\_VAR\_ followed by the variable name.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=84.01) [If you don't submit a value for a variable in any of these ways,](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=88.94) [Terraform will prompt you for a value at runtime.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=93.12) [I know that's a lot of options.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=96.64) [And what if you set the same variable in multiple ways, what's going to happen?](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=98.23) [There is an order of precedence.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=103.84) [Here's what it looks like, but I have to admit, I always have to look it up.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=105.81) [Terraform evaluates each of these options from left to right,](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=110.43) [with the last one winning.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=113.88) [If you find that your variable has the wrong value being set,](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=115.32) [this might be the culprit.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=119.37) [Now that we know how to set values for our variables, let's go make use of our updated and validated deployment.](https://app.pluralsight.com/course-player?clipId=b4433c09-7c9a-4660-b378-1f3cc7f7d3c7&startTime=121.11)

### [Deploying the Updated Configuration](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6)

[Reviewing the variables in our configuration,](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=1.04) [there are a few that don't have a default set.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=3.05) [We're going to have to set the aws\_access\_key and aws\_secret\_key.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=5.58) [Scrolling down to the bottom of our variables,](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=10.41) [we can see that the project and the billing code also need a value supplied.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=13.24) [All the other variables have a default set and we can go](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=18.28) [ahead and keep using that default.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=21.43) [Let's take a look at the potential syntax if we wanted to submit](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=23.94) [values for all of these variables at the command line. I'll go](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=27.47) [ahead and expand commands over here and we'll take a look in m4](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=30.89) [commands. In our m4 commands,](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=34.19) [we have already initialized and validated our Terraform configuration.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=36.71) [Now we can pass our variables at the command line if we'd like to and the](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=40.64) [syntax for that is ‑var= the name label of the variable and then another](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=44.58) [equals and the value you want to set that variable to.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=49.35) [Now,](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=52.54) [as you can see, this command can get very long. There has got to be a](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=52.63) [simpler way to do this and we know there is. Let's go ahead and create](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=56.04) [a file called terraform.tfvars and populate it with some of our](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=59.97) [non‑sensitive variables and values.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=63.76) [I'll go ahead and create a new file called terraform.tfvars in](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=66.64) [the same directory as our configuration.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=71.21) [There we go.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=74.04) [And let's go ahead and split screen things again so we can add](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=74.58) [the values and see what the values should be.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=78.08) [We'll start with the first variable, billing\_code. I'll go ahead and](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=80.32) [grab that value and paste it over in our file and I'm going to set it](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=83.39) [equal to the value described in the command.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=87.13) [There we go.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=89.87) [Now let's set the next variable, which is project, go ahead and](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=90.78) [paste that over and set that one equal to web‑app.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=94.21) [There we go.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=98.44) [And the next two variables are AWS access key and secret key.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=99.25) [We don't want those in a file, instead, we can store](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=103.41) [them inside an environment variable.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=106.8) [Let's go ahead and save our terraform.tfvars file, we'll go ahead and](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=108.75) [close that out, and then looking at our m4 commands,](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=112.97) [we can see we are going to export 2 environment variables.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=116.37) [If you're working in Linux or Mac OS, you can use the export command.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=120.15) [If you're using PowerShell, you can use the $env: and then](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=124.2) [the name of the environment variable.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=128.67) [Once again,](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=130.47) [the environment variable is going to be TF\_VAR\_ the name of the](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=131.17) [variable that you want to set a value to.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=136.4) [So the first one is going to be aws\_access\_key.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=138.81) [I'm working in PowerShell so I'm going to go ahead and paste in my access key](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=143.54) [and secret key so I can set them as environment variables.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=147.41) [Alright, I've updated the two commands with my AWS access key and secret key.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=151.24) [Let's go ahead and copy both those commands and paste](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=156.03) [them in the terminal down below.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=159.6) [Now I have those environment variables set,](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=161.14) [they're not stored in a file with our configuration and they won't be shown](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=163.51) [in the terminal output or in any logging we enable for Terraform. Let's go](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=167.06) [ahead and clear the terminal and now we can go ahead and run Terraform plan](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=171.07) [with our output file and we don't have to worry about including any](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=175.65) [variable values in the command because we have defined them in files and](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=179.4) [environment variables.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=183.13) [We'll go ahead and run Terraform plan now, and because the](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=184.56) [only change we made is to create variables,](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=188.13) [local values, and outputs, and add some tags to our resources, the only](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=191.34) [real change on the AWS side is to add those tags.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=196.25) [So let's go ahead and expand the terminal up and take a look at what's](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=199.74) [changing in our configuration. Now we can see that there are six changes](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=203.47) [with nothing to add and nothing to destroy.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=208.41) [If we look at what's being changed about our VPC,](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=211.08) [the yellow tilde means that something is being updated or changed, and the](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=214.44) [green plus sign means a value is being added so we can see the tags that are](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=219.52) [being added to our VPC. Let's go ahead and run the terraform\_apply to update](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=224.2) [the tags on all of our resources.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=230.17) [This should go very quickly because we're simply modifying the tags for our](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=232.84) [resources, it's not having to create or destroy anything.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=236.55) [Now we can see that the output we get at the end is, in fact,](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=239.74) [the public DNS of our AWS EC2 instance.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=243.08) [Now we can use that as opposed to going into the console. At this point, we have accomplished all the goals that John set out for us.](https://app.pluralsight.com/course-player?clipId=9e7ff5dd-5d74-48ef-8771-ab0a51dbc9b6&startTime=246.96)

### [Summary](https://app.pluralsight.com/course-player?clipId=45c768e0-c356-44cf-85f3-0957dd3bd176)

[In this module, we made our configuration a bit more viable.](https://app.pluralsight.com/course-player?clipId=45c768e0-c356-44cf-85f3-0957dd3bd176&startTime=1.14) [We used input variables so we can supply the proper values at runtime](https://app.pluralsight.com/course-player?clipId=45c768e0-c356-44cf-85f3-0957dd3bd176&startTime=4.63) [and get those hard‑coded credentials out of here.](https://app.pluralsight.com/course-player?clipId=45c768e0-c356-44cf-85f3-0957dd3bd176&startTime=9.3) [We also saw the multitude of ways to set values for our variables.](https://app.pluralsight.com/course-player?clipId=45c768e0-c356-44cf-85f3-0957dd3bd176&startTime=12.11) [It can get confusing quickly, so I recommend keeping it simple.](https://app.pluralsight.com/course-player?clipId=45c768e0-c356-44cf-85f3-0957dd3bd176&startTime=16.87) [We also managed to get some information out of our](https://app.pluralsight.com/course-player?clipId=45c768e0-c356-44cf-85f3-0957dd3bd176&startTime=21.44) [configuration with output values. And finally,](https://app.pluralsight.com/course-player?clipId=45c768e0-c356-44cf-85f3-0957dd3bd176&startTime=24.07) [we validated our configuration before trying to deploy it](https://app.pluralsight.com/course-player?clipId=45c768e0-c356-44cf-85f3-0957dd3bd176&startTime=27.11) [to catch any syntax or logic errors in our code. With a](https://app.pluralsight.com/course-player?clipId=45c768e0-c356-44cf-85f3-0957dd3bd176&startTime=30.39) [viable configuration in place,](https://app.pluralsight.com/course-player?clipId=45c768e0-c356-44cf-85f3-0957dd3bd176&startTime=35.64) [it's time to turn our attention back to the architecture.](https://app.pluralsight.com/course-player?clipId=45c768e0-c356-44cf-85f3-0957dd3bd176&startTime=37.61) [Our current design isn't exactly resilient,](https://app.pluralsight.com/course-player?clipId=45c768e0-c356-44cf-85f3-0957dd3bd176&startTime=40.56) [so we're going to add another instance and load balancing to the deployment. That's coming up in the next module.](https://app.pluralsight.com/course-player?clipId=45c768e0-c356-44cf-85f3-0957dd3bd176&startTime=43.47)

## [Updating Your Configuration with More Resources](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a)

### [Overview](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a)

[We've updated our configuration to include variables, locals, and outputs.](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=1.34) [Now it's time to update the architecture of our deployment to](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=6.7) [include resiliency by adding new resources.](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=9.9) [Hey, everyone. This is Ned Bellavance.](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=13.64) [I'm a HashiCorp ambassador and founder of Ned in the Cloud.](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=15.06) [Let's add some more resources to our configuration.](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=18.64) [Our existing architecture is a single EC2 instance](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=22.64) [running in a single subnet on AWS.](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=26.54) [If something were to happen to that instance or the](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=29.74) [availability zone associated with the subnet,](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=32.29) [our application would go down.](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=35.04) [That's probably okay for development, but not if this application](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=37.44) [is going to make its way to production. We will start our process](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=41.65) [by updating the architecture design,](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=45.7) [determining what new resources we need to add.](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=48.42) [Once we know what resources we need to add, we can consult the official](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=52.04) [HashiCorp docs to see what arguments are required for each resource.](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=56.74) [Armed with the knowledge gleaned from the docs,](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=61.84) [we will set about updating the configuration with new resources and data](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=64.1) [sources and apply the updated config to our existing deployment.](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=68.3) [We will also take a moment to talk a bit more about the magical state](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=72.74) [data Terraform uses to map a config to a deployment.](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=76.82) [What's in that data, and how should you interact with it? First, we will start by planning and infrastructure update with our friend John.](https://app.pluralsight.com/course-player?clipId=87a885b8-e3e1-466f-8e3f-154a401abc5a&startTime=80.54)

### [Globomantics Architecture Updates](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8)

[Adding variables,](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=1.24) [locals, and outputs to the configuration was a great start, but now it's](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=2.46) [time to add some resources to improve the architecture.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=7.09) [Let's see what Globomantics has in mind.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=10.64) [Our current architecture is using a single subnet in a](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=13.54) [single availability zone with a single EC2 instance. That's](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=16.98) [a lot of single points of failure.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=20.83) [John from the Ops Team has some suggestions to improve the](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=23.74) [reliability of the deployment. First, we'll start by adding a](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=27.4) [second availability zone in AWS.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=31.52) [If you're not familiar,](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=34.54) [each availability zone in an AWS region is a separate physical data](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=35.82) [center, and each subnet is associated with one, and only one,](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=40.45) [availability zone. Adding a second subnet in a separate availability](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=44.55) [zone will protect from a zone failure.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=48.42) [We also only have a single EC2 instance. John suggests that we add a](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=51.64) [second instance in case the first instance fails.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=57.45) [Of course, adding a second instance doesn't magically fix](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=60.84) [things; we need a way to make both instances accessible, and](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=64.23) [we'll do that through a load balancer.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=68.33) [Lastly, John wants to make sure we maintain the readability of the code.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=70.94) [He noted that we made a separate file for variables,](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=75.22) [locals, and outputs, and he thinks it would be a good idea](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=78.82) [to split the resources out as well.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=81.9) [Perhaps we could make one for base networking,](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=84.24) [another for instances, and one for the load balancer. Not only](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=86.64) [does that make it easier to read the code,](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=90.5) [it might make some files reusable in other configurations.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=92.92) [What does this updated architecture look like? Here's our current](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=96.66) [architecture with the single subnet and EC2 instance. We didn't](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=101.04) [specify an availability zone for our subnets, so AWS picked one for](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=105.07) [us. And here's the new architecture.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=109.27) [We now have two subnets that should be in separate availability zones,](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=114.29) [meaning we're going to need to specify an availability zone for each one.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=118.89) [We now have two instances that will be identical in nature except for](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=123.64) [the subnet they attach to, and we are adding an application load](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=127.36) [balancer, which will serve as the public endpoint for our application](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=131.77) [and direct traffic to our instances.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=135.87) [If you're not overly familiar with AWS, or even if you are,](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=138.64) [you might be wondering exactly which resources you'll need to add to the](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=142.05) [Terraform configuration to create this architecture.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=145.75) [Well, I'm not going to leave you hanging to figure that out on your own.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=148.62) [This is a Terraform course, after all, and we're not here to learn the](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=152.55) [intricacies of AWS. Here are the new data sources and resources we'll](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=155.82) [need to add to our configuration. With our two subnets, we now care](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=161.5) [which availability zone each one is in.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=166.19) [We could add a variable to specify the availability zone for each subnet, but](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=169.14) [there's a better and more dynamic way. We can add a data source that gets the](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=173.7) [list of availability zones in the current region and use that list in our subnet](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=178.66) [settings. For the load balancer component,](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=183.28) [there are actually several resources that need to be added, and I have](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=186.31) [to admit, it's not immediately obvious what they are.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=190.54) [The first is the aws\_lb resource itself,](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=194.14) [which will be the application load balancer. Next will be the](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=198.46) [aws\_lb\_target\_group, which defines a group that the application load](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=202.66) [balancer can target when a request comes in. To service incoming](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=210.5) [requests, we need an aws\_lb\_listener that listens on port 80 for](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=214.97) [inbound requests. And lastly,](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=223.37) [we need to associate our target group with our EC2 instances.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=225.95) [The aws\_lb\_target\_group\_attachment resource takes care of that.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=230.94) [Wow, that's a mouthful, isn't it?](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=238.34) [Well, that's all the new resource types.](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=239.96) [We're also going to add an additional subnet, EC2 instance, and a security](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=242.64) [group for the load balancer. Why don't we head over to the configuration and add some placeholders for the new resources?](https://app.pluralsight.com/course-player?clipId=529455f4-df09-45e2-bb84-23d152769fa8&startTime=247.76)

### [Adding New Resources to the Configuration](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab)

[All right,](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=1.24) [let's get started by updating the file structure a](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=1.7) [little bit for our globo\_web\_app.](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=4.74) [I'll go ahead and expand the folder out now, and we'll](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=6.81) [start by creating some new files.](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=9.93) [Let's go ahead and create one for the load balancer, and we will](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=12.17) [create one for the instances, and we can rename our main.tf network](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=16.31) [because the only thing that's going to be left in it once we move](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=22.19) [stuff around is networking components.](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=24.83) [Okay, now that we've created our files,](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=28.54) [let's go ahead and move the instance configuration into its own](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=30.82) [file. Scrolling down to the bottom, I'll go ahead and grab this](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=34.73) [entire body of text that defines the instance, cut it, go into the](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=38.76) [instance file, and paste it in there.](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=43.4) [All right, our instances will now have their own file to reside in.](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=45.71) [I'll go ahead and save that. For the load balancer, we haven't actually](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=49.84) [created any of the resources yet, so let's instead add some placeholders](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=53.88) [for the resources we know we need to create.](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=58.22) [I often add comments that let me know what resources I need to create before](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=61.34) [I actually create them, so I'll go ahead and add some comments to this file](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=66.08) [now. I'll add the aws\_lb, the aws\_lb\_target\_group, the aws\_lb\_listener, and](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=70.14) [the aws\_lb\_target\_group\_attachment.](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=80.66) [Now I know what needs to go in this file, but, of course, I](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=84.64) [still have to create the resources and understand all the](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=87.81) [arguments that go into each resource.](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=90.62) [How am I going to get that information? Ah, the answer is to read the documentation.](https://app.pluralsight.com/course-player?clipId=5ee53d24-d25b-4d45-8886-b3bd8b8b4aab&startTime=93.26)

### [Using the Documentation](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066)

[This should go without saying, but I'm going to say it anyway,](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=1.14) [there is no shame in going to the docs to try and figure out how to](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=4.35) [configure a resource or work with some Terraform syntax.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=7.7) [Whenever I am writing a new Terraform configuration,](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=11.44) [I usually have the code editor open in one monitor and](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=14.36) [multiple docs tabs open in another monitor.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=17.9) [So why don't we go check out those docs?](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=20.81) [The documentation for the providers and the resources within](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=23.94) [them can be found at registry.terraform.io.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=27.6) [Now,](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=31.74) [the provider that we are interested in is the AWS provider which we can](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=31.93) [find by simply clicking on Browse Providers and it gives us a list of the](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=36.13) [most popular providers on the first page.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=41.42) [We want to work with the AWS provider, and lucky us, it's right there.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=44.46) [Let's go ahead and click on that.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=48.18) [The front page will tell you some information about the current AWS](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=50.84) [provider and you'll note there is a tab for documentation. Let's go ahead](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=54.79) [and click on that to go to the documentation.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=59.11) [The main page of the documentation explains a little bit](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=62.44) [about how to use the AWS provider.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=65.42) [It gives some examples of how to instantiate it, as well](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=68) [as how to authenticate to the provider.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=71.26) [We'll cover that more in a leader module.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=73.84) [Right now, we are mostly concerned with adding our data source and our resources.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=76.24) [The easiest way to find those is usually to search through the](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=80.6) [filter box so I'll go ahead and start typing in availability zones.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=84.07) [After typing just a portion of the phrase,](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=88.64) [we can see under Data Sources in the matching results, we have](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=90.83) [aws\_availability\_zone and aws\_availability\_zones, that's the one I'm](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=94.64) [interested in so I'll go ahead and click on it, and this is the](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=100.08) [documentation for the data source.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=103.48) [It gives us a description of what the data source does and then](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=106.04) [it provides us a simple example for usage.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=109.76) [This is great.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=112.44) [This explains how to use this data source.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=113.38) [First, we declare it using the type of data source and giving it a name](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=116.18) [label, and then there is some optional arguments that go in the](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=120.11) [configuration block. When we want to use this data source.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=123.47) [It gives us an example of how to use it with a subnet,](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=127.13) [which is pretty convenient because that's exactly how](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=129.41) [we want to use this data source.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=132.41) [If we want to inspect some more information about this data source,](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=134.48) [we can go to the arguments reference.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=138.39) [I'll go ahead and click on the link.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=140.37) [This takes us down to the Arguments Reference portion of the page.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=142.64) [These are the arguments you can supply inside of the configuration block.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=146.41) [We might want to specify the state argument that filters the list of](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=150.14) [availability zones that are returned by the data source.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=153.99) [We could say just give me the available ones. Below the](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=156.88) [argument reference is the attribute reference.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=160.38) [These are the attributes that are exposed for the data source.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=163.54) [The one that we're most interested in is the names of the](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=167.34) [availability zones because that's what we're going to use to](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=169.98) [configure our subnet, and based off the information here,](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=173.23) [it is a list that is returned of the availability zone names,](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=176.6) [which means we can reference each zone by its element within the list.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=181.02) [If we go back up to the example usage,](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=185.63) [that makes sense with what it's showing us here that we use the](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=188.12) [names attribute along with an element of that list to retrieve](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=191.08) [a single availability zone name.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=194.83) [Now that we know this,](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=198.14) [we can go ahead and just copy a portion of this example and](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=199.24) [put it right into our configuration file.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=202.72) [There is no need to recreate the wheel here. With that text](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=204.96) [copied, let's go over to our configuration, and since this is](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=208.52) [going to be part of our network configuration,](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=212.15) [let's go to the network file, we'll scroll all the way up to the top,](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=214.39) [and we'll add another data source in the data area.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=219.64) [There we go.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=223.44) [We've added our new data source for the availability zones.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=223.79) [Now we can make use of them in our subnet.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=226.65) [The next thing to do is add the additional subnet, security group, and EC2 instance.](https://app.pluralsight.com/course-player?clipId=e3c12fc0-09f0-4267-b3e9-44c34a235066&startTime=229.53)

### [Updating the Network and Instance Configuration](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b)

[Now that we've successfully added our availability zone's data source, it's](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=1.44) [time to update our subnet's security group and EC2 instances.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=5.96) [Let's first start by updating our existing subnet to use an availability zone.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=10.6) [I'll go ahead and scroll down in the file to our subnet.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=15.34) [There it is.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=18.6) [And we're going to add a new argument here for the availability zone.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=19.23) [The argument is going to be availability zone, and I will set that equal to](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=23.44) [the data.aws\_availability\_zones.available data source.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=28.84) [And the attribute we want, remember, is names.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=34.44) [So we'll do .names.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=36.9) [And for this first subnet, let's take the first element from the list.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=39.04) [So we'll do square brackets and 0, since lists are 0‑indexed.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=42.58) [All right, we've added our availability zone.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=47.24) [Now before we create a second subnet, the CIDR block is defined](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=49.72) [with the variable vpc\_subnet1\_cidr\_block.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=53.24) [Wouldn't it be easier if we had a variable that had all of the subnet](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=56.84) [blocks defined in it? Why don't we go ahead and create that first. So,](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=60.34) [we'll go ahead and open up variables, and we'll scroll up to that](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=64.37) [variable definition for the subnet1\_cidr\_block, and instead we'll change](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=67.89) [that to vpc\_subnets\_cidr\_block. Instead of type string, we'll make it a](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=72.82) [list of strings.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=78.36) [And for the default, we can update this to a list of strings. I'll](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=80.14) [add the square bracket, so it's a list, and I will add a second](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=84.64) [element to the list of 10.0.1.0/24 for our second subnet and close](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=88.42) [the square bracket, and we can update our description to CIDR Block](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=94.83) [for Subnets in VPC.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=98.93) [All right,](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=101.34) [let's go back to our subnet configuration in the network.tf file. And](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=101.71) [we'll update this variable to vpc\_subnets\_cidr\_block, and we'll](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=107.07) [select the first element out of the list.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=111.95) [Now you'll see the reason I did this in a moment as we add](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=114.84) [the second subnet for our configuration.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=117.77) [Before I add the second subnet to our configuration, my challenge to you is](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=120.75) [to go ahead and try to add these resources on your own.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=124.75) [You're going to need to add a second subnet, a route table](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=128.06) [association, and a second EC2 instance in the instances file.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=131.23) [Go ahead and try to do that now. If you run into trouble,](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=135.49) [you can always check the solution that's in the m5\_solution directory, and](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=138.34) [we'll come back in a moment to see my updated solution.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=143.28) [All right, we're back.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=146.54) [Let's go ahead and see what I did in my solution. For the second subnet,](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=147.72) [I made a copy of the existing subnet resource, and I changed the name label to](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=152.07) [subnet2. For the cidr\_block, I changed the element to 2 to reference the second](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=156.54) [element in the list, and for availability\_zones,](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=161.88) [I changed that to a 1 as well to reference the second availability](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=164.77) [zone. By setting it up in this way, we could add a third or fourth](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=168.35) [subnet and just make sure that we update the subnet's cidr\_block](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=172.3) [appropriately. Scrolling down into the routing, let's take a look at](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=175.74) [those route table associations.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=179.83) [Once again, I simply copied the existing](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=181.84) [route\_table\_association\_resource, changed the name label to](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=184.34) [subnet2, and changed the subnet\_id reference to subnet2. Both of](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=188.09) [these subnets are going to use the same route table.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=193.36) [Moving over to the instances file, for the second instance, once again,](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=197.04) [I made a copy of the existing aws\_instance resource, I changed the name](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=201.85) [label to nginx2, and I changed the subnet to subnet2. To differentiate](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=206.87) [the two web pages, I changed the echo command for the first one to say](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=212.73) [Taco Team Server 1, and if we scroll down, the second one is now Taco](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=216.44) [Team Server 2.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=221.42) [The next thing we need to do is create an additional security group for our](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=223.64) [load balancer so it allows port 80 traffic from anywhere.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=226.95) [So let's go back to the network file.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=230.35) [And if we scroll down here,](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=232.84) [we already have a security group for our instances that](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=234.25) [allows HTTP access from anywhere.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=237.08) [Let's make a copy of the security group.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=239.94) [I'll go ahead and update the name label of this new security group.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=242.64) [We'll call it alb\_sg, and we'll update the name to nginx\_alb\_sg.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=246.24) [We're gonna be using the same VPC ID, and the ingress block is already correct.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=254.43) [We want to allow port 80 access from anywhere.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=259.15) [We do want to make a change to our existing security group for the](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=262.74) [instances. Now that we have a load balancer in front of them,](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=265.62) [they should only accept traffic from addresses that are](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=268.87) [within the VPC. So we can scroll up and change this](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=271.51) [cidr\_block reference to var.vpc\_cidr\_block.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=275.38) [Now,](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=280.23) [it will only allow traffic from addresses that are in the](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=280.62) [vpc\_cidr\_block. Let's go ahead and save the network file.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=283.52) [The next thing to do is add our load balancer resources. But before we do that,](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=287.64) [we need to know how to construct each of those resources. Let's head back to the docs.](https://app.pluralsight.com/course-player?clipId=281ebd79-83a6-46fd-a8b6-8aaa58cad62b&startTime=292.25)

### [Adding the Load Balancer Resources](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6)

[Back in the docs, let's try to search for aws\_lb, and](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=1.14) [wow, that returns over 1000 results.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=6.47) [Okay, that's not going to be very helpful.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=8.89) [Let's go ahead and clear the filter, and I happen to know](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=10.52) [from experience that this is under Elastic Load Balancing](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=13.43) [v2. So let's scroll down to that.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=16.57) [There's Elastic Load Balancing v2. That includes the application load bouncer](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=19.14) [and the network load balancer. We'll go ahead and expand that out, and we can](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=23.13) [see it split up into Resources and Data Sources.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=26.5) [That means if we had an existing AWS load bouncer and we wanted to use it](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=29.98) [as a data source, we could. But in our case we want to create an AWS load](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=34.31) [balancer resource, so let's go ahead and click on that resource. And just](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=38.53) [like the data source, this gives us an example usage for both the](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=42.2) [application load bouncer and the network load balancer. The example here](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=45.46) [is very close to what we actually want, so let's go ahead and copy this](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=49.88) [and place it in our configuration and then make a few simple updates.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=54.1) [I'll go ahead and copy the text and go over to the](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=58.04) [configuration, and we'll paste it directly in the file.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=60.48) [There we go.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=64.54) [Now let's update the name label and the name of our load balancer. We'll set](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=65.17) [the name label to nginx, and we'll set the name to globo\_web\_alb. Internal](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=69.94) [should be set to false because we're creating a public load balancer. The](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=76.33) [load\_balancer\_type should be application. That's the type that we want. For](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=80.25) [the list of security\_groups, we should update it to the security group that](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=84.17) [we just created.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=87.55) [So let's go into split screen mode and bring up our network](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=88.59) [configuration on the left and scroll down to our new load balancer](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=91.94) [security group and grab that name label, and we'll paste it over here.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=95.77) [And now we need to update the subnets argument to the list of subnets](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=99.98) [that we're going to be using.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=104.09) [So we'll go ahead and delete this subnets argument and add square brackets](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=105.31) [to indicate a list, and now we can add our two subnets.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=109.47) [So I'll go ahead and scroll up to our subnet definitions, and I'll](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=113.18) [grab the resource type, followed by the name label, and the](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=116.92) [attribute that we want is id, so I'll do .id, then I'll add a](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=121.4) [comma, and we'll copy this text, paste it, and update it to subnet2.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=126.28) [Now we've included both of the subnets we want to associate with our](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=131.78) [load balancer. The next property is enable\_deletion\_protection. We're](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=135.4) [going to set that to false because we want Terraform to be able to](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=139.05) [delete this load balancer when we're done with it. For now, we're not](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=141.97) [going to configure the access logs, so I'll go ahead and delete this](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=145.09) [block. And lastly, we'll update our tags to reference our local value,](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=147.97) [local.common\_tags.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=152.84) [That's everything for the load balancer. My challenge to you now is to](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=155.14) [create the rest of the resources using the documentation.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=158.4) [If you get stuck,](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=161.31) [you can reference the solution that's in the m5\_solution directory, and](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=162.17) [when we come back, you can see how I updated my solution.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=166.23) [Okay,](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=170.84) [here's my updated solution, and why don't I get out of split screen mode](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=171.25) [here so we can better see what's in the configuration.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=174.93) [I added the aws\_lb\_target\_group,](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=178.24) [specifying the correct port of 80, the protocol of http, and the correct](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=181.04) [VPC ID. Scrolling down a bit more, I created the aws\_lb\_listener, which](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=185.87) [needs to reference the ARN of the load balancer that we've created, the](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=192.2) [proper port and protocol, and we're going to set the default\_action in](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=196.17) [here of type forward to send traffic to a target group, and then we'll](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=199.95) [specify the target\_group\_arn of the target group we just created.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=204.09) [Scrolling down a little bit more, we have two target group attachments,](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=208.64) [one for each EC2 instance. In there I've specified the](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=212.19) [target\_group\_arn, the target\_id is going to be the idea of each EC2](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=216) [instance, and the ports is going to be ports 80.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=221.15) [That's everything that goes into this configuration.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=224.24) [Now before we apply our updated configuration to our deployment, let's talk a little bit about Terraform state.](https://app.pluralsight.com/course-player?clipId=7e95ee5a-3f21-41f0-bd3e-88e57e509ff6&startTime=227.24)

### [Viewing State Data](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c)

[So far, we've talked about state data as the way that](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=1.44) [Terraform maps what's in your configuration to the actual](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=4.03) [deployment on target environment,](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=7.3) [but what's in that state data and how can you interact with it when necessary?](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=9.64) [Terraform state data is stored in a JSON format.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=14.04) [You should not try to alter this JSON data by hand.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=18.14) [Bad things can and will happen.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=21.86) [We'll be looking at how you can use Terraform commands to work with it shortly.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=24.74) [State data stores important information about your deployment,](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=28.94) [including mappings of resources from the identifier in the configuration](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=32.4) [to a unique identifier in your target environment. Each time Terraform](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=36.74) [performs an operation like a plan or apply, it refreshes the state data by](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=41.41) [querying the deployment environment.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=46.47) [The state data also contains metadata about the version of](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=48.66) [Terraform used, the version of the state data format, and the](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=52.06) [serial number of the current state data.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=55.97) [When Terraform is executing an operation that potentially alters state data,](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=58.74) [it tries to place a lock on the data so no other](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=63.84) [instance of Terraform can make changes.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=66.87) [Imagine if the state data was in a shared location and two admins tried](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=69.84) [to make conflicting changes at the same time, that's no good. Locking](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=74.01) [helps to prevent that situation from arising.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=78.7) [Speaking of the state data location,](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=81.94) [you can store the state locally on your file system, which is what](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=84.23) [Terraform does by default, or you can specify a remote backend for the](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=87.83) [state data, that could be an AWS S3 bucket, an Azure storage account, an](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=92.91) [NFS share, or HashiCorp's Terraform Cloud service. A remote backend for](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=97.93) [state is useful when working on a team to collaborate and to move state](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=102.89) [data off your local machine for safety's sake. We're not going to cover](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=107.24) [remote state data in this course, but if it sounds interesting to you,](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=111.4) [I recommend checking out my Terraform deep dive course to learn more.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=114.92) [Another feature supported by Terraform state is workspaces](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=119.14) [which enable you to use the same configuration to spin up](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=122.56) [multiple instances of a deployment, each with their own separate state data.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=125.84) [We will cover workspaces in more detail in a future module.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=130.62) [What does state data look like?](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=134.36) [Here is a rough sketch of what is in the state data.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=136.64) [We've got the current version of the state data format and the](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=140.04) [version of Terraform that was last used on the data.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=144.3) [This is important because older versions of Terraform might not be](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=147.84) [compatible with the latest format of the state data.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=151.44) [Terraform will let you know if that's a problem.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=154.84) [The serial number is incremented each time the state data is updated. The](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=157.34) [lineage is a unique ID associated with each instance of state data and](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=161.73) [prevents Terraform from updating the wrong state data associated with a](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=166.39) [config. The Output section contains the outputs we saw printed in the](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=170.18) [terminal window in the last module, and resources is a list of resource](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=174.72) [mapping and attributes.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=179.18) [Let's jump over to our configuration and look at the actual](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=180.94) [state file. Back in our configuration, we can see the state](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=184.21) [file is terraform.tfstate.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=187.93) [Let's go ahead and open it.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=190.18) [Starting from the top, the version is version 4, the terraform](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=191.94) [version used is 1.0.8, and the serial number is 32, that is](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=195.29) [incremented each time the state is changed. And then we have our](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=200.45) [lineage, which is the unique ID for this particular state data.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=203.79) [Below that, we have the outputs.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=208.04) [We have a single output defined and the value is stored in the](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=210.25) [state. Below that, we have a list of resources.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=213.61) [The data source is considered a resource, in this case, and](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=217.54) [it has information about that data source.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=220.93) [If we scroll down some more,](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=223.56) [we have our first actual resource, which is our AWS instance.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=225.03) [It has the name label we've associated with this specific resource,](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=229.13) [the provider that was used to create it, and then information](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=232.9) [about that resource including its attributes.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=236.24) [That is what you'll find if you look inside the state file,](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=238.84) [which leads me to another very important point.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=241.76) [You do not want to make any changes to this file directly and honestly](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=244.37) [you probably shouldn't even open the file, in general. Let's look at some commands you can use to work with state data.](https://app.pluralsight.com/course-player?clipId=2bfdd153-3db5-4b5f-9a1d-188e3105018c&startTime=248.22)

### [Terraform State Commands](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6)

[There are a subset of commands with Terraform specifically to deal with state.](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=1.24) [We won't cover all of the commands, but I did want to touch on some of the](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=5.6) [most commonly used ones. To see all the resources being managed by Terraform,](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=8.86) [you can run terraform state list. From that list,](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=13.64) [you might want to know more about a specific resource. You can find out](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=17.99) [more by running terraform state show and the resource address, which is](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=21.71) [the resource type and the name label.](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=26.56) [You can move an item to a different address in the same state file.](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=28.94) [This can be useful for renaming resources or moving them into modules.](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=33.04) [The syntax for that command is terraform state mv for move, followed by the](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=37.33) [source address and the destination address for the resource.](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=42.53) [Lastly, if you need to purge something from the state,](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=46.4) [you can do so by using terraform st rm and the address of the resource.](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=49.09) [You might want to remove a resource from Terraform](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=54.64) [management without destroying it.](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=57.12) [You could remove the resource block from the configuration](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=59.24) [and then remove the entry from state.](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=61.79) [Otherwise, the next time you ran terraform apply,](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=64.24) [it would attempt to destroy the deployed resource in the target environment,](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=66.59) [which leads me to my next and maybe most important point.](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=70.84) [The first rule of Terraform is to make all changes with Terraform. Don't try to](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=74.64) [manually edit state data, and don't make changes to managed resources with the](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=80.82) [cloud console or the CLI. Make changes in the configuration, and then apply](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=85.37) [those changes through Terraform; otherwise, Terraform will either undo your](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=90.66) [changes at best or get hopelessly confused at worst. With that advice in mind,](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=94.98) [let's head back to our configuration and get our updates deployed. Back in our](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=100.68) [configuration, let's go ahead and expand the commands directory and open up the](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=105.37) [m5\_commands. First, let's try out a couple of those Terraform state commands.](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=109.54) [I'll go ahead and bring up the terminal down below, and](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=114.87) [let's first run terraform state list.](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=117.66) [I'll go ahead and expand the window a little bit here and here are](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=120.74) [all of the resources it knows about in state.](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=124.13) [If we want to see the properties of a specific resource,](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=127.17) [we can use the address that's shown on the screen.](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=130.08) [Let's run terraform state show and then look at the](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=132.74) [information for the aws\_instance.nginx1. Okay,](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=136.11) [this now shows us all of the available information about nginx1. I'll go](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=140.34) [ahead and maximize the terminal, and we can see all of the information](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=145.66) [that's in here, and it's a fairly significant amount.](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=149.12) [Next up,](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=153.04) [let's validate our configuration and run the update against our existing deployment.](https://app.pluralsight.com/course-player?clipId=8d406eae-e189-48c0-8100-d140fe96f7c6&startTime=153.49)

### [Deploying the Updated Architecture](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6)

[Before we try to run a plan for our configuration,](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=1.14) [let's first run terraform validate and make sure we don't](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=3.47) [have any mistakes in our configuration.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=6.51) [And as you can see, it caught an error in the loadbalancer.tf file.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=7.96) [It's letting us know that we can't use underscores in](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=11.94) [the name for our load balancer.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=14.64) [Okay, let's go into loadbalancer and update the name with dashes instead.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=16.17) [And I'll go ahead and save the file and we'll run terraform validate again.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=21.02) [Excellent!](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=27.24) [Now our configuration is valid.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=27.86) [Let's go ahead and run terraform plan.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=29.8) [I'll go back to my m5\_commands.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=32.84) [If you haven't already,](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=34.23) [you're going to need to export the environment variable](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=36.41) [TF\_VAR\_aws\_access\_key and secret\_key.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=39.6) [I've already done that, so I can scroll down to the terraform plan command.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=44.14) [I'll go ahead and run that now, and we'll save the plan to m5.tfplan.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=48.16) [Okay, we're going to be making some significant changes here.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=55.54) [We have 12 things to add, 1 to change, and 3 to destroy.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=58.06) [I'll go ahead and expand the terminal so we can see](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=62.44) [what is going on in the plan.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=65.05) [Scrolling up a bit, let's see what's being replaced.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=66.62) [Well, subnet1 needs to be replaced because it's changing availability zones,](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=69.91) [so it's letting us know it's going to delete that subnet and recreate it.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=74.41) [Scrolling up a bit more,](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=77.78) [our security group for the NGINX instances is going to be](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=79.2) [updated because we're changing the ingress block.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=82.86) [Our route table association for subnet1 has to be replaced](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=86.14) [because the subnet is being replaced.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=89.66) [And scrolling all the way up from there to our first nginx1 instance,](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=92.34) [that also has to be replaced in part because we're changing the subnet ID,](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=95.97) [but also because we changed the user data that's associated with the instance.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=100.18) [Now we are fine with all of these changes,](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=105.07) [so let's go ahead and run terraform apply to apply the](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=106.75) [changes to our target environment.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=110.55) [This is going to take a little while because it's going to create that](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=113.44) [subnet and the load balancer and the EC2 instance.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=116.24) [Generally speaking,](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=119.1) [the load balancer is what actually takes the longest to create,](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=120.4) [so I'll go ahead and pause the recording now and we'll jump to](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=123.25) [when the deployment has completed successfully.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=126.57) [Our deployment is successful,](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=130.04) [but our output is still giving us the AWS instance public DNS.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=131.34) [That's something we should probably change.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=135.11) [Let's go ahead and open up outputs, and instead of the instance,](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=137.61) [we want to get the public DNS of our load balancer.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=141.62) [Let's go back in split screen mode and we'll hide the terminal for a moment,](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=144.14) [and let's go to the load balancer.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=150.04) [We'll grab the address for the load balancer,](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=151.37) [which is aws\_lb.nginx.dns\_name for the attribute.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=154.1) [And we'll go ahead and save that output.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=160.35) [We'll bring the terminal back up.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=162.68) [We can run a terraform validate to make sure our change didn't mess anything up.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=165.14) [And now, because we haven't made any changes to the resources,](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=169.32) [we can just run terraform apply directly,](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=174.44) [and we can do that by simply doing terraform apply and adding the flag](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=177.64) [‑auto‑approve so it doesn't prompt us to approve any changes.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=182.04) [I would only recommend doing this when you're absolutely](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=186.44) [certain that no changes will be made that might be](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=188.78) [destructive to your target environment.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=191.33) [Since we're only changing an output,](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=193.55) [it's not going to make any changes to our target environment,](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=195.21) [and now we have the public DNS for our load balancer.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=197.81) [Let's go ahead and grab that load balancer address and plug it into a browser.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=201.16) [I'll go ahead and open up a new tab here and paste this into the browser.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=206.54) [And if we look at the tab, it says Taco Team Server 2.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=211.04) [If we refresh, it now says Taco Team Server 1.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=215.27) [We know that both instances are responding on the load balancer and our deployment is successful.](https://app.pluralsight.com/course-player?clipId=90c54838-977a-403d-8943-89195b100de6&startTime=219.86)

### [Summary](https://app.pluralsight.com/course-player?clipId=940a5a0f-f4d3-4856-aca4-b95fba3ece6c)

[In this module,](https://app.pluralsight.com/course-player?clipId=940a5a0f-f4d3-4856-aca4-b95fba3ece6c&startTime=1.14) [we've added new resources to our configuration to make it](https://app.pluralsight.com/course-player?clipId=940a5a0f-f4d3-4856-aca4-b95fba3ece6c&startTime=1.96) [more resilient and production ready.](https://app.pluralsight.com/course-player?clipId=940a5a0f-f4d3-4856-aca4-b95fba3ece6c&startTime=4.83) [We also took a look at the docs for the AWS provider to help us with](https://app.pluralsight.com/course-player?clipId=940a5a0f-f4d3-4856-aca4-b95fba3ece6c&startTime=7.44) [the arguments and syntax for all our new resources.](https://app.pluralsight.com/course-player?clipId=940a5a0f-f4d3-4856-aca4-b95fba3ece6c&startTime=10.9) [Just remember, there is no shame in reading the docs or copying examples.](https://app.pluralsight.com/course-player?clipId=940a5a0f-f4d3-4856-aca4-b95fba3ece6c&startTime=14.54) [State data is Terraform's map from the config to the](https://app.pluralsight.com/course-player?clipId=940a5a0f-f4d3-4856-aca4-b95fba3ece6c&startTime=19.34) [deployment and it is very important.](https://app.pluralsight.com/course-player?clipId=940a5a0f-f4d3-4856-aca4-b95fba3ece6c&startTime=22.42) [A corrupt state is a dire circumstance to find yourself in. Treat](https://app.pluralsight.com/course-player?clipId=940a5a0f-f4d3-4856-aca4-b95fba3ece6c&startTime=24.8) [the state data with respect and all will be well.](https://app.pluralsight.com/course-player?clipId=940a5a0f-f4d3-4856-aca4-b95fba3ece6c&startTime=29.13) [So far,](https://app.pluralsight.com/course-player?clipId=940a5a0f-f4d3-4856-aca4-b95fba3ece6c&startTime=32.54) [we've only worked with the AWS provider. Now it's time to](https://app.pluralsight.com/course-player?clipId=940a5a0f-f4d3-4856-aca4-b95fba3ece6c&startTime=33.18) [see how you add an additional provider,](https://app.pluralsight.com/course-player?clipId=940a5a0f-f4d3-4856-aca4-b95fba3ece6c&startTime=36.7) [how to work with provider versions, and we're going to learn what](https://app.pluralsight.com/course-player?clipId=940a5a0f-f4d3-4856-aca4-b95fba3ece6c&startTime=39) [provisioners are and why you probably shouldn't use them. That's all coming up in the next module.](https://app.pluralsight.com/course-player?clipId=940a5a0f-f4d3-4856-aca4-b95fba3ece6c&startTime=42.77)

## [Adding a New Provider to Your Configuration](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c)

### [Overview](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c)

[One of the key strengths of Terraform is its vendor](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=0.24) [agnostic and pluggable approach.](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=3) [Anyone can develop a provider plugin for Terraform and you can](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=5.64) [use more than one provider in a configuration.](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=9.51) [We will see how to add and configure providers in this module.](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=12.64) [Hey everyone. This is Ned Bellavance. I'm a HashiCorp](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=16.44) [ambassador and founder of Ned in the Cloud.](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=18.87) [Let's add a new provider to our configuration.](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=21.44) [Our configuration will continue to evolve in this module based on requests from](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=25.14) [both the development and ops teams at Globomantics. One of their requests will](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=30.26) [require adding a new provider to the configuration,](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=35.23) [but before we do that, we'll learn a bit more about](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=38.44) [how to add and configure a provider.](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=41.22) [We are also going to dig into the dependency graph that Terraform creates](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=44.44) [when planning a deployment and learn when it might be necessary to specify](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=49.01) [an explicit dependency in your configuration.](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=53.67) [Finally,](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=57.34) [we are going to examine the options that exist for post](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=58.03) [deployment configuration of resources.](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=61) [Once our EC2 instances are deployed,](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=63.74) [how do we perform the initial configuration and](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=66.36) [manage them going forward? First, it's time to check in with Sally, Sue, and John.](https://app.pluralsight.com/course-player?clipId=f45d55dd-e9c8-486e-ac12-13b28cc1464c&startTime=69.31)

### [Globomantics Architecture Updates](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200)

[Our deployment is shaping up nicely. We've got a multi‑zone, multi‑instance](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=2.14) [application running up in AWS. But, of course, nothing in IT is ever really](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=6.83) [done. The Dev and Ops teams both have new requests.](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=12.41) [Our friend Sally Sue has a couple requests from the](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=17.24) [development side of the house.](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=20.04) [For starters, she would like to give us the website files and have them](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=21.84) [dynamically uploaded to the web servers at startup.](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=25.5) [She would also like to get access to the request logging from](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=29.04) [the load balancer for analysis and debugging.](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=32.4) [John has a few things he'd like to see us implement as well. As](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=36.24) [Terraform is adopted by Globomantics, he wants to make sure we are all](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=40.24) [using the same major version of Terraform and the provider plugins. He](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=44.53) [would also like the Terraform files to be formatted consistently to help](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=49.27) [with sharing across the teams.](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=53.89) [Why don't we start with Sally's two requests by updating our architecture](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=56.54) [to support her needs. It sounds like she needs an S3 bucket for logging,](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=60.58) [and we can also put her website files there to be picked up by the EC2](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=65.26) [instances when they start up. In our architecture, we will add an S3](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=69.49) [bucket and upload the website content to it. Then we will assign the EC2](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=74.76) [instances a profile that has access to copy information from the S3](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=80.99) [bucket.](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=86.27) [The load balancer configuration supports logging to an S3 bucket, so we can use](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=87.74) [the same S3 bucket to write those access logs out. S3 buckets need to have](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=92.86) [globally unique names, and that's something we can generate with the random](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=99.67) [provider for Terraform. With that in mind, let's see how we can add a provider and meet some of John's requests.](https://app.pluralsight.com/course-player?clipId=d9639105-fa94-4855-9849-45cdd9daf200&startTime=103.98)

### [Terraform Providers](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0)

[Provider plugins are Terraform's superpower.](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=1.34) [We talked about providers in an earlier module,](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=4.74) [but now that you've had a chance to use them,](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=7.09) [it's time to go into greater detail.](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=9.24) [As we have already seen,](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=11.76) [Terraform provider plugins are available in the public](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=14.08) [registry at registry.terraform.io,](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=17.02) [but you can also get provider plugins from other public registries,](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=20.54) [privately hosted registries or even your local file system.](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=24.31) [We aren't going to get into that use case in this course,](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=28.44) [but it's useful to know.](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=31.29) [There are three types of provider plugins available](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=33.14) [on the Terraform hosted registry, Official,](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=35.93) [Verified, and Community.](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=38.88) [Official providers are written and maintained by HashiCorp.](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=41) [Verified plugins are written and maintained by a third‑party](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=44.64) [organization that has been verified by HashiCorp and is part of](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=48.26) [the HashiCorp technology partner program.](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=52.5) [Community provider plugins are written and maintained](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=55.1) [by individuals in the community,](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=58.21) [and have not gone through the verification process.](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=60.12) [There's nothing inherently wrong or bad about using community providers,](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=63.44) [but you should be aware of their providence and probable level of support.](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=67.75) [One thing all the providers have in common is that they are open source and](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=72.14) [written in Go. If you have the inclination to inspect or contribute to a](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=76.14) [provider, the code is readily available for you to do so. Providers themselves](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=80.68) [are a collection of data sources and resources, as we have seen when reviewing](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=86.81) [the documentation. Providers are versioned using semantic version numbering.](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=91.8) [You can control what version of a provider plugin you use in your](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=97.83) [configurations so you can avoid a situation where a provider is updated and it](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=101.99) [breaks something in your deployment. Within your configuration, you can invoke](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=106.92) [multiple instances of the same provider and refer to each instance by an alias.](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=112.08) [For example,](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=118) [an instance of the AWS provider is limited to one region and account.](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=118.7) [If you wanted to use more than one region in a configuration,](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=123.59) [you could do so with multiple instances of the AWS provider and aliases.](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=127.06) [Let's take a look at how you can specify the source of a](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=133.24) [provider plugin and the desired version. This will help us fulfill John's request.](https://app.pluralsight.com/course-player?clipId=1815a734-45d4-4ff9-b01d-50e08a9f6ce0&startTime=136.28)

### [Provider Syntax](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1)

[We have already seen how to create a provider block in our configuration,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=1.34) [and you might assume that is where you would specify](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=5.17) [more information about the provider, like its version and source.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=8.6) [That assumption would be well founded,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=12.74) [but unfortunately incorrect. Provider information is](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=14.62) [defined in the terraform configuration block using a nested](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=18.24) [block called required\_providers.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=22.38) [We haven't seen the terraform block before.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=25.44) [It is used to configure general settings about a Terraform configuration,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=27.68) [including the version of Terraform required,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=31.5) [back‑end settings for the state data, required provider plugins,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=34.24) [provider metadata, and experimental language features.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=38.35) [For the purpose of this course,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=41.38) [we will focus on using the terraform block to define our required\_providers.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=43.15) [Each key in the required\_providers block will be the](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=48.04) [name reference for a provider plugin.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=51.88) [The convention is to use the standard provider\_name,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=54.64) [unless you're going to have multiple instances of a](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=57.96) [plugin from different sources.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=61.08) [That's an advanced topic and one you're unlikely to encounter when](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=62.96) [you're first getting started with Terraform,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=67.25) [so don't worry about it right now.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=68.94) [The value for the provider key will be a map defining the source of](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=71.16) [the plugin and the version of the plugin to use.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=75.87) [By default,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=79.13) [Terraform assumes you are getting your plugin from the](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=80.26) [HashiCorp‑hosted Terraform Registry,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=83.29) [and it provides a simple shorthand for the address value.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=85.5) [There is an expanded form of the address for alternate locations.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=89.84) [The version of the provider can use several different arguments,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=94.24) [including setting it equal to a version,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=97.74) [a range of versions,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=100.13) [or using a special sequence of a tilde followed by a greater‑than symbol.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=101.67) [That last one is not immediately intuitive, so let's look at an example.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=106.11) [We've been using the AWS provider from the Terraform Registry.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=110.83) [If we wanted to add it to our required\_providers block,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=115.32) [we would set the key to aws,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=118.57) [as that is the name of the provider in the documentation.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=120.6) [For the source, we can use the shorthand of hashicorp/aws.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=124.18) [Since we're not giving Terraform a full address of the plugin,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=130.04) [it will try and find the plugin on the Terraform Registry.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=133.56) [Under our version, let's say we wanted to stay on version 3 of the plugin,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=137.22) [but we don't care about the minor version.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=142.61) [Using the tilde and greater‑than symbol tells Terraform to](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=145.03) [find the latest plugin that is of the form 3.x. If we wanted](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=149.04) [to stay on the minor version of 3.7,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=154.18) [we could update the expression to 3.7.0, and that would](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=156.98) [keep us on the latest 3.7 release.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=161.5) [Most of the breaking changes in a provider will come from a](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=165.04) [major version release, so staying on the same major release of](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=168.52) [a plugin should keep things stable,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=172.85) [although your mileage may vary depending on the provider.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=174.99) [Once we've defined our required\_providers,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=178.84) [we can reference them in a provider block. The block starts with](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=181.17) [the provider keyword, and then the name of the provider used in](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=184.95) [the required provider block. If you are going to create more than](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=188.83) [one instance of the provider, you can add an alias argument inside the block,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=192.65) [providing a string for that instance of the provider.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=197.69) [And then you can provide any additional arguments that are specific to](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=201.64) [that provider. Assuming we've gone with the convention and used aws as](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=205.72) [the provider\_name for the AWS provider, our provider block stays the](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=210.96) [same, with aws as the name label.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=215.55) [If we want to create an additional instance of the AWS](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=218.84) [provider for a different region,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=222.17) [we could give an alias of west in the block. To use the aliased](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=224.12) [instance of the provider with a resource or data source, we would add](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=228.99) [the provider argument to the configuration block.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=233.64) [The value would be the provider\_name.thealias,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=237.04) [which would be aws.west, in this case. If no provider argument is](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=240.31) [specified, Terraform will use a default provider instance with no](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=245.66) [alias set. Armed with all this new knowledge,](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=249.96) [let's head over to our configuration and add a required\_providers block for the AWS and random providers.](https://app.pluralsight.com/course-player?clipId=2d80d406-422b-41dc-bbfe-b7e45cb7c5d1&startTime=253.2)

### [Specifying Required Providers](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57)

[Before we add the terraform and required\_providers block to our](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=1.24) [configuration, let's take a look at the docs. We can browse to the AWS](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=5.33) [provider by clicking on Browse Providers and going to AWS. And let's go](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=9.72) [into the Documentation tab, and in the beginning of the AWS Provider it](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=15.04) [provides some Example Usage, and there is the terraform block and](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=20.35) [required\_providers block.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=24.36) [That's exactly what we want, so let's go ahead and](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=26.14) [copy that text from the example.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=28.61) [So I'll copy that text, and let's go over to our configuration. In our](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=32.14) [configuration, let's go ahead and expand the globo\_web\_app directory, and](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=37.54) [we're going to create a new file called providers.tf, and in the](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=41.36) [providers.tf file we'll go ahead and paste that text.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=45.97) [Okay,](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=49.54) [now we are sourcing our provider from the public registry, and](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=49.98) [we're setting the version to stay on major version 3. Right](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=53.85) [now 3.63 is the latest version,](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=57.51) [but when they come out with 3.7, we'll automatically upgrade to 3.7.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=59.87) [If version 4 comes out,](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=64.65) [we will not automatically upgrade to that, and that is what we want. Now](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=66.29) [that we have our AWS provider added, there's something else I want to point](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=70.88) [out about the AWS provider documentation. Something that we glossed over](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=74.96) [when we were looking at the documentation earlier is the Authentication](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=80.25) [section for the AWS provider.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=83.86) [This provides information about how to authenticate using the provider.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=86.64) [We've been using static credentials up until now, defined in variables.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=90.95) [There are many other options for authentication.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=96.04) [We have environment variables; a shared credentials or](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=98.73) [configuration file which is generated by the AWS CLI; and](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=101.94) [also if you're running Terraform on AWS,](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=106.63) [you can leverage CodeBuild, ECS, EKS or the EC2 Instance Metadata Service.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=109.72) [Instead of using hard‑coded credentials with variables, an approach](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=116.48) [that I've often seen is using environment variables.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=121.23) [Let's scroll down to the Environment Variables area.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=124.2) [We can provide our credentials with two environment variables as](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=127.34) [opposed to defining variables inside of the Terraform](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=131.24) [configuration. By doing that, we will prevent someone from](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=134.48) [accidentally hard‑coding credentials in a terraform.tf vars file](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=137.56) [and checking that into source control.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=141.79) [That's bad.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=143.78) [We don't want that to happen.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=144.48) [So let's go back to our configuration,](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=145.81) [remove those variables, and from here on out we can use](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=147.82) [the environment variables instead.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=151.07) [Okay, back in the configuration,](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=153.54) [let's go ahead and open up our variables file, and we are going to delete the](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=155.42) [aws\_access\_key and aws\_secret\_key from our list of variables.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=161.12) [We'll go ahead and do that now, there we go.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=165.91) [We're going to keep the aws\_region, because we need](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=168.49) [to define that for our provider.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=171.13) [I'll go ahead and save that file, and now let's go to where our provider is](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=173.14) [defined. Right now that's sitting in the network.tf file.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=177.54) [That's probably not the best place for it, so let's go ahead and](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=181.54) [remove that from the network.tf file, and instead we'll add it to the](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=184.92) [providers.tf file. So I'll go ahead and add it in there, and now I can](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=190.17) [remove the access\_key and secret\_key arguments, since we'll be](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=195.61) [supplying those values through the environment variables defined in](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=199.27) [the documentation.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=202.62) [Now let's head back to the documentation and we will walk through adding the random provider to our configuration.](https://app.pluralsight.com/course-player?clipId=82eee115-5abf-45b0-a7d1-2de3ce12ef57&startTime=204.24)

### [Adding the Random Provider](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93)

[We are going to use the random provider and the random\_integer resource in the](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=1.34) [provider to help generate a unique ID for our S3 bucket.](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=6.2) [Remember S3 bucket names need to be globally unique.](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=10.85) [The easiest way to do that is add some sort of unique ID to](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=14.39) [the end of the name for your S3 bucket.](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=18.21) [Let's go ahead and search for the random provider, and](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=21.04) [it comes up as the first result.](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=24.27) [We can go ahead and click on that, and if we want](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=26.01) [to see how to use the provider,](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=28.85) [we can actually click on the USE PROVIDER drop‑down. That will give us](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=30.51) [an example of how to add it to our existing terraform block or add a](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=34.39) [new terraform block if we don't have it.](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=38.54) [My challenge to you now is to add this additional provider to the](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=41.14) [required\_providers block in the configuration and set the version to stay on](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=44.89) [major version 3, but accept updates in the minor version.](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=49.51) [Go ahead and pause the video now and try to add the provider on your own.](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=54.24) [Okay, let's see how you did.](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=59.44) [Going back to the configuration, I have added the random provider to my](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=61.24) [required\_providers block, and I've set the version to ~> 3.0, which will keep](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=66.42) [us on the major 3.0 version. The resource we want to add from random is the](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=72.28) [random integer, so let's go back to the documentation and see how we add](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=78.09) [that. Back on the website, let's click on the Documentation area, and before](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=81.73) [we expand the resources, one thing I want to point out about the random](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=86.79) [provider is that it doesn't have any configuration options for the provider](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=90.25) [block,](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=94.47) [which means you don't actually need to include a provider block](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=94.91) [in your configuration since there's nothing to configure. With](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=98.55) [that in mind, let's expand the resources here and take a look](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=102.28) [at the random\_integer.](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=105.96) [Here's the random\_integer with an example usage.](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=107.94) [What I would like for you to do now is add the random\_integer](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=111) [resource to the locals.tf file in our configuration, and set the](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=114.67) [minimum to 10000 and the maximum to 99999.](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=119.59) [You don't have to include the keepers argument, just a min](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=124.49) [and a max and use the name\_label of rand.](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=127.74) [Go ahead and pause the video now, and we'll come back and see how you did.](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=131.24) [Okay,](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=135.04) [let's go to my updated configuration and see how I added the random\_integer](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=135.64) [resource to my locals.tf file. Here is my locals.tf file, and you can see I've](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=139.84) [added the resource random\_integer with the name\_label rand, setting a minimum](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=145.9) [value of 10000 and a maximum value of 99999.](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=150.43) [When we use this as part of our S3 bucket naming, we will have a five‑digit](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=155.01) [random integer that will be appended to the name of the S3 bucket. With those](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=159.84) [components in place, let's look at the resources we need to add for our S3 bucket and to allow access from the EC2 instances.](https://app.pluralsight.com/course-player?clipId=04e5cba4-cd26-4208-846b-7c37a86adb93&startTime=164.78)

### [Creating IAM and S3 Resources](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505)

[With our provider situation figured out,](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=1.24) [we can turn to Sally's request to add an S3 bucket for website content and](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=3.82) [logging. Before we jump back into the configuration,](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=8.66) [let's figure out what resources we will need to create.](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=11.88) [We are going to create an S3 bucket and place objects in that bucket for the](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=15.44) [website. To accomplish that goal, we are going to use the aws\_s3\_bucket](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=20.16) [resource and the aws\_s3\_bucket\_object resource.](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=25.02) [Our EC2 instances will need access to the S3 bucket, but we don't want to](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=30.14) [make the bucket public for everyone, instead we can create some IAM](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=35.21) [resources to help us grant access to the EC2 instances. We'll create a](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=39.24) [role using the aws\_iam\_role and grant that role permissions to the bucket](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=44.66) [with an aws\_iam\_role\_policy.](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=50.29) [Then we can assign the role to the EC2 instances by creating an](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=53.24) [aws\_iam\_instance\_profile and then adding an entry to our](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=57.5) [aws\_instance block to use that instance profile.](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=61.98) [We also need to provide the load balancer access to the S3 bucket, and we](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=65.94) [can do that through a bucket policy that refers to a data source of](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=70.85) [aws\_elb\_service\_account. That will give us the service principal account](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=75.83) [for the elastic load balancer in the region that we're currently working](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=82.11) [in, and we can grant that access to the S3 bucket. With all that context in](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=85.53) [mind, let's head over to our configuration and add some placeholders for](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=90.72) [each resource. Back in our configuration, let's add a file for the S3](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=94.79) [configuration and we'll call it s3.tf, and within that file let's add](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=100.28) [placeholders for all the different resources that we need to create.](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=104.87) [So I'll add in the comments for the file, aws\_s3\_bucket,](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=108.84) [aws\_s3\_bucket\_object, aws\_iam\_role, aws\_iam\_role\_policy,](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=113.21) [and aws\_iam\_instance\_profile.](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=122.44) [In addition to these resources,](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=126.24) [let's go ahead and open up the loadbalancer file, and let's add a](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=127.92) [placeholder to the beginning of this loadbalancer file.](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=131.59) [Okay, there we go, we've got all of our placeholders. For the website](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=135.24) [files that we'll be uploading to our S3 bucket, those are located in](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=139.44) [the root of the exercise files. So we can scroll down to the bottom](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=143.62) [here. Those are the website files.](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=146.61) [We've got an index.html file and an image file of the Globomantics logo.](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=148.37) [We'll go ahead and copy this website directory and paste](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=154.24) [it in our globo\_web\_app directory.](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=157.99) [There we go, we now have our website files.](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=160.34) [The other thing we need to do is create a name for our S3 bucket,](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=162.79) [and we can do that by defining a new local value.](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=165.97) [So let's open our locals.tf file, and we'll add another value in here.](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=169.44) [We'll set the name to s3\_bucket\_name, and we'll set the value to](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=174.64) [globo‑web‑app‑, and then the integer from our random\_integer resource,](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=180.9) [which we can do by adding the interpolation symbol with the](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=188.34) [dollar sign and the curly braces, and then the reference to](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=191.53) [the result from that resource, which is going to be random\_integer.rand.result.](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=194.28) [That will append a five‑digit unique ID to our S3 bucket name. Going back to the](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=200.64) [s3.tf file, my challenge to you, if you really do want a challenge, is to try to](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=206.66) [add all of the necessary resources to this file.](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=213.02) [I will say that many of these resources require you to write an IAM policy](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=216.84) [or a bucket policy, and that's very difficult, so maybe skip those portions](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=221.49) [of the resource configuration and try to do the rest, along with the](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=226.69) [loadbalancer data source. And then you can take a look in the M6 solution](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=230.28) [directory to see how the IAM policies are configured for each of the](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=235.28) [resources that uses it.](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=240.19) [This is going to be a real challenge, so if you want to do it, go ahead and pause the video now and we'll come back to see my solution.](https://app.pluralsight.com/course-player?clipId=fde4e6ee-8058-4f0f-8b76-c7fe7b39c505&startTime=241.94)

### [Viewing the Updated Configuration](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb)

[Okay, welcome back.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=1.34) [Let's see how you did.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=2.38) [And first, we'll start with the S3 bucket.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=3.45) [The bucket argument is going to be the name of the bucket,](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=6.04) [and we're going to set that to our local value.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=8.98) [The acl Is going to be private because we don't want this to be a](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=11.51) [public bucket. We'll set the force\_destroy = true,](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=15.41) [which allows Terraform to destroy the bucket.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=19.68) [Now below that is the policy, and we're going to embed the entire policy here,](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=22.64) [which is in JSON.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=27) [In order to do that,](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=28.51) [we are going to use the heredoc syntax that we saw when we](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=29.85) [configured the user data for our instances.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=32.88) [And this will replicate this text exactly except for the](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=35.12) [interpolation that we've added for the values from Terraform.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=39.39) [So let's take a look at what's in this policy.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=43.02) [And don't worry about being a bucket policy or an IAM policy expert.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=45.35) [This is a Terraform course, after all, and not one on AWS.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=50.04) [So I'm just going to point out the relevant things for you if](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=53.3) [you're ever writing one of these policies.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=56.64) [In our statement for the bucket policy,](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=58.73) [we want to allow the load balancer and the delivery](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=61.84) [logs service access to this S3 bucket.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=64.62) [We do that by adding an effect of allow,](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=68.17) [and we're going to reference a principle here from our Elastic](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=70.92) [Load Balancer service account data source.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=74.49) [So if we go over to the loadbalancer file,](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=77.13) [this is the data source that you'll need to reference the service](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=80.28) [account used by Elastic Load Balancers in your region.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=83.74) [Okay, going back to the S3 file, for the action,](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=87.54) [we're giving it s3:PutObject, and for the resource,](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=91.46) [we're giving it the bucket name and then the path, alb‑logs.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=95.17) [This gives the Elastic Load Balancer permission to write](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=99.64) [data to that path in our S3 bucket.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=103.07) [We're also going to give that same permission to the](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=106.64) [service delivery.logs.amazonaws.com.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=108.9) [And we're going to give that service an additional](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=112.74) [permission of s3:GetBucketAcl.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=115.31) [This entire policy is available on the AWS docs,](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=119.24) [so don't worry about trying to memorize it or anything.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=122.27) [You can always go back to the documentation and find it.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=124.77) [Alright, scrolling down to the next resource,](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=127.67) [we have our two bucket objects,](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=130.44) [which are the website components we want to upload to the S3 bucket.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=132.46) [We first have the bucket argument that references the S3 bucket,](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=137.24) [and then we have a key,](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=141.27) [which is the destination on the S3 bucket where it should create that object,](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=142.85) [and the source is where to get that object from.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=147.36) [We're getting it from the website directory that we copied](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=150.1) [into our configuration directory earlier.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=153.25) [Scrolling down a bit more,](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=156.06) [we get into the IAM portion of things by first creating the IAM](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=157.91) [role that's going to be used by our instances.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=162.33) [The name is allow\_nginx\_s3. And for the assume role policy, this allows EC2](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=166.14) [instances to assume this role. That's all that does. Scrolling down a little](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=173.46) [bit more, we get into the role policy, and this is the policy that actually](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=178.56) [grants permissions to access the S3 bucket.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=182.93) [We're naming it allow\_s3\_all, and we're assigning it to the role that we](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=187.03) [just created by name, and then we define the policy with the same heredoc](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=192.2) [syntax. We're giving it the Action s3:\*, which means you can do anything in](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=196.72) [the S3 bucket, and we're assigning it the resource of the bucket name and](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=201.6) [any paths along that bucket name.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=206.48) [That's the policy that's assigned to the IAM role we just created.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=209.64) [Scrolling down a bit more, we get into the instance profile. The](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=213.49) [instance profile is what's going to be assigned to the EC2 instance.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=217.5) [We're giving it the name nginx\_profile.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=221.15) [We're associating it with the role that we created earlier, and we're](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=223.68) [giving it the common tags like we have with everything else in this](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=227) [configuration that supports common tags.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=230.13) [The next thing we need to do is update our instance and our load](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=233.24) [balancer to take advantage of this S3 bucket. But before we do that, we need to talk about dependencies.](https://app.pluralsight.com/course-player?clipId=8750307f-5a39-4d85-bd50-45d4af2a4feb&startTime=237.15)

### [Planning and Dependencies](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc)

[When Terraform is trying to make the deployment match your configuration,](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=1.24) [it has to run through a planning process.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=5.38) [Terraform goes through this process when you run a plan, apply or destroy.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=7.94) [As part of the planning process, it needs to figure out the order in which to](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=12.74) [create, update or delete objects. To calculate a plan of action, Terraform](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=17.07) [will first refresh and inspect the state data. Then it will parse the](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=23.77) [configuration and build a dependency graph based on the data sources and](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=28.89) [resources defined in the code. Comparing the graph to the state data,](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=33.77) [Terraform will make a list of additions,](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=39.04) [updates, and deletions. Ideally, Terraform would like to make](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=41.89) [the updates in parallel, so it tries to figure out which](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=46.13) [changes are dependent on other changes.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=49.59) [Changes that are not dependent on other changes can be made](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=52.34) [at the same time, while changes that have a dependency will](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=55.43) [have to be done serially.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=58.88) [How does Terraform figure out the order in which changes need to happen?](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=61.34) [References. Let's look at an example that we have](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=65.64) [in our configuration right now.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=69.3) [In our current configuration, we are creating a VPC,](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=71.64) [a subnet, and an EC2 instance.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=75.05) [The VPC doesn't refer to any other resources in the configuration,](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=77.74) [so Terraform can create it immediately.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=81.89) [If we look at the arguments in the aws\_subnet resource,](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=85.04) [we have a reference to the vpc.id. The reference](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=89.05) [creates a dependency on the VPC resource.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=92.93) [Terraform will wait until the VPC is created, and then](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=96.64) [use the ID to create the subnet.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=100.1) [Our aws\_instance configuration has a reference to the aws\_subnet ID.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=103.14) [That creates a dependency for the EC2 instance, so Terraform will](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=109.33) [wait for the VPC and then the subnet to be created before it tries](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=113.9) [to create the EC2 instance.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=118.44) [Terraform can infer the dependency tree for this configuration](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=120.94) [implicitly. It doesn't need you to tell it that the subnet is](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=124.66) [dependent on the VPC. Sometimes a dependency is non‑obvious, and you](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=128.15) [must explicitly tell Terraform about it.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=133.28) [We actually have that situation in our configuration](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=136.74) [right now, you just don't know it yet.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=139.85) [It's one of those things that you only figure out once it breaks, so let](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=142.09) [me explain. In our configuration, we are creating an aws\_iam\_role. Both](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=145.95) [the instance\_profile and the role\_policy directly reference the iam\_role,](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=152) [so Terraform will wait until the role exists to create those two](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=157.16) [resources. To assign proper permissions to our EC2 instances, we have to](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=161.69) [add the instance\_profile to our aws\_instance configuration, which creates](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=167.55) [a dependency between the instance\_profile and the instances. However,](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=172.97) [in order for the EC2 instances to actually access the](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=177.99) [S3 bucket using the iam\_role\_policy,](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=182.03) [it also needs to be created. If the EC2 instance starts up](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=185.29) [before the iam\_role\_policy is ready, access to the bucket](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=190.06) [will be denied, and that's bad.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=194.35) [The solution is to add a depends\_on argument to the aws\_instance resource](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=197.64) [that references the iam\_role\_policy. With that explicit dependency,](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=203.34) [Terraform will wait until the iam\_role\_policy creation is complete before](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=208.55) [moving on to creating the aws\_instances.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=213.33) [Generally speaking, Terraform is pretty good at detecting implicit dependencies.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=216.64) [The depends\_on argument should be used sparingly, and only](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=221.74) [when an explicit dependency is required.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=225.2) [Armed with that knowledge,](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=228.44) [let's go back to the configuration and update the load balancer and EC2 instances.](https://app.pluralsight.com/course-player?clipId=579eafbc-5fab-44be-a61a-faca3a1bb1bc&startTime=229.51)

### [Updating the Load Balancer and Instances](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7)

[Okay, my challenge to you is to go into the load balancer and add the](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=1.34) [access log configuration and go into the EC2 instance,](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=5.88) [add the instance profile, and add that depends\_on argument. The depends\_on](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=10.36) [argument is expecting a list of references to other resources within the](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=15.8) [configuration. So go ahead and try that now,](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=20.57) [pause the video, and when we come back, we can take a](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=23.24) [look at my updated configuration.](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=25.92) [Alright, welcome back.](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=29.84) [Let's see how you did.](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=30.91) [Let's first take a look at the load balancer configuration.](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=32.07) [In the load balancer configuration, you can see there's now an](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=35.54) [access\_logs configuration block inside of the resource, and in there,](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=38.53) [we are referencing the bucket that we created.](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=42.8) [We're going to use the actual reference and not the bucket name, so we](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=45.32) [create a dependency between the load balancer and the bucket.](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=48.49) [The prefix is going to be alb‑logs, and enabled is set](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=52.24) [to true. We want to write logs there.](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=56.27) [Okay, now let's take a look at the instances.](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=58.23) [In our instances, I have added an argument, iam\_instance\_profile, and it's](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=61.24) [set to the name attribute of the profile that we created.](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=66.83) [For depends\_on, we're giving it a list of resources it should be dependent on,](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=71.14) [so we need the square brackets, and then in there, I am referencing the](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=75.28) [iam\_role\_policy.allow\_s3\_all. So the instance will wait until that role policy](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=79.46) [is created before spinning up the instance.](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=86.09) [If we scroll down a little bit, we also have to update our](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=89.34) [second AWS instance, so don't forget to do that.](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=92.06) [We want them to be configured the same.](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=95.34) [The last thing we need to do is update our user data script. But before we do that, let's discuss post deployment configuration options.](https://app.pluralsight.com/course-player?clipId=6fc1ffba-6f90-409e-ba92-69aa53af9dc7&startTime=97.44)

### [Post Deployment Configuration](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26)

[After a resource is created, sometimes you need to perform post‑deployment](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=1.44) [configuration. It could be loading an application onto a virtual machine,](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=6.28) [configuring a database cluster or generating files on an NFS share based on](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=10.7) [resources that are created. If you want to stay in the Terraform ecosystem,](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=15.63) [there are many providers and resources that can help you with](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=20.79) [post‑deployment activities.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=24.72) [If you want to create a file, there's a file resource.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=26.84) [If you need to configure a MySQL database cluster,](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=30.21) [there is a MySQL provider. Using native Terraform](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=33.78) [resources will often be the answer.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=37.38) [Another option specific to servers is to pass data as a](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=40.44) [startup script to the server operating system.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=44.17) [All the major cloud providers offer a way to pass a script,](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=47.14) [although the name of the argument changes. For AWS,](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=50.74) [we are already using the user data argument to pass a startup script.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=54.02) [The downside to passing a script is that Terraform has no way](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=58.62) [to track if the script is successful or not.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=62.07) [It's simply another argument in the configuration.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=64.78) [If the script fails,](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=67.3) [you need to gracefully handle that, or you could go outside of](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=68.48) [Terraform and leverage configuration management software.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=72.05) [There are many different config management options out there,](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=75.74) [which Terraform can hand off to for post deployment configuration.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=78.98) [Ansible, Chef, Puppet are three well‑known examples. A common](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=83.03) [practice is to bake the configuration management software into a](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=88.48) [base image for a machine and have Terraform use that base image when](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=92.1) [it creates an instance.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=96.18) [If all else fails,](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=98.24) [you can use Terraform provisioners. You're likely to encounter these out](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=100.17) [in the wild as you ramp up on Terraform, so let's dig into what](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=105.05) [provisioners are and why they're usually a bad idea.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=108.52) [Provisioners are defined as part of a resource, and they are](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=113.14) [executed during resource creation or destruction.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=116.52) [A single resource can have multiple provisioners defined with each provisioner](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=120.94) [being executed in the order they appear in the configuration.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=126.11) [If you need to run a provisioner without a resource,](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=130.34) [there is a special resource called the null\_resource that allows you](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=133.86) [to run provisioners without creating anything.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=137.81) [If a provisioner fails,](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=141.54) [you can tell Terraform to either fail the entire resource](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=143.31) [action or continue on merrily. Which one you choose will](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=146.48) [depend on what the provisioner is doing.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=150.27) [HashiCorp considers provisioners as a last resort when all other options](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=153.14) [have been considered and found lacking. Provisioners are not creating](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=157.79) [objects Terraform can fully understand and manage, which puts the onus on](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=162.16) [you and your team to ensure things like error checking, idempotence, and](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=167.01) [consistency are implemented properly.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=171.33) [There are three provisioner types. The file provisioner will](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=174.44) [create files and directories on a remote system.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=178.18) [The local‑exec provisioner allows you to run a script on the local machine](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=182.14) [that is executing the Terraform run. Local‑exec is used as a workaround for](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=186.2) [functionality that may not yet be in a provider, and it's probably the](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=191.37) [provisioner you'll see most often. Remote‑exec allows you to run a script](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=195.4) [on a remote system. Most of the time, the file provisioner and the](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=200.51) [remote‑exec can be easily replaced with a startup script through something](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=204.61) [like user data.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=208.91) [There used to be more types that were specific to](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=210.54) [configuration management products like Chef or Puppet,](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=212.74) [but all of those have been deprecated. In case you encounter](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=215.82) [provisioners out there in the wild, let's look at some examples of how they're configured.](https://app.pluralsight.com/course-player?clipId=6f3bff17-d945-41f3-8ac3-b33a15b09a26&startTime=219.79)

### [Provisioner Syntax](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1)

[In the file provisioner example,](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=1.44) [we are first defining how the provisioner can connect to](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=3.58) [the remote machine to copy those files.](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=6.85) [It is also possible to define a connection block for](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=9.54) [all provisioners used in a resource.](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=12.63) [The connection types are either going to be SSH or WinRM.](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=15.34) [A provisioner can refer to the attributes of the](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=19.94) [resource it lives in using the self object.](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=22.69) [For instance,](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=25.69) [here we are getting the public IP attribute of an EC2](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=26.72) [instance the provisioner needs to connect to.](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=30.84) [The source and destination arguments define the files or](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=33.47) [directories that should be copied to the remote machine.](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=37.12) [The local‑exec provisioner does not need a connection block](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=40.74) [since it is running on the local machine.](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=44.2) [You can pass it a command to execute and specify which](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=46.13) [interpreter to use for executing the command,](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=49.64) [for instance, Bash, PowerShell, Perl or any other interpreter that you have.](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=52.38) [The remote‑exec provisioner will need connection information](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=58.04) [defined in the resource or in the provisioner.](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=61.43) [Remote‑exec can execute an inline script,](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=64.24) [a script stored in a file or a list of paths to local scripts](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=67.25) [executed in the order they are provided,](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=71.65) [which is what I'm showing here in the example.](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=74.06) [As I said,](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=76.69) [HashiCorp recommends heavily against using provisioners whenever possible,](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=77.88) [but you still may encounter them in your Terraform travels.](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=82.74) [For our configuration,we're going to stick with user](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=85.89) [data for post‑deployment config.](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=88.84) [Let's head over to our configuration and update it to grab those website files from the S3 bucket onto those EC2 instances.](https://app.pluralsight.com/course-player?clipId=74745ced-abb1-4098-b294-29f6f919d2e1&startTime=90.69)

### [Updating the Startup Script](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c)

[Our goal here is to update the script that's defined in the](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=1.34) [user data argument for each instance.](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=4.84) [Were trying to grab the two files that make up our website from the S3 bucket,](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=7.23) [copy them down locally, and then move them to the](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=12.34) [/usr/share/nginx/html directory.](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=15.44) [So we're going to replace some of the commands that are here with new commands.](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=19.44) [The good news is Amazon Linux comes with the AWS CLI, so we can use the AWS](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=23.14) [S3 commands that are baked into the CLI, and the command line will](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=28.75) [automatically use the instance profile that's been associated with the EC2](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=33.28) [instance to authenticate to the S3 bucket.](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=37.84) [Now if you'd like to, you can pause the video now and update the](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=41.34) [command to copy those files over. And when we come back, I will](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=44.08) [show you the updated script that I have.](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=47.8) [Okay, here's my updated script.](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=51.04) [We're using the aws s3 cp command to copy two files from the bucket to our home](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=52.97) [directory, that's /home/ec2‑user, and then we are removing the default](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=59.92) [index.html file from the nginx installation and copying the files from our home](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=66.28) [directory over to that nginx HTML directory.](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=71.5) [With our configuration complete, let's step into the next phase, which is to get this configuration validated and deployed.](https://app.pluralsight.com/course-player?clipId=08abb1bb-5ae0-46f5-88d4-34a2ef8dfa5c&startTime=76.34)

### [Formatting and Deploying the Updated Configuration](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4)

[One of the things that John from the ops team asked us to do is to](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=1.54) [make sure that our files are formatted properly, and we can do that](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=4.94) [by using the terraform fmt command.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=9.3) [So I'll open up the terminal window now, and terraform fmt works on any files](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=12.23) [it finds in the current directory that you run it from.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=17.96) [So if we run terraform fmt,](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=21.24) [it will look at the current formatting for each of the files in the](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=23.94) [directory and then make updates to those files to bring them in line with](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=26.89) [HashiCorp standards for HashiCorp configuration language files. If you're](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=31.36) [curious about what has changed in those files,](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=36.63) [go ahead and open up and inspect those files, and you can see](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=39.01) [how the formatting has changed. The next step in our process](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=42.08) [is running terraform init again.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=45.54) [You might be wondering why.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=47.92) [And the reason is because we added a provider to our](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=49) [configuration, and Terraform needs to download that provider](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=52.44) [plugin from the Terraform registry.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=56.02) [So let's go ahead and run terraform init now.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=58.16) [Okay,](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=61.24) [if we scroll up a little bit, we can see it installs the HashiCorp](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=61.7) [random version 3.1.0. It's going to continue to use the previously](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=65.48) [installed AWS plugin because our updated version setting doesn't](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=70.91) [change which version is installed.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=74.99) [Okay, so now that we have initialized our configuration,](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=77.34) [the next thing to do is validate our configuration.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=80.64) [So we'll go ahead and run terraform validate. And](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=84.01) [excellent! My Terraform configuration is valid.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=87.25) [You may get some errors, so go ahead and pause and remediate those errors](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=89.96) [now, and then we'll resume by running terraform plan.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=93.63) [Okay,](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=98.74) [remember that we removed our AWS access and secret key from the variables,](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=99.08) [so we now need to set them as environment variables.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=104.21) [If we expand the commands directory and open up m6\_commands, here are the](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=107.45) [commands for Linux and macOS or for PowerShell to set the proper environment](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=112.83) [variable for the AWS access key and secret access key.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=118.15) [Go ahead and update those values and run the command](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=122.84) [to set your environment variables.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=126.71) [I've already run those to set my environment variables.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=128.4) [Once we have those environment variables set, now we can run terraform](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=131.94) [plan, and we'll send the output plan to m6.tfplan.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=135.79) [I'll go ahead and run that now.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=140.49) [And based on the plan, we have 11 things to add, 1 to change, and](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=142.84) [4 to destroy. If we maximize the view here,](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=146.37) [we can get an idea of what it's creating.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=149.47) [We know we're creating a bunch of resources because we added them, but](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=151.6) [I'm curious to see what is changing or being destroyed.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=155.51) [So let's scroll up, and we see that the target\_group\_attachment is](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=158.5) [being replaced because the target\_id is being replaced,](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=162.94) [which tells me that the instances are also being replaced.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=166.61) [If we scroll up to one of the instances, we can see the instance is](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=170.04) [being replaced. And if we scroll down with the instance,](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=174.31) [the user data has been updated, which forces a replacement of the EC2 instance.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=177.42) [It's interesting to note that adding an IAM instance profile does not](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=183.64) [require a replacement of the EC2 instance, so it's actually updating](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=187.47) [that user data that is forcing the replacement.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=191.1) [Lastly, the load balancer is being updated in place because we have updated the](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=194.44) [access logs configuration. That doesn't force a replacement.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=198.95) [We're just updating as is. Alright, all that sounds good.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=202.35) [Let's go ahead and run terraform apply "m6.tfplan", and that will](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=205.69) [apply the changes that were listed in the plan.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=212.22) [This will take a few minutes to recreate those AWS](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=215.04) [instances, so I'll go ahead and pause the recording now and](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=218.02) [resume when the deployment is complete.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=220.84) [Okay,](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=223.34) [my deployment is complete, although I had to run it a second time because](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=223.62) [the nginx profile I was trying to create already existed. So I had to](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=227.56) [delete it and then let Terraform recreate it.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=231.69) [So pro tip, make sure you don't already have a profile named nginx\_profile.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=234.25) [Now that the deployment is complete,](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=239.27) [let's go ahead and go to the address so we can generate some traffic on our](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=241.25) [website, which will then cause the load balancer to write data to the](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=245.69) [access logs. So I'll go ahead and grab this address. And in our browser,](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=249.78) [I'll go ahead and open up a new tab. And now you can see our updated web](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=254.22) [content is being loaded by the EC2 instances. We've removed the ability to](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=258.63) [differentiate between the two different servers since it's not really](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=263.56) [necessary anymore.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=267.17) [We know that that works.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=268.19) [I'll go ahead and refresh the website a few times just to generate some](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=269.37) [web traffic that will be written to the S3 bucket.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=273.61) [Okay, now that we have generated some traffic for our website,](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=277.24) [we can go over to the S3 console. Here's the S3 bucket that we](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=280.31) [created using Terraform. In there, we can see we have two paths.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=284.61) [We have alb‑logs and the website. Let's go into the alb‑logs. And](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=288.67) [there we have a folder,](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=293.45) [AWSLogs, and there we have one based off of our account. And in](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=294.41) [there, there is a test file that was run when we updated our](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=298.72) [configuration of the Elastic Load Balancer. It may take 5 or 10](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=301.79) [minutes for the load balancer to process new requests and add them to](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=305.96) [the access log for the S3 bucket.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=310.15) [So if you don't see access logs right away, don't worry.](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=312.16) [They will be there shortly. At this point, we have met all the](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=315.85) [requirements from both the development team and the ops team. Good job!](https://app.pluralsight.com/course-player?clipId=152199df-ac66-4c9e-9289-cfba993972a4&startTime=319.45)

### [Summary](https://app.pluralsight.com/course-player?clipId=7792d78c-a8e4-43ab-8f72-ae6a96cecef4)

[In this module,](https://app.pluralsight.com/course-player?clipId=7792d78c-a8e4-43ab-8f72-ae6a96cecef4&startTime=1.14) [we learned how to add a new provider to a configuration, and we also saw how](https://app.pluralsight.com/course-player?clipId=7792d78c-a8e4-43ab-8f72-ae6a96cecef4&startTime=2.14) [to properly specify the version and the source for our provider using the](https://app.pluralsight.com/course-player?clipId=7792d78c-a8e4-43ab-8f72-ae6a96cecef4&startTime=7.12) [required provider's block. We updated the architecture for our configuration](https://app.pluralsight.com/course-player?clipId=7792d78c-a8e4-43ab-8f72-ae6a96cecef4&startTime=11.46) [to include an S3 bucket, and in the process,](https://app.pluralsight.com/course-player?clipId=7792d78c-a8e4-43ab-8f72-ae6a96cecef4&startTime=16.3) [learned about Terraform's dependency graph.](https://app.pluralsight.com/course-player?clipId=7792d78c-a8e4-43ab-8f72-ae6a96cecef4&startTime=19.11) [Lastly,](https://app.pluralsight.com/course-player?clipId=7792d78c-a8e4-43ab-8f72-ae6a96cecef4&startTime=21.84) [we talked about why provisioners are a bad idea and other options for](https://app.pluralsight.com/course-player?clipId=7792d78c-a8e4-43ab-8f72-ae6a96cecef4&startTime=22.36) [performing post deployment configuration. The next step in evolving our](https://app.pluralsight.com/course-player?clipId=7792d78c-a8e4-43ab-8f72-ae6a96cecef4&startTime=26.43) [configuration is to add functions and looping into the mix.](https://app.pluralsight.com/course-player?clipId=7792d78c-a8e4-43ab-8f72-ae6a96cecef4&startTime=31.21) [Looping helps us create multiple instances of an](https://app.pluralsight.com/course-player?clipId=7792d78c-a8e4-43ab-8f72-ae6a96cecef4&startTime=35.14) [object efficiently and dynamically,](https://app.pluralsight.com/course-player?clipId=7792d78c-a8e4-43ab-8f72-ae6a96cecef4&startTime=38) [and functions can help us transform data in our](https://app.pluralsight.com/course-player?clipId=7792d78c-a8e4-43ab-8f72-ae6a96cecef4&startTime=40.21) [configuration to make it more useful and effective. That's coming up in the next module.](https://app.pluralsight.com/course-player?clipId=7792d78c-a8e4-43ab-8f72-ae6a96cecef4&startTime=43.11)

## [Using Functions and Looping in Your Configuration](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a)

### [Overview](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a)

[Terraform has some more tricks up its sleeve when it comes to](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a&startTime=1.34) [creating a dynamic and efficient configuration.](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a&startTime=3.99) [A key feature of any programming language is the ability](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a&startTime=7.34) [to create loops and use functions, and Terraform is no exception.](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a&startTime=10.44) [Hey everyone, this is Ned Bellavance.](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a&startTime=15.05) [I'm a HashiCorp ambassador and founder of Ned in the Cloud.](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a&startTime=16.65) [Let's get loopy adding functions and iteration to our configuration.](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a&startTime=19.74) [We'll kick off this module with some new ideas from our old buddy,](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a&startTime=24.74) [John. He's been reading up on iteration and functions in Terraform,](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a&startTime=28.54) [and he has a few ideas to improve our configuration.](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a&startTime=32.59) [That means it's time to do some learning of our own.](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a&startTime=36.64) [We'll check out what looping constructs exist in Terraform and how they can](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a&startTime=39.41) [be used to make our config more dynamic and flexible.](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a&startTime=43.95) [We're also going to want to use some functions to fulfill John's](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a&startTime=48.24) [requests. We'll see what type of functions are available,](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a&startTime=51.62) [how they're used in a configuration, and how to test](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a&startTime=55.41) [expressions using Terraform console. First, let's check in with John and see what suggestions he has.](https://app.pluralsight.com/course-player?clipId=51762754-7a86-4b7f-b6d9-0575f3c5ad5a&startTime=58.99)

### [Globomantics Updates](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3)

[We fulfilled the requests from Sally Sue when it](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=1.34) [comes to the deployment architecture,](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=3.93) [but now John has a few suggestions on how our code](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=6.13) [could be more effective and efficient.](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=9.46) [To start with,](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=12.03) [John would like to be able to dynamically increase the number](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=13.6) [of instances deployed for the application.](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=16.84) [Two instances might be good for development,](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=20.14) [but in a production scenario he'll likely need more.](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=22.54) [He would also like to decouple the startup script from the configuration files](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=26.04) [and store it in its own file for possible updates and reuse.](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=30.86) [John also thinks it's a little cumbersome to set CIDR](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=35.17) [addresses for the subnets and the VPC.](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=38.72) [He'd like to be able to just set the VPC CIDR address and let](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=41.42) [Terraform split it up among the subnets.](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=45.79) [Finally,](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=49.14) [he's noticed that we've been a little inconsistent with our naming of AWS](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=49.61) [resources. He'd like to be able to add a naming prefix and apply it](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=54.07) [consistently across all resources. You tell him, not a problem.](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=58.36) [Terraform and you can take care of it.](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=63.45) [The updates that John requested aren't going to change our architecture.](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=66.24) [The goal is to keep the deployment the same while](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=70.63) [improving our infrastructure as code. Let's start by checking out the looping constructs in Terraform.](https://app.pluralsight.com/course-player?clipId=1ef09131-b79b-444d-af1e-290ca77e94d3&startTime=73.55)

### [Loops in Terraform](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a)

[Terraform has several different ways to create multiple instances](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=1.24) [of an object or manipulate collection objects.](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=5.38) [We'll start with an overview of the various options and then drill down](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=8.51) [into the two that are most useful for our configuration.](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=12.82) [The first looping construct to consider is the count](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=17.14) [meta‑argument for modules and resources.](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=20.69) [Count is used to create multiple instances of a resource or module](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=23.65) [when the instances are very similar in nature,](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=28.46) [the value for a count argument is an integer,](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=31.84) [and that includes 0.](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=34.94) [You can tell Terraform to create 0 of a resource by setting the count to 0,](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=36.56) [which sounds like an odd thing to do.](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=41.38) [It's actually super useful when you want to make the creation of a](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=43.66) [resource conditional on other factors in the configuration.](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=47.65) [The next construct is the for\_each meta‑argument, which is also used for](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=52.04) [modules and resources. For\_each takes a set or a map as a value.](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=56.32) [It's used instead of count in situations where each instance will](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=61.51) [be significantly different than the others.](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=65.86) [You have full access to the values stored in the set or map](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=68.54) [you submit, and those values can be used when configuring](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=72.3) [each instance of the resource.](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=76.22) [That gives you a lot more flexibility than a simple count integer.](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=78.36) [Dynamic blocks are used to create multiple instances of a nested](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=82.56) [block inside a parent object. They accept a map or a set for a](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=87.11) [value to construct the blocks.](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=92.13) [This is an advanced topic that we're not going to cover in this](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=94.24) [course, but I included it for completeness. Let's focus in on the](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=97.3) [syntax of the count and for\_each meta‑arguments, since we will be using both in the configuration.](https://app.pluralsight.com/course-player?clipId=d81022eb-eafa-4319-af69-1b3229a2d13a&startTime=101.72)

### [Count Syntax](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73)

[The count meta‑argument can be used for resources or modules.](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=1.14) [The syntax for either is the same, and since we haven't touched on modules yet,](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=5.54) [we're going to use resources for our example.](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=10.43) [The count argument goes inside the resource and accepts an integer as a value.](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=13.18) [The integer determines how many instances of the resource should be created.](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=19.14) [In our example, the count is set to 3,](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=24.14) [so Terraform will create three EC2 instances.](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=26.36) [When the count argument is used,](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=30.24) [a special new variable is available called count.index.](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=33.13) [As Terraform loops through the creation of each instance,](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=37.23) [count.index will resolve to the current iteration Terraform is on.](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=41.4) [You can use this value anywhere in the resource configuration block.](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=46.72) [In our example, we are using count.index to name our EC2 instances globo‑web‑,](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=51.36) [the number of the iteration.](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=58.63) [Count starts at 0, making the first instance globo‑web‑0.](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=60.22) [Now you might be wondering,](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=66.84) [how do I reference the instances that I'm creating with the count argument?](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=68.07) [Well, the count argument is going to create a list of resources.](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=73.24) [Each element of the resource list can be referenced by a number.](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=77.54) [The syntax is similar to standard resource addresses.](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=81.94) [We start with the resource‑type.name\_label, and then we add a square](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=86.07) [bracket with the element number of the instance we want, optionally](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=91.13) [followed by the attribute of the instance if needed.](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=95.48) [In our example,](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=98.84) [if we wanted to refer to the name attribute of the first AWS instance,](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=99.72) [the syntax would be aws\_instance.web\_server[0].name.](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=104.23) [If you would like to get an attribute of all of the instances,](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=112.04) [you can use an asterisk in the square brackets. This will return a list containing the attribute value for each instance.](https://app.pluralsight.com/course-player?clipId=214f58ee-8650-4746-93e3-ef6b01b10c73&startTime=116.04)

### [For\_each Syntax](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc)

[The for\_each meta‑argument can also be used in resources or modules.](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=1.64) [The value for the for\_each argument will be either a set or a map.](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=6.81) [As a quick reminder, a set is an unordered collection of objects.](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=11.91) [A tuple and a list are ordered collections,](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=16.94) [so you cannot use a list or a tuple directly,](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=19.76) [but you can transform a list or a tuple with the toset function.](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=23.11) [In our example, we are using a map with a set of key‑value pairs.](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=28.14) [Terraform will look at the number of elements in the map or the set](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=33.54) [and create a corresponding number of instances.](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=37.46) [In this example, we have two entries in the map,](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=40.84) [so Terraform will create two S3 bucket objects.](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=43.49) [In a for\_each loop,](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=47.11) [there are two special variables, each.key and each.value. During](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=48.73) [the looping process, each.key will be set to the key of the map](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=54.32) [item currently being iterated over.](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=58.72) [What about each.value?](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=61.54) [I think you can probably guess what it's set to, the](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=63.14) [value corresponding to the current key.](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=65.9) [If you are iterating over a set instead of a map, each.key and](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=68.24) [each.value will be equal to the same thing. Values in the map or set](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=72.76) [do not have to be a primitive data type,](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=78.22) [like a string or a number.](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=80.57) [It could be a complex object with nested values that you'd like](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=82.39) [to use in each iteration of the resource.](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=86.46) [Using a for\_each argument is going to create a map of resources.](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=89.94) [Each entry in the map can be referenced by the key name,](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=94.74) [just like we've seen when dealing with map data types in the past.](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=98.38) [The syntax is the resource type, followed by the name\_label, and then](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=102.54) [square brackets with the key string in quotes, followed by dot and the](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=106.82) [attribute you're interested in. In our example,](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=111.3) [if you wanted to get the id attribute of the cheese instance,](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=114.22) [the syntax would be](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=118.15) [aws\_s3\_bucket\_object.taco\_toppings["cheese"].id. Just like the](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=119.44) [count syntax, if we want to get the id attribute of all of the instances,](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=128.1) [we can swap out the key string with an asterisk.](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=132.98) [The returned value would be a list of all of the IDs. Based on these two](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=136.54) [looping constructs, let's see if we can find some places in our configuration that would benefit from using count or for\_each.](https://app.pluralsight.com/course-player?clipId=b291cc4c-27cf-49cb-a52d-cf98aa8141bc&startTime=141.74)

### [Looping Targets](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236)

[Within our configuration,](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=1.14) [we should be on the lookout for anywhere we are creating](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=2.35) [more than one of the same resource.](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=5.48) [If you'd like to look through the config now and make some guesses,](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=7.5) [feel free to do so.](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=10.94) [Here's the list that I came up with,](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=12.4) [starting with the primary resources that we can update.](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=14.64) [We have two AWS subnets right now and possibly more in the future,](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=18.34) [depending on how the architecture evolves.](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=22.62) [Each subnet is almost identical to the others,](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=25.44) [except for the CIDR address and availability zone,](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=28.39) [which makes them a good candidate for the count loop.](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=30.98) [Likewise,](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=34.24) [we are creating multiple EC2 instances that are fairly undifferentiated,](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=34.81) [except for the subnet they attach to.](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=39.04) [Looks like we'll be using a count loop for them as well.](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=41.75) [Lastly, we are creating multiple AWS S3 bucket objects,](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=45.14) [but those have different names and paths,](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=49.84) [so it might make more sense to use a for each loop to create them.](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=51.69) [Since we are going to use loops to create these resources,](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=56.64) [there are going to be other resources that will be impacted as well.](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=60.21) [We need to create an AWS route table association for each subnet,](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=64.44) [so we can use a count argument there.](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=68.89) [We also need to create an AWS load balancer target](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=71.54) [group attachment for each EC2 instance,](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=75.04) [so we'll use a count argument there as well. Let's jump over to the configuration and set a few things up.](https://app.pluralsight.com/course-player?clipId=78d43b16-4323-4048-b1ac-3ede09410236&startTime=77.78)

### [Updating the VPC and Instances](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d)

[Let's start by opening our network.tf file. I'll go ahead and](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=1.34) [expand the directory and open network.tf.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=4.8) [All right, there we go.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=7.65) [And let's scroll down to the definition for our subnet.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=8.58) [Scrolling down to the first subnet,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=11.69) [we are going to update this first subnet resource for all of](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=13.46) [our subnets by adding a count argument.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=17.78) [Now, what's going to drive that count argument?](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=20.65) [Let's first set up a variable to define how many subnets](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=23.89) [we're going to create with this resource.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=27.75) [Let's open the variables.tf file.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=30.24) [All right, there we go.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=33.34) [And we are going to add a value.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=34.84) [Let's go ahead and add it below the vpc\_cidr\_block.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=37.38) [We'll call the variable vpc\_subnet\_count,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=40.78) [we'll set the type = number,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=43.86) [we'll set the description to the number of subnets to create,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=47.34) [and we'll set the default = 2.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=50.72) [Now that we have our variable ready,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=54.04) [let's go back to the network.tf file and update the resource block.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=55.88) [For the resource block, let's change it from subnet1 to subnets.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=60.37) [This is going to create all of our subnets after all.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=65.04) [And below there, we will add our argument for count,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=67.62) [and we'll set the value of the count = vpc\_subnet\_count.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=71.34) [Next we need to update our CIDR block,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=76.04) [and we can use the count.index to select an item from](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=78.51) [the vpc\_subnets\_cidr\_block variable, so we'll set this to count.index.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=82.53) [On the first iteration, it will select the first element from the list,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=88.06) [and on the second iteration, it will select the second element from the list,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=92.54) [and so on.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=96.33) [The vpc\_id will remain the same.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=97.46) [They're all in the same VPC.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=99.79) [The map\_public\_ip\_on\_launch will remain the same.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=101.58) [The availability\_zone will also need to update with the](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=104.35) [count.index to select the element from the names list.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=107.06) [There we go, we've updated the value to count.index.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=111.64) [That's everything we need to change for this resource.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=115.75) [Below it, we have our subnet2.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=118.26) [We no longer need subnet2 because we're defining all of our](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=120.2) [subnets with that single resource block,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=123.8) [so we'll go ahead and delete this resource block.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=125.92) [There we go.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=129.23) [Now the other thing we need to update our the route](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=130.54) [table associations for the subnets.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=132.95) [Let's scroll down to that resource.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=135.41) [Let's rename our first route table association resource rta‑subnets.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=137.64) [And now we'll add the count argument to this resource.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=144.34) [We'll set the count equal to the number of subnets because that's how](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=148.44) [many route table associations we need to create.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=151.8) [Now we need to reference each subnet that we created with our subnet resource.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=155.24) [We'll use the resource addressing that we learned](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=160.74) [earlier to create that reference.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=163.35) [So it should be aws\_subnet, and remember, we changed the resource to subnets.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=165.59) [And we want to specify a particular subnet,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=172.14) [so we'll add the square bracket,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=175.26) [and within the square bracket we'll add count.index.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=177.54) [This way, in the first iteration,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=181.04) [it will reference the first element in the list of subnets and the id attribute.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=182.84) [And then on the second iteration it'll reference the second subnet, and so on.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=188.01) [The route table id stays the same because we're associating](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=192.74) [all these subnets with the same route table.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=195.82) [Now that we've updated this resource, we can delete the rta‑subnet2 resource.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=198.75) [And that takes care of updating our subnets and the route table association.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=205) [My challenge to you is to update the instances with a count argument as well.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=210.94) [In the instances file,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=215.66) [you can update the first instance to nginx instances or](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=217.31) [whatever name label you would like to use,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=221.51) [and add a count argument.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=223.78) [You'll need to add a variable like instance\_count for the](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=225.63) [number of instances that will be created,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=228.67) [and within the configuration,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=231.54) [you're going to need to reference the proper subnet for each instance.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=233.34) [That's going to end up being a little more complicated](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=237.84) [than you would initially think so.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=240.02) [For now,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=241.41) [we can safely assume that we just have the two instances and two subnets,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=242.07) [one instance per subnet.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=246.1) [The other thing you'll have to update is the target](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=248.54) [load balancer group attachment, and that is in the load balancer.tf.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=251.04) [Down at the bottom we have our two target group attachments.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=255.79) [You're going to update it so that there is only one that is also using](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=259.08) [the count argument and referencing the proper target IDs to the](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=262.73) [instances that you're creating with the loop.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=267.06) [So go ahead and try to do that now,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=268.94) [and when we come back you can see my updated configuration.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=270.43) [Okay, welcome back.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=274.64) [Let's see how you did.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=276.08) [First, I added a variable for the instance\_count,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=277.27) [and I added it right below instance\_type to kind of](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=279.75) [keep the same variables together.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=282.21) [Instance\_count is set to type number, and the default is equal to 2.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=284.94) [Now let's check out the instances.tf file. For instances.tf I](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=289.51) [renamed the resource to nginx instead of nginx1. The count is set](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=294.63) [to var.instance\_count, and the subnet\_id reference I updated to](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=299.41) [subnets and then the count.index.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=304.47) [We're actually going to change that a little bit in the future,](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=306.91) [but for now it's okay to leave it like that.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=309.5) [Under loadbalancer I set the count to var.instance\_count, and for the](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=312.14) [target\_id I updated the reference to nginx and the count.index for that element out of the list of instances.](https://app.pluralsight.com/course-player?clipId=52a36737-0165-4ca3-9b2d-8a18bef04e2d&startTime=317.18)

### [Updating the S3 Bucket Objects](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f)

[Now the last thing to update is our bucket objects.](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=1.64) [So let's go into s3.tf, and we are going to update the](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=5.24) [bucket objects to be a single bucket object.](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=9.86) [We'll start by updating the name label to website\_content.](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=13.64) [Then, we will add a for\_each meta argument, and we're](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=18.64) [going to use a map for our for each.](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=22.72) [So I'll set the curly braces to indicate a map.](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=25.62) [The first item in the map,](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=29.64) [the key will be website, and we'll set it to the path of the](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=30.85) [website file that we want to upload to our S3 bucket,](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=34.62) [which would be /website/index.html.](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=38.22) [The second item will be the logo, so I'll set the key to logo. And then](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=42.06) [the path to the logo is /website/Globo\_logo\_vert.png.](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=45.93) [We're going to use the same bucket as the target for each bucket](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=51.34) [object, so we can leave that the same. The key,](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=54.05) [which is the path for the object on the S3 bucket,](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=57.22) [we can set that to each.value,](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=60.84) [which will use the value that's stored in each map key.](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=63.54) [And then the source is the path to the file that we want to create as an object.](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=66.84) [We're going to use the current directory by specifying dot, and then we'll](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=71.56) [use the interpolation syntax to set it to each.value.](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=75.55) [So on the first loop, this will evaluate to ./website/index.html.](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=79.86) [And that way we will create all of our AWS bucket objects.](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=85.74) [We can also delete the second resource here because we no longer need it.](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=89.84) [You could make this more dynamic by creating a variable that includes all](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=94.34) [of the items that need to be uploaded or even use a function of some kind](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=98.92) [to evaluate all of the files in a directory.](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=103.5) [If you'd like to do that, I leave that as an exercise to you. For now,](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=106.74) [we're going to leave this as hard coded values in the for each statement.](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=110.25) [Now speaking of functions,](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=115.14) [we are going to need to use functions to meet the rest of the](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=116.98) [requirements that John has laid out for us, so let's dig a little deeper into functions and expressions within Terraform.](https://app.pluralsight.com/course-player?clipId=ed1b9473-a9e0-4208-81f1-3a612512aa8f&startTime=120.62)

### [Terraform Expressions and Functions](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5)

[Terraform includes functions and expressions to support the](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=1.24) [manipulation of data in HCL files. We've already seen the](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=4.76) [expressions and even some of the functions at work, but now it's](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=9.03) [time to examine them in more detail.](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=12.52) [We've been using Terraform expressions for a while now, in](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=15.74) [particular, the interpolation and heredoc expressions to include](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=19.03) [resource and variable values in a string or pass an entire string](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=23.04) [to an argument like user data.](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=27.52) [Terraform also supports arithmetic and logical operators](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=29.84) [like and, or, equals, greater than, etc.](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=33.9) [The evaluation will depend on the data type you are operating on and](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=38.54) [whether that data type supports the comparison.](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=42.91) [Terraform also supports conditional expressions, which are](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=46.14) [essentially an if statement followed by a value to return if](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=49.96) [true and a value to return if false.](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=53.9) [You can combine a conditional expression with a count argument](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=57.14) [to decide if a resource is created or not.](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=61.02) [The for expression is used to manipulate and transform collections.](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=64.74) [It can take any collection object type, map,](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=69.81) [list, set,](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=72.99) [etc., and it will return a new list or map. For expressions are a](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=73.95) [great way to work with the set of instances that a count or a for](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=79.11) [each argument generates from a resource block. Just like any other](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=83.38) [programming language, Terraform supports functions that help you](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=88.48) [transform and manipulate data.](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=91.82) [Unlike provider plugins, functions are built into the Terraform binary, so you](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=94.44) [don't have to initialize or download anything to use them. Since they don't](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=99.36) [use an external service or executable, they also evaluate much faster than a](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=103.87) [resource or data source from a provider. If I wanted to build a model of what](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=108.82) [a basic function looks like,](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=113.99) [it's going to be something like this. You have the function](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=116.16) [name and then parentheses, and then some number of](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=119.09) [arguments to go with that function.](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=122.54) [Some functions actually take no arguments, while others take](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=124.74) [many. Arguments are not named, unlike some other programming](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=127.85) [and scripting languages, instead, the arguments must be in the proper order.](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=131.69) [You could test functions by placing them in a Terraform configuration and](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=136.34) [running a plan, but that's a little time consuming and difficult to debug.](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=140.41) [For that reason, Terraform has a subcommand called console that opens up an](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=144.83) [interpretation console where you can have Terraform evaluate functions and](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=149.55) [other expressions. That is much more efficient than testing things in a](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=153.93) [configuration directly.](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=158.02) [Console will also load the current state data values of a](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=159.74) [configuration, allowing you to use real data to test your](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=163.3) [functions and expressions.](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=167.32) [Terraform has over 100 functions, and we are going to cover each one in](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=169.54) [excruciating detail, so buckle up for 10 hours of excitement.](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=174.52) [Just kidding. Instead,](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=179.04) [why don't we group the functions into some broad categories that will help you find the function you need in the future.](https://app.pluralsight.com/course-player?clipId=0c4b3f69-de49-4ed8-bb14-eebc2d41a6f5&startTime=180.37)

### [Common Function Categories](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81)

[Based on the current Terraform documentation, there are at least nine](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=1.24) [function categories with more possibly coming in the future.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=5.73) [I'm not going to list all of those categories here.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=9.54) [Instead, we'll focus on those you'll probably use as](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=12.07) [you build your first configurations.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=14.96) [The first category is numeric functions.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=17.64) [These are functions that are used to manipulate numbers.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=20.64) [For instance, if I had a list of numbers and I want to get the smallest number,](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=23.78) [I can use the min function, and it will return, in this case, the](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=27.85) [number 7. There are also string manipulation functions.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=31.47) [A possible use for a string function is working](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=35.76) [with Azure Storage account names.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=38.91) [They cannot have uppercase letters, and if someone](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=41.14) [provided a string with uppercase letters for a storage](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=44.05) [account, you would receive an error.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=46.57) [There is a function called lower that takes a string and will put anything](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=49.14) [that's capitalized into lowercase and return that string to you.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=53.14) [There are functions to deal with collections. And](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=57.04) [when I'm talking about collections,](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=60.37) [I'm talking about lists and maps, basically. We will be using](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=61.85) [the merge function shortly in our configuration to merge the](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=65.77) [common tags map with another map.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=69.26) [One interesting category is the functions for IP networking.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=72.84) [If you've done any work with IP networking,](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=77.64) [you know that math in IP addressing is kind of funky, and for that reason,](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=80.35) [the standard numeric functions don't work very well.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=85.24) [There are dedicated functions like cidersubnet(),](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=88.24) [which takes a network range, carves out a subnetwork in that](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=91.54) [range based off of arguments that you give it.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=95.54) [There are also functions that interact with the local filesystem.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=99.44) [One of the most common ones to use is the file function. That](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=103.27) [takes a path argument pointing to a file,](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=106.58) [reads the contents of that file out to a string, and returns the string.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=109.74) [So if you need to get the contents of a file,](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=114.34) [you use the file function, very straightforward.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=116.87) [Lastly, type conversion functions allow you to convert one data type to another.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=119.74) [You probably won't use most of these functions often with the](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=125.14) [exception of toset(). If you'll recall from earlier,](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=128.55) [the for each argument takes a map or a set, and the](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=132.6) [toset() converts a list or a tuple to a set.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=136.78) [That's pretty useful. If you're interested in looking at the](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=140.94) [other categories and functions, they are all nicely laid out](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=144.06) [in the Terraform documentation.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=147.82) [Let's take a deeper look at some individual Terraform functions we will use in our configuration.](https://app.pluralsight.com/course-player?clipId=af04daa8-852f-4ab3-88a5-0c9bece3ab81&startTime=150.24)

### [Function for the Configuration](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd)

[We can leverage the functions in Terraform to meet the requirements given](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=1.34) [to us by John. We'll start with the Startup script.](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=5.18) [Currently we define the Startup script using a heredoc](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=9.13) [expression, but John wants us to move that into a file.](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=12.18) [We could try using the file function, but we need to dynamically](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=15.94) [update the bucket name used by our script.](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=19.6) [Instead, we will use the templatefile function, which reads in the](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=22.44) [contents of a file and replaces variables in the file with values](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=26.46) [submitted as part of the function.](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=30.99) [Another request from John was to simplify the networking by](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=33.34) [determining the subnet addressing dynamically. We can do that by](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=36.69) [leveraging the cidrsubnet function, giving it the VPC cidr\_range](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=40.54) [and carving out space for our subnets.](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=45.47) [The function takes the cidr\_range you would like to work with, the](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=48.84) [subnet bits to add to the existing subnet mask, and which network](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=51.98) [number you want out of the resulting subnetworks. John also wants us to](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=56.42) [consistently name all of the resources.](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=61.71) [We can do that by adding a variable for a naming prefix and adding a](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=64.54) [name tag for each resource that doesn't have a name argument. But we](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=68.56) [already have a list of common tags in a map.](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=73.15) [What are we going to do?](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=76.04) [No problem.](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=77.54) [We can use merge to merge our common tags map with a map](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=78.35) [of additional tags for each resource.](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=82.61) [Finally, we are going to be adding a naming prefix variable to the](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=85.74) [configuration. When we use it for our bucket name, we should apply the lower](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=89.31) [function to make sure our bucket name is always lower case, even if someone](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=93.86) [submits an uppercase value with the naming prefix. Ready to add some functions to the configuration? Awesome, let's go.](https://app.pluralsight.com/course-player?clipId=148715e0-2ebf-4e34-af26-c95a3ceb37dd&startTime=98.2)

### [Testing Functions with Terraform Console](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de)

[Before we try to add functions to our configuration, let's first](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=1.24) [test out some of these functions using the Terraform console. I'll](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=5.25) [go ahead and open up the commands directory and open up](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=8.97) [m7\_commands, which has some examples for us to run to try the](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=11.91) [different functions and syntax.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=16.01) [You do need to initialize the configuration before terraform console will work.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=17.93) [We've already initialized our configuration, so we](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=22.95) [don't have to worry about that.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=25.2) [We can simply run terraform console. This starts the](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=26.42) [interactive environment where we can test different functions,](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=29.84) [and we can make use of variable values and resource and data](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=33.59) [source values within our functions.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=37.26) [Let's first test out a basic numeric function, the min with the arguments 4,](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=40.24) [5, and 16.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=44.89) [I'll go ahead and copy this and paste it down below.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=47.04) [The result is 5, which is correct.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=50.24) [That is the lowest number.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=52.28) [Now let's try using the lower function that takes a string.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=53.9) [TACOCAT, in all capitals, should evaluate to tacocat in all lowercase.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=57.74) [I'll go ahead and copy that one, and paste it down below, and there we go.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=62.48) [It evaluated our string and set it to all lowercase.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=67.3) [Now we're going to test out the cidrsubnet, and we're going](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=71.14) [to feed it the vpc\_cidr\_block as a value.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=74.56) [The value it uses for the variable is the default value we defined for](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=78.45) [that variable. If you don't remember, let's go ahead and open up the](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=82.72) [variables file, and let's find that vpc\_cidr\_block.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=85.87) [It's set to 10.0.0.0/16. Based off of the syntax, we are going to add 8 bits to](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=90) [that to make it a /24. And the 0 argument says we're going to select the first](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=97.6) [available network from the set of subnetworks.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=103.38) [So let's go ahead and run this command and see what the resulting value is.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=106.54) [The resulting value is 10.0.0.0/24.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=111.44) [That's exactly what we would expect.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=115.6) [And this is an excellent way we can leverage the cidrsubnet](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=117.39) [function to automatically generate the cidersubnet ranges for the](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=120.47) [subnets we're creating in the count loop.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=125.28) [Before we get to that, let's try a few other functions.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=127.94) [The next one I want to try is lookup. The lookup function](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=130.94) [is used to look up the value in a map.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=134.07) [You first have to specify a map in the argument. We'll use](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=136.58) [local.common\_tags, and then the key that you want to look](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=140.37) [for. We'll specify company.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=144.17) [If that key is not found,](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=146.34) [we can give it an alternate value to return, in this case, unknown.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=147.85) [Let's try out this function now. And it returns the value](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=151.69) [Globomantics based off the key, company.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=155.2) [If we instead use a key of missing, which I know is not in the common\_tags map,](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=157.84) [then it returns the alternate value we specified, Unknown.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=162.92) [In addition to trying out functions, you can also just retrieve a value.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=167.34) [Let's retrieve the value stored in local.common\_tags, and it returns the](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=170.78) [map that's stored in our current local.common\_tags.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=175.42) [You can also try out some arithmetic operators.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=179.02) [One arithmetic expression we're going to use is the modulo](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=182.54) [operator to assign an instance to a subnet.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=186.4) [Now that might not make sense right now. We'll get into that in a moment.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=189.73) [Let's first start by moving our startup script to a separate file and making use of that template file function.](https://app.pluralsight.com/course-player?clipId=54cd887d-41c6-4b6b-b5bc-ddfcdb7766de&startTime=193.17)

### [Using the Templatefile Function](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66)

[We are going to move our startup script to its own file and](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=2.04) [make use of the templatefile function.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=6.05) [So for now I will hide the terminal, and let's create a new file in](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=8.64) [globo\_web\_app that's going to hold our startup script.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=13.36) [I'll name that file startup\_script.tpl.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=17.14) [You don't have to name it .tpl, that's something that I do just](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=21.34) [so I know it's a template file. Within that template file we're](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=24.76) [going to have our startup script.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=27.61) [So let's open up the instances file and we'll copy the](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=29.29) [script that we've defined in user data.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=32.31) [So I'll go ahead and copy this entire script and paste](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=34.94) [it into the startup\_script file.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=38.06) [Now you'll note in the script we are referencing the](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=40.44) [aws\_s3\_bucket.web\_bucket.id attribute.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=42.84) [When the template file is evaluated, it's not going to be](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=47.64) [able to directly evaluate that expression.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=50.38) [We need to put a variable in here that we can](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=52.88) [reference in our template file function.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=55.18) [So let's change this instead to s3\_bucket\_name. That's a variable](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=57.2) [we can now reference in our template file function, and I'll](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=61.45) [update that for the second entry as well.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=64.67) [Now I'll go ahead and save the file, and back in instances we will replace the](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=67.44) [current user data arguments with the templatefile function.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=72.62) [So I'll go ahead and delete what's in here and start](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=75.93) [this off with a templatefile function.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=79.04) [The first argument in the templatefile function is the path to the](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=81.44) [template file we want to use. To start off the path to the startup](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=85.32) [script, we can make use of a special variable that exists in](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=90.07) [Terraform, it's the path.module variable.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=93.87) [This will resolve to the full path of the module](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=97.73) [that we're currently working in.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=100.97) [Then we can add a slash and the startup\_script.tpl.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=102.94) [That's the path to the file we want to use, and now we can provide a map](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=107.58) [of variables and values to use in that template file. So I'll add a comma,](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=111.8) [and then I'll start a map with curly braces.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=117.27) [We only have one variable in our template file,](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=119.47) [which is s3\_bucket\_name, and I'll set the value to](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=122.29) [aws\_s3\_bucket.web\_bucket.id, which is what we had in the initial startup script.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=125.77) [Now it will pass that value and replace wherever it](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=132.34) [sees s3\_bucket\_name with that value.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=135.02) [Go ahead and save that.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=138.24) [The next thing to do is add the CIDR subnet function to our definition of the subnets.](https://app.pluralsight.com/course-player?clipId=84f9d770-42db-4da0-9c8f-c46e61d86e66&startTime=139.84)

### [Using the Cidrsubnet Function](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556)

[We are going to use the cidrsubnet function to get](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=1.24) [the CIDR ranges for our subnets.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=4.64) [Let's go ahead and open up the network file and](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=7.42) [scroll up to where our subnets are.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=10.26) [There we go.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=12.35) [There's the cidr\_block argument.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=13.25) [My challenge to you is to use the cidrsubnet function to define the](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=15.1) [value for the cidr\_block for our AWS subnets.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=19.38) [Go ahead and try that now, and when we come back,](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=23.34) [I'll show you my solution for setting that cidr\_block argument.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=25.54) [All right, let's see how you did.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=31.34) [We're basically mimicking what we did in the console.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=32.81) [So we have cidrsubnet the function,](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=35.01) [we're passing it the cidr\_block we're using for our VPC,](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=37.02) [we're adding 8 bits to the subnet mask,](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=40.19) [and we're using count.index to select the subnetwork](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=43.35) [that's evaluated by adding those bits.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=46.98) [As we saw at the console, the first one should evaluate to 10.0.0.0/24,](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=49.24) [and the next one will evaluate to 10.0.1.0/24.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=53.91) [While we're still thinking about networking,](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=60.14) [there's something we need to update about our instances.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=62.11) [Let's go over to the instances.tf file.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=64.88) [You'll notice for the subnet\_id we're using the expression](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=67.74) [aws\_subnets.subnets[count.index].id.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=70.88) [That's going to work well when we have two instances and two subnets,](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=75.54) [but what happens if we want four instances](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=79) [distributed evenly across two subnets?](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=81.93) [This expression is not going to work anymore because count.index](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=84.87) [will go beyond the number of subnets that we have.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=88.35) [We need a different expression here that evaluates properly,](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=90.87) [and we can use the modulo expression to do that.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=94.37) [So let me show you how that works by bringing up the console again.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=98.1) [Going with our example, let's say that we have four instances,](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=101.16) [and we want to place it in either the first or second subnet.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=105.16) [We can use the modulo operator to do that.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=108.38) [We would start with the count.index of the first instance,](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=111.57) [which would be 0, and then the modulo operator,](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=114.6) [which gets the remainder after a division.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=118.34) [And then we'll look at the number of subnets we have, which is 2.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=120.62) [That will evaluate to the number 0, so it will get placed in the first subnet.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=124.64) [Our next instance will be instance number 1,](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=129.5) [and when we do % 2 on that, we'll get a remainder of 1. So far, so good.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=132.84) [That's going to go in the second subnet. Now,](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=137.33) [our third instance, if we do % 2 on that, because there is no](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=139.35) [remainder, that will resolve to 0, and it will put it in the first](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=143.89) [subnet. Our fourth instance will evaluate to 1,](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=147.55) [so it will be placed in the second subnet.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=151.32) [All we need to do is encapsulate this modulo expression so that](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=153.36) [it puts our instances evenly across two subnets, and this will](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=157.36) [work for more than just two subnets.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=160.77) [Let's go ahead and update our expression to be [(count.index %](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=163.07) [var.vpc\_subnet\_count)], and we'll put the whole expression in parentheses](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=169.24) [so it's evaluated before it tries to get the element.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=174.88) [Now we can increase the number of instances beyond 2 and not worry](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=178.32) [about how they're distributed across our subnets.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=181.88) [I'll go ahead and save this file now. The next request to deal](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=184.84) [with from John is consistent naming across all of the resources, so let's get started on that.](https://app.pluralsight.com/course-player?clipId=43eda0cb-95b7-4f46-8e63-9f5f52166556&startTime=188.44)

### [Adding a Naming Prefix](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a)

[John wants a naming prefix to be added to the configuration and](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=1.04) [then consistent naming across all resources.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=5.28) [Let's go ahead and start by adding a variable to the variables file. We'll](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=8.19) [scroll down and open up the variables file. There we go.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=12.54) [We'll create a new variable and name it naming\_prefix. We'll set the type =](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=16.54) [string, the description = Naming prefix for all resources, and we'll set a](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=22.01) [default of globweb. Instead of using this naming prefix directly, why don't we](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=26.6) [add a local value where we manipulate this naming prefix a little bit? So let's](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=31.73) [go ahead and open up the locals.tf file, and we'll add a new local value here](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=35.8) [called name\_prefix, and we'll set that equal to the variable naming\_prefix and](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=40.73) [add ‑dev to it.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=47.14) [We could update this for each environment as we create them, and](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=49.04) [that's something we'll deal with in a later module.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=52.54) [The S3 bucket name does not currently use the name\_prefix.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=55.09) [So my challenge to you is to use this new local value name\_prefix and add](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=59.33) [it to the S3 bucket name instead of globo‑web‑app, and then make sure that](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=64.56) [the entire S3 bucket name is all in lowercase.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=69.94) [Go ahead and try that out now.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=73.64) [And when we come back, we'll see my solution.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=75.09) [Alright, here's how I approach that solution.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=78.44) [I'm using the lower function here to make sure](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=81.78) [everything in the string is set to lowercase.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=84.21) [I'm referencing the name\_prefix local. Did you know you can reference](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=87.34) [a local inside of ae locals block? You sure can.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=91.19) [I'm referencing the name\_prefix local, dash, and then the](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=94.74) [random integer result for the bucket name.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=98.37) [The last thing to do is add common naming to all the](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=101.84) [resources within our configuration.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=104.74) [Let's first start with the VPC.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=107.44) [I'll go ahead and open up the network.tf file, and let's](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=109.84) [scroll up to where we define our VPC.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=112.78) [We can add a name tag for our VPC by adding an additional tag,](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=115.64) [but we already have our local.common\_tags.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=120.57) [How are we going to combine that with a new tag?](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=123.63) [We can use the merge function.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=126.12) [Let me show you how the merge function works.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=128.23) [Be sure to save both the variables and locals file before you try this](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=130.74) [expression. I'll go ahead and bring up the terminal again so we can test](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=134.14) [out the merge function in the terraform console.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=138.66) [I exited out of the terraform console because it didn't have our](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=141.62) [new variables and locals loaded into it yet.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=144.9) [It only loads those values when you first start up the console.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=147.98) [To make sure I have the latest variables and locals, I am going](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=150.78) [to launch terraform console again.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=154.36) [Now we can try to use the merge function.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=157.14) [We're going to try to merge together the local.common\_tags and](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=159.36) [add a new map that has a name tag in it.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=163.36) [We start with the merge function, and then in parentheses, the](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=167.24) [first map we want to use is (local.common\_tags, and then we want](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=170.97) [to add another map to it, so we'll add a comma and start another](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=175.14) [map with the curly braces.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=178.73) [Within that map, all we want to add is a name tag.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=180.52) [So we'll start with the key, Name, and set it equal to the](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=183.38) [local.name\_prefix value and add on ‑vpc for the string.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=188) [Then we'll close our map with the curly braces and close](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=194.19) [our merge function with parentheses.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=197.17) [And if I hit Enter, there we go.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=199.36) [We have an updated map that will be submitted to the tags](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=201.4) [argument that has all the values we want.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=204.98) [So I'll go ahead and close the terminal, and now we'll](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=207.74) [update the tags with the merge function.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=210.96) [I'll add the merge function,](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=213.74) [add a comma after local tags and start a map. We'll set the key to](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=215.57) [Name. We'll set the value to the same value we just used in the](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=220.17) [console, local.name\_prefix and add ‑vpc.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=223.96) [And then we'll close the map and close the parentheses for the merge function.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=229.04) [There we go.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=234.24) [That's all done.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=234.82) [Now my challenge to you is to go through the rest of the](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=235.82) [resources within the configuration.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=238.58) [If there's a name argument, go ahead and update the name argument as needed.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=240.79) [If there is no name argument,](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=244.76) [add a name tag to the tags argument using the merge function.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=246.84) [A good example of a resource that does have a name argument, if](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=251.28) [we scroll down to our first security group,](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=254.61) [this does have a name argument, which will be applied as the name tag.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=256.81) [So we can update this one with the naming prefix. Any](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=260.41) [resources that don't have this name argument,](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=264.13) [you can add it to the tags argument instead.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=266.3) [One other thing to note is for resources where we're using the](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=269.24) [count argument or the for each argument,](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=272.43) [you may want to use that value in the naming tag, so you name](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=275.03) [each instance of the resource differently.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=278.8) [Subnets would be a good example of that where you want to name](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=281.38) [each subnet based off of the count index.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=284.43) [Go ahead and try to make those changes now. When we come back,](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=287.54) [we'll go through the process of formatting, validating, and deploying our updated configuration.](https://app.pluralsight.com/course-player?clipId=e30e2ce4-3edd-4891-b284-9efb829d4f6a&startTime=290.77)

### [Validating and Deploying the Updated Configuration](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3)

[Now that you've updated your configuration files, if you have any questions,](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=1.44) [you can definitely check out the m7\_solution directory to](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=5.15) [see my solution for this configuration.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=8.77) [Let's go ahead and format and validate our configurations.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=12.04) [I'll exit the Terraform console by doing exit, and](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=15.74) [go ahead and run terraform fmt.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=18.88) [All of our files are now nicely formatted, let's run terraform](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=21.14) [validate to make sure we don't have any syntax issues, and it](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=24.63) [looks like we missed something with our subnets, we're going to](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=27.93) [have to update our configuration.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=30.61) [Let's go into the loadbalancer.tf file, and scroll all the way](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=32.57) [up to our load balancer, and sure enough, we're referencing two](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=36.97) [resources that don't exist anymore.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=40.13) [We need to update this.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=42.26) [What we want is a list of all the subnets that exist.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=43.58) [Now if you'll remember from the reference syntax we looked at earlier,](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=48.34) [we can do this by using an asterisk,](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=52.19) [so I'll change the reference to aws\_subnet.subnets, and then we'll](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=54.71) [use square brackets and the asterisk to indicate that we want to](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=60.03) [retrieve all of the instances, and then we'll use .id to get the ID](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=65.06) [attribute of all of those instances.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=70.18) [Now the object returned is going to be a list, so we can get rid of](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=72.75) [this other reference of subnet2, and we can get rid of the square](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=77.84) [brackets, because the object being returned is already a list, we don't](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=82.49) [want to put a list inside of a list.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=86.27) [So I'll go ahead and save this, and now, let's try running terraform](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=88.26) [validate again. And success! Our configuration is valid.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=92.89) [That's why you always run terraform validate after you make changes,](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=97.97) [because you're always going to forget something in your](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=101.76) [configuration. Okay, with a valid configuration,](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=104.09) [we can go ahead and run through the plan and apply process. Going back to](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=106.79) [m7\_commands, if you haven't already exported your AWS access key and secret](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=111.56) [key as environment variables, go ahead and do that now. I already have that](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=118.01) [set, I can move onto the next step, which is running terraform plan, and](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=121.97) [sending the plan to the file m7.tfplan.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=125.84) [Go ahead and copy that, and run it down below.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=130.04) [This is probably going to make some significant changes,](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=134.44) [because we're changing the naming,](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=136.94) [we're changing some of the subnet references, it's going to](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=138.73) [make a lot of changes is what I'm saying.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=142.6) [So, it's going to add 19 new things,](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=144.28) [change 3, and destroy 19 things; and that's because, like I said,](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=147.09) [we're making some pretty significant changes. Fortunately we're still in a](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=151.36) [development context, so we can go ahead and run terraform apply to apply](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=155.22) [these changes to our deployment. Since we're recreating a lot of stuff, this](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=160.22) [is going to take a while to apply, so I'll go ahead and pause the recording](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=164.64) [now, and we'll resume when the deployment has completed. Okay, our](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=168.39) [deployment has completed successfully, it's made all the changes that we](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=172.24) [asked of it, let's go ahead and make sure our application is back up and](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=176.01) [running.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=179.61) [I'll go ahead and copy this entire address right here, and we'll](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=179.85) [go over to a browser, and paste it in here.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=183.63) [There we go, our site has loaded successfully.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=187.84) [Let's go over to the EC2 Management Console. Looking at the names for our](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=190.61) [EC2 instances, we've got globoweb‑dev‑nginx‑0 nginx‑1.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=195.95) [I used the count index to help with the naming of the instances.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=202.17) [If you'd like to go to your AWS console,](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=206.74) [you can verify the naming and the creation of all of your resources to](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=208.97) [make sure your configuration operated correctly.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=213.53) [At this point, we have satisfied all of John's requirements. Well done everybody.](https://app.pluralsight.com/course-player?clipId=b9933078-e76a-4ddc-b59b-6685e57bd9d3&startTime=216.43)

### [Summary](https://app.pluralsight.com/course-player?clipId=367d2a6e-508d-46b6-b445-89a9dfa8371f)

[In this module,](https://app.pluralsight.com/course-player?clipId=367d2a6e-508d-46b6-b445-89a9dfa8371f&startTime=1.14) [we explored the concepts of looping and functions in](https://app.pluralsight.com/course-player?clipId=367d2a6e-508d-46b6-b445-89a9dfa8371f&startTime=1.95) [Terraform. We started with adding count and for each loops to](https://app.pluralsight.com/course-player?clipId=367d2a6e-508d-46b6-b445-89a9dfa8371f&startTime=5.28) [make our configuration more dynamic.](https://app.pluralsight.com/course-player?clipId=367d2a6e-508d-46b6-b445-89a9dfa8371f&startTime=9.63) [Then we leveraged functions to further improve the code and](https://app.pluralsight.com/course-player?clipId=367d2a6e-508d-46b6-b445-89a9dfa8371f&startTime=12.14) [simplify the required inputs for deployment.](https://app.pluralsight.com/course-player?clipId=367d2a6e-508d-46b6-b445-89a9dfa8371f&startTime=15.66) [In the next module,](https://app.pluralsight.com/course-player?clipId=367d2a6e-508d-46b6-b445-89a9dfa8371f&startTime=19.34) [we are going to examine modules. Oh boy, that might sound a](https://app.pluralsight.com/course-player?clipId=367d2a6e-508d-46b6-b445-89a9dfa8371f&startTime=20.26) [little confusing. We'll examine Terraform modules.](https://app.pluralsight.com/course-player?clipId=367d2a6e-508d-46b6-b445-89a9dfa8371f&startTime=24.49) [Terraform modules are used to package up common configurations for reuse, and they are incredibly useful. That's coming up, next.](https://app.pluralsight.com/course-player?clipId=367d2a6e-508d-46b6-b445-89a9dfa8371f&startTime=28.82)

## [Using a Module for Common Configurations](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890)

### [Overview](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890)

[A common feature of programming languages is the ability to](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890&startTime=1.14) [import libraries or modules for common tasks,](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890&startTime=4.44) [data structures, or functions.](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890&startTime=7.53) [Terraform implements a similar ability through the use of modules. Terraform](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890&startTime=9.64) [modules stop you from reinventing the wheel by allowing you to use common](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890&startTime=14.32) [configurations built by others. Hey everyone, this is Ned Bellavance, I'm a](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890&startTime=18.66) [HashiCorp Ambassador and founder of netinthecloud.](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890&startTime=22.71) [Let's dive into Using a Module for Common Configurations.](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890&startTime=25.45) [We'll start this course module by first defining what a Terraform module is.](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890&startTime=29.94) [The most surprising thing? You've been using a module this whole time and](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890&startTime=35.24) [didn't even realize it. Once we've established what a module is and how it's](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890&startTime=40.05) [used, we'll check in with John to see what improvements he thinks we could](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890&startTime=45.05) [make by leveraging modules in our code.](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890&startTime=49.24) [Then we'll implement those changes, first by using an existing](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890&startTime=52.14) [module from the Terraform public registry, and then creating](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890&startTime=55.83) [our own module for S3 buckets. But first, what is a Terraform module?](https://app.pluralsight.com/course-player?clipId=4b2bc485-53fe-43ca-9643-00e64b2e0890&startTime=59.85)

### [Terraform Modules](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511)

[Whether or not you realize that you've been using Terraform](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=1.14) [modules all along, what is a Terraform module? It is simply a](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=4.05) [configuration that defines inputs,](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=8.08) [resources, and outputs, and all of those are optional.](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=10.52) [When you create a set of tf or tf.json files in a directory, that is a module.](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=14.94) [The main configuration you are working with is known as the root module,](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=22.94) [and you can invoke other modules to create resources.](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=27.35) [Modules can form a hierarchy with the root module at the top.](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=31.24) [Our root module could invoke a child module, which could](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=35.64) [in turn invoke another child module.](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=39.5) [For instance,](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=42.54) [let's say we use a module to create a load balancer with a VPC and an EC2](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=43.54) [instance. The load balancer module may use a module to create the VPC and](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=49.59) [another to create each EC2 instance. The motivation behind creating or](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=55.01) [using modules is to leverage a common set of resources and configurations](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=60.93) [for your deployment.](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=65.99) [Where can you get modules?](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=67.84) [They can be sourced from the local filesystem,](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=69.57) [a remote registry or any properly implemented website that](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=72.19) [follows the HashiCorp provider protocol.](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=76.26) [The most common source is the Terraform public registry.](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=79.04) [In fact,](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=82.18) [you may have noticed the browse module option on the public registry.](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=82.83) [Modules that are hosted on a registry are also versioned in the same way](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=87.32) [that providers are. You can specify a version to use when invoking a](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=92.06) [module. Staying on your preferred version can prevent breaking changes](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=96.14) [from impacting your deployments. Once you've added the module to your](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=100.42) [configuration,](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=104.34) [terraform init will download the module from the source](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=105.4) [location to your working directory.](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=108.36) [If the module's already in the current working directory,](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=110.94) [Terraform will not make a copy of it. As I](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=113.77) [mentioned in the discussion of looping,](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=116.79) [you can create multiple instances of a module using either](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=118.87) [the count or for\_each meta arguments.](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=122.33) [The components that make up a module should already be very familiar to you.](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=125.94) [Modules generally have input variables,](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=130.64) [so you can provide values for input to the module, and output values that are](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=133.25) [based off of what the module is creating, and, of course,](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=139.01) [the actual resources and data sources within the module.](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=142.28) [A module is not required to have any of these components,](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=146.04) [but it probably would not be very useful without them.](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=149.16) [Now that we know a bit about modules, let's see what Globomantics has in mind for using them with our configuration.](https://app.pluralsight.com/course-player?clipId=36d4e77c-0dfc-4e31-911f-38d79aab2511&startTime=152.54)

### [Globomantics Updates](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c)

[After learning about modules,](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=1.24) [you're probably already thinking of how the](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=2.97) [configuration could be improved and simplified.](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=4.78) [Looking at the current architecture,](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=8.64) [we've got our application sitting in a VPC, which we know is made up of subnets,](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=10.56) [routes, route associations, an internet gateway, and more.](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=15.63) [That seems like a common configuration that should go into a module.](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=19.54) [Also, our S3 bucket with the bucket and the IAM policies seems](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=23.84) [like something that might be used in other deployments at](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=28.39) [Globomantics. What does John think about that?](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=31) [You caught up to John in the hallway to talk about your module idea. Turns](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=34.14) [out, he's been researching them on his own, and he thinks it would be a](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=38.11) [great idea to add them to your configuration.](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=41.49) [He would like everybody at Globomantics to standardize on the](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=44.44) [VPC module from the Terraform public registry.](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=47.92) [He also really likes the idea of creating a module for the S3 portion of](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=51.64) [the configuration, with all the necessary IAM roles,](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=56.18) [profiles, and bucket policies that will allow a load balancer to write](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=59.79) [access logs and EC2 instances to grab website content.](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=63.8) [Before we try to implement these improvements, first, we need to check out the syntax used to create and instantiate a module.](https://app.pluralsight.com/course-player?clipId=e282f08b-d5fb-46c6-bcee-da1246b2f75c&startTime=69.04)

### [Module Structure](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc)

[A module really is just a collection of Terraform files in a directory.](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=1.34) [In the same way that we have been crafting our](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=6.34) [configuration with files for variables,](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=8.27) [outputs, and different resource groupings, you can do the same](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=10.61) [with a module or just put it all in one big file.](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=13.96) [The contents of a module will include input variables,](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=17.04) [resources to be created, and outputs that the parent module might want to use.](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=20.48) [In this example, we are building a module for an S3 bucket.](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=25.04) [The input variable bucket\_name can be used to name the S3 bucket. Then](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=28.94) [we have the actual resource being created. And in that resource, we](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=34.06) [can use the input variable bucket\_name.](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=38.27) [The parent module is probably going to want some information about that bucket,](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=41.34) [and we can expose that information using an output value,](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=45.92) [passing back the bucket\_id. Now is probably a good time to mention why input](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=49.8) [variables and output values are so important to a module.](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=56.38) [The only way for a parent module to pass information to a](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=60.94) [child module is through input variables.](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=64.86) [The child module has no access to local values,](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=68.13) [resource attributes, or input variables of the parent module.](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=71.51) [Any information a module might need has to be passed](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=75.63) [through those input variables.](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=79.54) [Likewise,](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=81.44) [the parent module has no access to the local values and resource](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=82.11) [attributes of the child module, the only way to pass information back](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=86.19) [to the parent module is through output values.](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=90.62) [The good news is that the input variables and output values support](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=94.14) [any data type available in Terraform, so you can pass a complex](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=98.44) [object, an entire resource, or a simple string.](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=102.47) [The choice is up to you. Bearing this in mind, let's take a](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=106.05) [look at how you instantiate a module, pass variable values to it, and reference outputs from it.](https://app.pluralsight.com/course-player?clipId=c89c853f-d4d8-4bc7-ac84-28995f1a43fc&startTime=109.41)

### [Module Syntax](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931)

[Invoking a module starts with the module keyword,](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=1.24) [followed by a name label for the module.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=4.63) [The rest of the configuration information goes inside the block.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=7.14) [The source argument tells Terraform where to get the module from.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=10.94) [The source can be the local file system,](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=14.69) [the Terraform registry, or any other supported source type.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=17.11) [If the source supports versioning,](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=21.14) [you can specify the version argument with a version expression,](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=23.51) [just like the expressions we used for a provider version.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=27.55) [If you'd like to use a specific instance of a provider within a module,](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=31.44) [you can do so with the providers argument.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=35.79) [The value for the argument will be a map where the key is the](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=38.67) [name of the provider in the child module,](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=42.06) [and the value is the name of the provider alias in the parent module.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=44.23) [If you don't specify a providers block,](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=48.84) [Terraform will use the default provider instance.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=51.56) [The remainder of the block will be key‑value pairs,](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=55.04) [with the key being the name of an input variable in the child module and the](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=58) [value that you would like to pass to the child module.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=62.45) [Let's take a look at an example with our potential S3 bucket module.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=65.57) [We'll start with the module keyword and a name label of taco\_bucket.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=70.44) [In the block we'll specify the source as the current directory and](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=74.15) [the S3 subdirectory where we have our module files.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=78.42) [Since this is a local source, it doesn't support versions.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=82) [Beyond that,](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=86.14) [we can pass the single variable bucket\_name to the module, and that's it.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=86.71) [The module will take care of creating the resources](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=91.54) [and making output values available.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=94.31) [Let's take a look at how we can reference those values.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=97.04) [The general format for referencing a module output is the module keyword, dot,](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=100.24) [the name label of the module, dot, the output value name.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=105.09) [In our example,](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=109.24) [we can get the bucket id by using the syntax](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=110.09) [module.taco\_bucket.bucket\_id. As I mentioned, the output value](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=113.37) [can be any data type, and naming is up to you.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=119.89) [We used the attribute name in this example, but we could've](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=122.93) [called the output value s3\_bucket\_id or whatever else makes](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=126.44) [sense in the context of the module.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=130.24) [Armed with all of this module knowledge, let's start making use of it.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=132.54) [First, we will replace the current VPC resources with the](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=136.59) [VPC module on the Terraform registry. Of course, that means going to the registry and reading about the VPC module.](https://app.pluralsight.com/course-player?clipId=32c5e473-f64e-451b-9f57-8b228e76c931&startTime=140.02)

### [Adding the VPC Module](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b)

[Here is the main page of the Terraform Registry.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=1.14) [We've already gone into the Providers section,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=4.29) [so now let's go into the Modules section.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=6.3) [If we look to the left, we can filter by Provider for the modules that we want.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=9.34) [The module we actually want is the vpc module,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=13.74) [which happens to be the top module here.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=16.54) [So let's go ahead and click on that module.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=19.54) [Within this module, I want to point out a few things.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=22.64) [It has a basic set of instructions on how to use the module.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=25.53) [It also provides the source code for the module on GitHub.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=29.84) [So if you want to view what's actually in the module,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=33.52) [you can click through on that link and view it yourself.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=35.93) [Scrolling down a little bit, we have a README section,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=38.59) [which describes how to potentially use this module.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=41.62) [And then it also gives us a list of inputs that are accepted by the module,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=44.61) [output values that are given by the module,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=48.89) [any dependencies and the resources that would be created by the module.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=51.26) [A lot of this is dependent on the inputs you give the module.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=55.84) [We're going to be setting up a fairly basic VPC,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=60.54) [so we can simply copy this example and paste it into our](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=63.77) [configuration and then make some simple updates.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=67.45) [Let's do that now.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=69.96) [Okay, I've copied the text, let's head over to our configuration,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=71.74) [and I'll expand globo\_web\_app and open up the network.tf file.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=75.74) [There we go. And, we are going to be replacing a bunch of resources with this.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=80.82) [We're going to be replacing the vpc, the internet\_gateway,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=85.98) [the subnets, the route\_table, and the route\_table\_associations,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=90.14) [all with this module.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=95.11) [That's a lot of resources that we no longer have to manage.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=96.09) [Let's scroll back up to the top and paste in the module example.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=99.36) [Since this module is from the Terraform Registry,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=103.84) [we should definitely add a version argument to pin it to a specific version.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=106.61) [This way, if the module is updated in a way that breaks our configuration,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=111.74) [we can test it in a development environment before](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=115.65) [upgrading to the newest version of the module.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=118.27) [If we go back to the browser, we can see the current version is 3.10.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=120.63) [So let's go ahead and pin it to 3.10 for now.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=125.01) [We'll set the version = to 3.10.0,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=128.24) [and this way it will only use that version until we change this argument.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=131.61) [Okay,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=136.58) [now we need to update some of the values that are used for the arguments here.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=137.07) [We'll first delete the name argument since we'll be](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=141.75) [submitting that through our tags.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=144.27) [Next, we'll update the cidr block to use our variable.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=146.74) [For the availability zones argument,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=150.44) [we want to give it a list of availability zone names that's equal to](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=152.31) [the number of subnets that we're currently using.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=156.93) [To do that,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=159.84) [we can use the slice function to slice off a list of names](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=160.54) [from the availability zones data source.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=165.34) [Let's see how we do that.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=168.15) [The slice function takes a list as input and then slices](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=169.84) [off a portion of that list for use.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=173.62) [We'll specify the data source aws\_availability\_zones.names.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=175.81) [The next argument is the starting index for the slice.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=180.3) [We'll start at the first element in the names list.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=182.89) [The last argument is the ending index of our slice, and it is not inclusive,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=185.94) [so it won't include that element in our list.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=189.76) [We'll set that to var.vpc\_subnet\_count.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=192.13) [So when our subnet count is 2,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=196.44) [it will return 2 availability zone names and it](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=197.94) [will already be in a list format.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=201.46) [Okay, for the private\_subnets, we don't have any private subnets,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=203.72) [so we can go ahead and delete the private\_subnets.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=206.88) [For the public\_subnets,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=209.63) [we are going to need to calculate a list of public subnet](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=211.7) [CIDR ranges for our public subnets.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=215.75) [Let's look at how we've done this already.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=218.94) [If we scroll down to our subnets,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=221.01) [we compute the CIDR block using the cidrsubnet function and the](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=223.32) [count.index since we're creating our subnets and accounts.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=226.93) [We're no longer generating our subnets in account,](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=229.79) [so we need an alternate way to generate this list of CIDR subnets.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=232.64) [The way that we'll do that is with a for expression.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=237.54) [I briefly mentioned for expressions in the previous module, now it's time to dig into those a little more deeply.](https://app.pluralsight.com/course-player?clipId=67245833-a2f6-4c70-a2b5-8290d043c57b&startTime=240.28)

### [For Expressions](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90)

[For expressions are a way to create a new collection](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=1.44) [based off of another collection object.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=4.75) [It's especially useful when you're dealing with resources](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=7.64) [that have a count or a for each argument.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=10.22) [The input in a for expression can be any collection data type,](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=12.94) [list, set, tuple, map, or even object.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=17.44) [The contents of the collection will be available for](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=20.94) [transformation in the for expression.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=23.93) [The result of the for expression will be either a tuple or an object data type.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=27.04) [Remember that these are structural data types,](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=32.34) [which means the values inside don't all have to be of the same data type.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=34.98) [To help customize the result, you can filter it with an if statement.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=38.92) [You can filter on any value from the inputs.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=42.87) [Let's check out the syntax in a for expression to lend some clarity.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=46.24) [First, let's see how you would create a tuple result with a for expression.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=50.54) [The expression starts with either curly braces or square brackets.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=55.24) [The square brackets indicate that the result will be a tuple.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=59.47) [I found that kind of confusing at first, so I'll repeat that.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=63.44) [The brackets or braces that you use to encapsulate the for](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=66.58) [expression determine the result type.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=69.93) [After the square brackets, the expression starts with the keyword for,](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=72.54) [followed by syntax that identifies the input value and the](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=76.88) [iterator term to use during evaluation.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=80.69) [The structure is the iterator term, followed by in, and then the input value.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=83.64) [After that we have a colon,](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=89.44) [which signals the start of the value which will be stored in](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=90.85) [each tuple element in the resulting collection.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=94.34) [If that sounds esoteric and difficult to parse,](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=97.21) [I agree, and I think an example will clear things up.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=100.94) [Let's say we have a local value called toppings of](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=104.34) [type list with three elements in it,](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=107.08) [and we'd like to create a new tuple with the word Globo](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=109.3) [added to each element in the list.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=112.97) [We can accomplish this with a for expression.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=115.54) [The square bracket says that we want a tuple as the result.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=118.54) [The t is the placeholder for each value in the input value local.toppings.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=122.34) [After the colon is the resultant value we want to use for each element,](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=127.36) [which is simply the string Globo and the value stored in placeholder t.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=132.14) [The resultant tuple will have three elements,](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=137.31) [Globo cheese, Globo lettuce, and Globo salsa.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=140.77) [Remember that the input value doesn't have to match the result.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=144.19) [Local.toppings could have been a map.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=148.14) [Now let's check out the syntax for creating an object.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=150.84) [The expression will start with curly braces to indicate that we want](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=154.54) [an object as a result. As a quick refresher, an object is basically a](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=158.33) [set of key‑value pairs where the values can be of different data](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=162.87) [types. In this expression, the input value is a map, which means we](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=166.77) [now need two iterator identifiers, one for the key and the other for](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=171.07) [the value.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=175.71) [Next, we have a colon and an expression to evaluate](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=176.67) [for each entry in the object.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=179.95) [The syntax is the object key, followed by equals and the](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=182.44) [greater‑than symbol and then the object value.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=186.19) [Again, an example will probably help.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=189.24) [Here's a local value called prices of type map with three key value pairs.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=192.34) [Let's say we'd like a new object where each price is](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=198.04) [rounded up to the next whole integer.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=201.08) [We can do that with a for expression, where i is the](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=203.24) [map key, and p is the map value.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=206.76) [The expression to evaluate keeps the same key i, but](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=209.84) [alters the value with the ceiling function.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=213.52) [The resulting object has the value for each pair](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=216.24) [rounded up to the closest integer.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=218.92) [We are going to use a for expression to dynamically](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=221.24) [generate a list of subnet CIDR ranges. Let's head over to the configuration and see how.](https://app.pluralsight.com/course-player?clipId=7ae21c3d-5502-4849-b748-3868147b1f90&startTime=224.25)

### [Using a For Expression](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337)

[We are trying to create a tuple of cidrsubnet addresses to](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=1.24) [pass to the public subnets argument.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=5) [The number of elements in the tuple should equal the](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=7.54) [value stored in vpc\_subnet\_count,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=10.34) [which means we'll need an input to the for expression that is a list of](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=13.27) [integers from 0 to the value in vpc\_subnet\_count.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=17.85) [Fortunately, there is a function called range that will do exactly that.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=22.54) [Let me pull up the terminal,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=27.02) [and we'll start up terraform console to test out these expressions.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=28.67) [First we will test the range function.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=32.48) [The syntax is the range function and then the value you want it to count up to.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=35.12) [We'll specify the variable vpc\_subnet\_count.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=39.78) [Range will hand back a list of 0 and 1.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=43.74) [That sounds good; that's a good start.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=46.8) [Now we have a list to use as an input value for the for expression.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=48.84) [For the evaluation portion of the expression,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=52.94) [we can use the cidrsubnet function, passing it the vpc\_cidr\_block variable,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=55.84) [8 bits to add to the subnet mask, and the element value in our input list.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=60.88) [Let's try to construct a for expression with that information.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=65.88) [We'll start the expression with square brackets because we want a tuple back,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=69.84) [we'll have the for keyword to start our for expression,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=74.54) [we can set an iterator for our list, we'll call it subnet,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=77.84) [and that's going to be in the range,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=81.24) [and we'll set the range to var.vpc\_subnet\_count,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=83.63) [which we know will return a list with two elements,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=87.58) [0 and 1.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=90.44) [Then we'll add the colon and then the expression we want](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=92.24) [to use for the result of each element.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=95.1) [We'll do the cidrsubnet function, we'll feed it the variable vpc\_cidr\_block,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=97.44) [8, to add 8 bits to the subnet mask,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=103.64) [and then the subnet iterator. That will be 0 on the](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=107.31) [first evaluation and 1 on the second.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=110.89) [We'll close that parentheses for the cidrsubnet function and](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=112.86) [close the for expression with a square bracket.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=116.63) [I'll go ahead and hit Enter, and we get back a tuple that has two subnets in it.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=119.08) [Perfect, that's exactly what we need.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=123.61) [And this will be dynamic based off of the values of](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=125.52) [the cidr\_block and the subnet\_count.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=128.41) [Let's go ahead and copy this entire expression, and I'll hide the terminal.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=131.15) [Scrolling up to our vpc module,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=135.52) [we can replace the value for public\_subnets with our new expression.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=137.99) [Okay, there we go.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=142.84) [For enable\_nat\_gateway, we want to set that to false.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=144.22) [We don't have any private subnets, so we do not need a NAT gateway.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=147.67) [We'll also set enable\_vpn\_gateway to false,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=152.54) [because we are not using a VPN gateway.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=155.3) [For our tags,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=157.87) [we can go down and grab the tags argument from our existing VPC resource,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=159.22) [and go ahead and paste that as the value for the tags argument in the module.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=164.74) [There we go.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=168.94) [With our vpc module ready to go, we can remove the other resources.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=169.84) [There we go,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=175.54) [I have removed all the resources that we're replacing with the vpc module.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=176.07) [Now the next thing we need to do is replace any of the references](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=181.14) [to our VPC resources with the module references.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=184.84) [There are two output values that you'll need to use to](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=189.43) [update the rest of the configuration.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=192.76) [The first is the vpc\_id, and the second is the public\_subnets list.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=194.94) [For the vpc\_id, we'll update the expression to module.vpc.vpc\_id.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=200.01) [Vpc\_id is the output value from our vpc module.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=208.12) [We also need to update anywhere that the subnets are referenced.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=213.64) [For example,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=217.26) [let's go to the load balancer. In the load balancer we were](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=218.08) [referencing all of the public subnets with this expression.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=220.96) [We need to update the value for the argument to use the public](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=223.81) [subnets that are created by the module. To do that, we will](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=226.81) [update the value to module.vpc.public\_subnets, which is a list](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=229.76) [of all the public subnets.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=235.02) [My challenge to you is to go through the rest of the](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=237.34) [configuration and update it to use these module outputs.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=239.54) [If you have any questions,](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=243.03) [you can always reference the solution that's in the m8\_solution directory.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=244.47) [Go ahead and pause the video now, and when we come back we are going to create our S3 module.](https://app.pluralsight.com/course-player?clipId=04bc0158-60f0-4810-be9a-d2e9b3650337&startTime=248.62)

### [Creating the S3 Module](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa)

[The S3 module we are creating should create an S3 bucket with a bucket](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=1.34) [policy that allows a load balancer to write logs and the proper IAM](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=5.33) [resources to grant access to an EC2 instance.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=10.23) [Our inputs are going to include the bucket\_name,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=13.53) [the elb\_service\_account\_arn, and the common\_tags to be applied to all resources.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=17.24) [Those can all go in the file variables.tf.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=22.94) [The resources we need to create already exist in our configuration.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=26.94) [We've got the S3 bucket itself, the IAM role,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=30.74) [the role policy, and the instance profile.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=34.74) [In terms of output values,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=38.24) [we are going to use the S3 bucket and instance profile.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=39.79) [We can simply return the entire object for each resource and](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=43.54) [make use of all the attributes within.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=47.72) [Let's head over to the configuration and start setting up our module.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=50.05) [Let's create the S3 module inside of the globo\_web\_app directory.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=54.34) [We'll start by adding a directory called modules,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=59.01) [just in case we want to add any future modules to our configuration.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=61.45) [Within that modules directory, let's add a subdirectory for our S3 module,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=66.34) [and we'll name the directory, globo‑web‑app‑s3,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=71.42) [so that's pretty descriptive of what this module is intended for.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=75.22) [Within that directory we'll create three files.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=80.63) [We'll start by creating the variables.tf,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=83.57) [followed by a main.tf file to hold all of our resources,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=86.44) [and then an outputs.tf file for our output values.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=90.15) [Within the variables file,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=94.67) [I'm going to add some comments here for variables we want to create.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=96.78) [My challenge to you is to create these three variables,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=100.26) [the bucket name, the ELB service account,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=103.63) [and the common tags to pass to this module.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=106.38) [Go ahead and try that now, and when we come back you can see my updated solution.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=109.61) [Okay, here is my solution.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=116.34) [I've got a variable named bucket\_name that's of type string; a](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=117.95) [variable called elb\_service\_account\_arn,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=121.88) [which is also of type string; and then a variable called common\_tags,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=124.53) [which is of type map with strings as the values for the map.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=128.59) [And I actually set a default for the common\_tags in case](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=132.52) [someone using this module doesn't submit a list of common](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=135.57) [tags to use in the configuration.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=138.7) [Next up, we will add our resources to the main.tf file.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=141.44) [So let's scroll down and open up the s3.tf file.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=145.56) [We are going to copy all the resources in here except for the S3 bucket objects.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=149.84) [Those will still be created in part of our main configuration.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=155.07) [First, I will grab the S3 bucket resource,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=158.94) [remove that from the s3.tf file, and paste it into the main.tf file.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=162.64) [Next,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=167.94) [I will grab all of the IAM resources below the bucket object](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=168.37) [resource and paste those into the main.tf file.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=172.13) [Let's go ahead and save the s3.tf file.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=176.54) [And now back in the main.tf file,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=179.38) [my challenge for you is to update the references here to use](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=181.93) [the input variables for all of the resources.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=186.07) [Go ahead and try that now,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=189.34) [and when we come back we can review my updated solution.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=190.83) [Okay, in my updated solution the bucket value is going to be var,bucket\_name.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=196.04) [In the policy statement,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=202.14) [we're now using the variable elb\_service\_account\_arn instead of the data source,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=203.19) [and for the references to the bucket\_name,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=208.14) [we'll use the variable bucket\_name.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=210.21) [Scrolling down to the end of the S3 bucket resource,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=212) [the tags have been updated to use the var.common tags.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=215.25) [For the IAM role,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=219.31) [I've updated the naming to use the bucket\_name as the](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=220.98) [beginning of the name for the role,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=223.8) [and I've updated the tags to be var.common\_tags.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=226.14) [For the role policy,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=228.7) [I'm also using the bucket\_name to name the role policy and updating the](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=230.42) [reference to the bucket\_name to use the bucket\_name variable.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=235.55) [And down in the instance profile,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=239.17) [I updated the name to use the bucket\_name for naming and also](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=241.72) [updated the tags to use var.common\_tags.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=245.38) [That's everything that's in the main.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=248.58) [Now the last thing to do is to create two outputs.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=250.24) [I'll go ahead and save the main.tf file,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=253.42) [and let's go over to outputs and I'm going to put two comments in here](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=255.94) [for the bucket object and the instance profile object.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=260.08) [My challenge to you is to add the output values here to pass](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=265.04) [the whole bucket object and the whole instance profile object](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=268.73) [back up to the parent module.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=272.36) [Go ahead and try that now, and when we come back we can view my updated solution.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=274.49) [In my updated solution, we have the output web bucket,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=279.48) [which is set to a value of aws\_s3\_bucket.web\_bucket.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=283.92) [Because we don't specify an attribute,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=287.07) [it will pass the entire bucket object back as an output value.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=290.19) [That's pretty useful.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=294.37) [And then we do the same thing for instance profile,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=295.75) [referring to aws\_iam\_instance\_profile.instance\_profile.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=298.19) [We'll go ahead and save this output file,](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=302.46) [and now we need to add the module reference to our s3.tf file.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=305.24) [I'll go ahead and select that now.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=310.25) [Now my challenge to you is to add the module block](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=312.11) [with the proper input variables.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=315.83) [Go ahead and pause the video now, try it out, and when we come back you can see my updated solution.](https://app.pluralsight.com/course-player?clipId=6b5878d6-e990-4c6c-a388-1f7bcd86d3fa&startTime=318.64)

### [Adding the S3 Module](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7)

[Okay, here is my updated solution.](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=1.24) [We're creating a module with the name\_label web\_app\_s3. The source](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=3.32) [will be the current working directory /modules/globo‑web‑app‑s3. We](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=7.73) [have to give it three input variable values,](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=13.66) [bucket\_name set to the local.s3\_bucket\_name,](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=16.17) [elb\_service\_account set to the elb\_service\_account data source,](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=19.26) [and common\_tags set to local.common\_tags.](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=24.64) [Now that we've updated to use a module,](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=28.64) [we're going to have to update any references to the bucket or the](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=30.77) [instance\_profile with the output values from this module. For instance, our](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=33.97) [bucket argument in the aws\_s3\_bucket object should be updated to](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=39.57) [module.web\_app\_s3.web\_bucket.id. My challenge to you now is to update any](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=44.35) [other references to the bucket or the instance\_profile in our configuration to](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=51.89) [use the proper output value from our S3 module.](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=56.08) [Go ahead and do that now, and then we'll review my](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=60.54) [updated configuration when we come back.](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=62.89) [Okay, we're back in the loadbalancer file.](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=66.84) [I simply updated the access\_logs argument to use the S3 bucket created by](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=69.85) [our module. Over in instances, the iam\_instance\_profile has been updated to](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=75.26) [use the instance\_profile output value, .name.](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=80.45) [We had to update the depends\_on, because it was referencing the](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=83.94) [iam\_role, but that's not available to us anymore, so instead we just](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=86.98) [make it dependent on the module itself.](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=90.68) [And then in the templatefile function we have to update the s3\_bucket\_name](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=93.25) [to be the web\_bucket output value and the .id attribute.](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=97.49) [While we're looking at the instance configuration,](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=102.44) [one thing I want to point out is the configuration for the subnet\_id. At the](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=104.85) [end of the module expression, I have removed the .id attribute, and that is](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=110.44) [because what's returned by the module is actually a list of public subnets and](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=115.74) [not the public\_subnets object itself,](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=120.61) [which would have the id attribute. That's going to do it](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=122.77) [for all the updates to our configuration.](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=126.13) [Go ahead and save those updates. The next step is to get those updates deployed.](https://app.pluralsight.com/course-player?clipId=48309235-6b39-4d62-8f82-238e9f8568f7&startTime=128.72)

### [Validating and Applying the Updated Configuration](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106)

[We have updated our configuration to use a VPC module from the Terraform](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=1.04) [Registry and an S3 module that we wrote ourselves.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=5.12) [Let's go ahead and get those changes deployed.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=8.57) [I'll go ahead and open up the m8\_commands file.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=11) [And the first thing we need to do is run Terraform in it because Terraform needs](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=14.64) [to get these modules and include them in the configuration.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=19.1) [So I'll go ahead and open up the terminal.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=22.24) [There we go.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=24.69) [And we'll run Terraform in it.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=25.84) [Okay, Terraform has successfully initialized.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=29.24) [If we scroll up,](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=31.63) [we can see under initializing modules that it downloaded the VPC module and](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=32.38) [placed it in the .terraform\modules\vpc folder. Because our](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=37.83) [globo‑web‑app‑s3 module is already in the local directory, it will not try](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=43.25) [to download or copy the files for that module.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=48.85) [All right, now that we have successfully initialized Terraform, the next step,](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=52.34) [of course,](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=55.74) [is to run terraform fmt. But we don't just want to format our files in](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=56.24) [the globo\_web\_app directory, we also want to make sure that the files in](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=60.88) [our S3 module are formatted properly. And we can do that by running](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=64.56) [terraform fmt‑recursive to go into those subdirectories and properly](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=68.27) [format those files as well. And there we go, it has updated the](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=73.42) [formatting for all of our files.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=77.11) [The next step is to run terraform validate.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=79.23) [All right, excellent. Our updated configuration is valid.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=82.19) [The next step would be to export your environment variables if you](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=86.04) [haven't already done so. And after that, we'll run Terraform plan](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=89.45) [and send the output to m8.tfplan.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=93.66) [We'll go ahead and run that now.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=96.84) [Since we're moving a lot of things to modules,](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=98.84) [it's also going to have to recreate a lot of our infrastructure.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=101.43) [Again,](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=104.42) [I'm glad we're doing this all in development before we roll anything out to](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=104.91) [production. Let's go ahead and run terraform apply to apply all of these](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=108.92) [changes. If you happen to be running in production and you needed to move](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=113.88) [resources from the root module to a child module, that's a case where using](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=118.42) [the terraform state mv command can help you move things from the existing](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=123.19) [address to a new address that's inside the module, and that would stop](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=127.81) [Terraform from destroying the target infrastructure that you're trying to](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=131.93) [update.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=135.71) [That's a pretty advanced topic, which we're not going](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=136.52) [to get into here. For our purposes,](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=138.75) [we're still in the development environment, so tearing down this](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=140.75) [infrastructure and recreating it is no big deal.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=143.04) [This is going to take a while,](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=146.44) [so I'll go ahead and pause the recording now, and we'll resume](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=147.4) [when the deployment has completed successfully.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=149.94) [All right,](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=153.04) [our deployment is successful, let's go and check on our website. Copy that](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=153.54) [address, and go over to a browser. And there we go, our website is up and](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=157.97) [running and we are now using a VPC module and an S3 module. That's awesome.](https://app.pluralsight.com/course-player?clipId=8837e123-f629-4449-b500-c49be4012106&startTime=162.47)

### [Summary](https://app.pluralsight.com/course-player?clipId=fa4850f3-9c28-4392-a206-2d78a3c29c96)

[Terraform modules are incredibly useful.](https://app.pluralsight.com/course-player?clipId=fa4850f3-9c28-4392-a206-2d78a3c29c96&startTime=1.44) [You can find existing modules on the Terraform Registry and save](https://app.pluralsight.com/course-player?clipId=fa4850f3-9c28-4392-a206-2d78a3c29c96&startTime=4.19) [time and effort by not reinventing the wheel.](https://app.pluralsight.com/course-player?clipId=fa4850f3-9c28-4392-a206-2d78a3c29c96&startTime=7.81) [You can also write your own modules to assist with creating common](https://app.pluralsight.com/course-player?clipId=fa4850f3-9c28-4392-a206-2d78a3c29c96&startTime=11.19) [configurations in your organization and share those modules internally](https://app.pluralsight.com/course-player?clipId=fa4850f3-9c28-4392-a206-2d78a3c29c96&startTime=14.8) [or publish them on the Terraform Registry.](https://app.pluralsight.com/course-player?clipId=fa4850f3-9c28-4392-a206-2d78a3c29c96&startTime=19.24) [It turns out we've been using modules this whole time.](https://app.pluralsight.com/course-player?clipId=fa4850f3-9c28-4392-a206-2d78a3c29c96&startTime=22.24) [The root module is simply the module you're currently working in.](https://app.pluralsight.com/course-player?clipId=fa4850f3-9c28-4392-a206-2d78a3c29c96&startTime=25.33) [It has input variables, resource and data sources, and output values,](https://app.pluralsight.com/course-player?clipId=fa4850f3-9c28-4392-a206-2d78a3c29c96&startTime=28.61) [just like any other module.](https://app.pluralsight.com/course-player?clipId=fa4850f3-9c28-4392-a206-2d78a3c29c96&startTime=32.81) [The last thing we will cover is how to use the same](https://app.pluralsight.com/course-player?clipId=fa4850f3-9c28-4392-a206-2d78a3c29c96&startTime=35.34) [configuration to spin up multiple deployments.](https://app.pluralsight.com/course-player?clipId=fa4850f3-9c28-4392-a206-2d78a3c29c96&startTime=38.14) [We can leverage Terraform workspaces to manage state data for multiple environments. That's coming up in the next module.](https://app.pluralsight.com/course-player?clipId=fa4850f3-9c28-4392-a206-2d78a3c29c96&startTime=41.16)

## [Using Workspaces for Multiple Environments](https://app.pluralsight.com/course-player?clipId=98b61161-e8a1-49ea-aa55-45e98ada6c6b)

### [Overview](https://app.pluralsight.com/course-player?clipId=98b61161-e8a1-49ea-aa55-45e98ada6c6b)

[One of the great things about infrastructure as code is its reusability.](https://app.pluralsight.com/course-player?clipId=98b61161-e8a1-49ea-aa55-45e98ada6c6b&startTime=1.14) [With a few minor tweaks, the same code can be used to deploy nearly](https://app.pluralsight.com/course-player?clipId=98b61161-e8a1-49ea-aa55-45e98ada6c6b&startTime=5.12) [identical infrastructure in multiple environments.](https://app.pluralsight.com/course-player?clipId=98b61161-e8a1-49ea-aa55-45e98ada6c6b&startTime=9.84) [Terraform has a special feature called workspaces to help with reusability.](https://app.pluralsight.com/course-player?clipId=98b61161-e8a1-49ea-aa55-45e98ada6c6b&startTime=13.39) [Hi everyone, this is Ned Bellavance. I'm a HashiCorp](https://app.pluralsight.com/course-player?clipId=98b61161-e8a1-49ea-aa55-45e98ada6c6b&startTime=17.93) [Ambassador and founder of Ned In The Cloud.](https://app.pluralsight.com/course-player?clipId=98b61161-e8a1-49ea-aa55-45e98ada6c6b&startTime=20.19) [Let's dig into supporting multiple environments with Terraform We'll start the](https://app.pluralsight.com/course-player?clipId=98b61161-e8a1-49ea-aa55-45e98ada6c6b&startTime=22.34) [module by talking to Sally Sue over in software development.](https://app.pluralsight.com/course-player?clipId=98b61161-e8a1-49ea-aa55-45e98ada6c6b&startTime=26.99) [She's ready to move this web project out of development and into production,](https://app.pluralsight.com/course-player?clipId=98b61161-e8a1-49ea-aa55-45e98ada6c6b&startTime=30.61) [and she wants to make sure each environment is consistent. With that objective](https://app.pluralsight.com/course-player?clipId=98b61161-e8a1-49ea-aa55-45e98ada6c6b&startTime=34.62) [in mind, we'll take a look at how Terraform can be used to handle multiple](https://app.pluralsight.com/course-player?clipId=98b61161-e8a1-49ea-aa55-45e98ada6c6b&startTime=39.37) [environments with the same configuration.](https://app.pluralsight.com/course-player?clipId=98b61161-e8a1-49ea-aa55-45e98ada6c6b&startTime=43.62) [We will have to consider things like input values and state data management.](https://app.pluralsight.com/course-player?clipId=98b61161-e8a1-49ea-aa55-45e98ada6c6b&startTime=46.07) [One way to handle state data is with Terraform workspaces, and we](https://app.pluralsight.com/course-player?clipId=98b61161-e8a1-49ea-aa55-45e98ada6c6b&startTime=50.64) [will put that into practice with our configuration. But first, let's have a chat with Sally Sue](https://app.pluralsight.com/course-player?clipId=98b61161-e8a1-49ea-aa55-45e98ada6c6b&startTime=54.55)

### [Globomantics Expansion](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e)

[Our configuration and deployment for the web app at Globomantics has evolved](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=1.54) [and improved since that base configuration was handed to us.](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=6.47) [Now Globomantics is ready to roll this little project](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=10.74) [into a staged environment workflow.](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=13.89) [We can think of our current deployment as the development environment.](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=16.84) [We've kept things small with tiny EC2 instances and only using 2](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=20.59) [subnets. That is probably not going to work so well in a production](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=24.84) [environment. Sally Sue has approached us about adding a user](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=28.7) [acceptance testing environment and a production environment to the](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=32.8) [existing development environment.](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=36.17) [She would like us to make sure we are using the same](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=38.54) [configuration for each environment but supplying different](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=41.2) [input values depending on the environment.](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=45.09) [Fortunately, we have used variables extensively in our configuration, so it](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=48.24) [should be relatively easy to make adjustments for input values.](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=52.8) [Then we can feed those input values into our single configuration and](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=56.85) [use it to create and maintain each environment.](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=61.24) [But what about state data, credentials, and the deployment](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=64.74) [workflow? Let's examine what it means to deploy multiple environments and how to leverage Terraform workspaces.](https://app.pluralsight.com/course-player?clipId=dfafddf5-7ce8-463d-9f8a-dc6342ce119e&startTime=67.56)

### [Terraform Workspaces](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd)

[We are going to support multiple environments from a single](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=1.24) [configuration. Before I introduce Terraform workspaces to help with](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=4.53) [this goal, let's first think about some of the challenges inherent](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=8.67) [in supporting multiple environments.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=12.26) [When you're working with multiple environments in](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=15.04) [Terraform, there's a few things to bear in mind.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=17.2) [First of all, generally speaking,](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=20.04) [your environments are going to have more in common than](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=21.45) [they have differences between them.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=24.08) [That's kind of the whole point of having multiple](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=26.12) [environments in a configuration.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=28.87) [Your dev should be very close to your UAT, and your UAT should be very](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=30.57) [close to your production because anything you test and validate in UAT](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=35.21) [should be what actually ends up in production.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=39.64) [It also means that it's useful to have abstractions within your](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=42.74) [configuration where you can apply those different values,](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=46.12) [making your code more reusable.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=49.11) [We've done that by making extensive use of input variables.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=51.44) [Another thing to consider in the whole process is access. You're probably not](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=56.04) [going to have access to production if you're the one deploying to the lower](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=61.03) [environments. Often there's a separation of responsibility and access between](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=64.97) [what's called the lower environments and the production environment, so it's](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=69.89) [important to keep that in mind,](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=73.69) [especially when you're thinking about dealing with access keys and secret keys.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=75.38) [One of the ways to create multiple environments in Terraform is](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=80.24) [by using workspaces, and this is the HashiCorp recommended way of](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=83.63) [working with multiple environments.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=87.74) [We'll see how that works in a moment.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=89.59) [There are some decisions you need to make when it comes to having multiple](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=92.04) [environments. First is the management of your state.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=95.78) [Where is your state data going to live and how are you going to](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=99.03) [manage the state data for multiple environments?](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=102.57) [Typically, it's not a single state file for all of your environments.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=106.04) [Instead, you'll have your state data stored separately for each](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=109.92) [environment, or in more complicated setups,](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=113.06) [you might actually have a state file for your networking and a separate](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=115.81) [state file for each application running in an environment.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=119.29) [That's a lot of state data to manage. Then you have to determine](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=122.94) [where you're going to store your variable values.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=127.28) [Where are these values coming from?](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=129.84) [Are you going to store them in a file, are you going to submit them at the](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=132.34) [command line or are you going to use some third‑party tool to generate these](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=135.92) [values and submit them to Terraform? You also have to think about](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=140.21) [credentials management. Like I said before,](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=144.09) [you're not necessarily going to use the same credentials to deploy to](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=146.78) [production as you do to the lower environments.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=150.24) [And in fact, in a lot of places, you use a different set](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=153.09) [of credentials for each environment.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=156.59) [How do you manage those credentials and where are they stored?](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=158.94) [And finally,](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=162.84) [there's a balance to be struck between the complexity of your](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=163.63) [configuration and the amount of administrative overhead there](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=166.75) [is to maintain that configuration.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=170.06) [You could go with something that is relatively simple, but](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=172.44) [requires a significant amount of admin overhead or make](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=175.47) [something that's fairly complex,](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=179.52) [but also dynamic and robust, so when you want to add or edit an environment,](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=181.13) [there's not a whole lot of administrative work to do.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=186.09) [Let's look at two examples of how you could potentially manage multiple environments.](https://app.pluralsight.com/course-player?clipId=63268689-19cd-41e9-a153-f5ee2efc03cd&startTime=189.44)

### [State Management](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618)

[In this example we are going to manage our environment using multiple](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=1.74) [state files and multiple configuration value files.](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=5.35) [We have our primary folder where our Terraform configuration lives,](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=9.04) [along with a common set of variables that is the same across all environments.](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=13.09) [And then we can have folders for each environment, dev, uat, and prod.](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=17.75) [When we are running our terraform plan,](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=22.72) [we can specify that we want to store the state file in one of those directories.](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=25.33) [For instance, if we're running terraform plan for development,](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=29.94) [we can say, place the state file in the dev folder and call it dev.state.](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=33.15) [Then we can specify a variable file called common.tfvars](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=37.88) [that has our common values within it.](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=42.33) [And then finally, an additional var file called dev.tfvars that's in the](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=44.3) [development folder that has our development values.](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=50.05) [Now everything to do with development is stored in the development folder.](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=53.44) [We could proceed with the same for uat and with production. That's one way](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=57.25) [you can manage your state data and your variable values.](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=62.57) [Another potential way is to use workspaces. In workspaces,](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=65.74) [you still have your primary directory where your main](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=70.67) [configuration and your Terraform tfvars files exist.](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=73.65) [Workspaces will manage the state for you.](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=78.14) [It creates a terraform.tfstate.d directory and places the state files](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=80.93) [and child directories within that main directory.](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=86.76) [When you want to create a new workspace,](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=89.94) [you simply run the command terraform workspace new,](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=92.11) [and the name of the workspace.](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=95.8) [Terraform will create that workspace and switch you over to that](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=97.87) [context, and then you can just run terraform plan using your main](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=101.36) [configuration and the terraform.tfvars. Rather than manually managing](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=105.72) [your state, now Terraform is managing the state for you. But how do you](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=110.58) [get the individual value settings for each environment dynamically](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=114.78) [based off a workspace? Let's take a look at how we could do that in our configuration.](https://app.pluralsight.com/course-player?clipId=bb9b8dbf-04b3-466f-9f02-a6b636808618&startTime=118.97)

### [Adding Workspaces to the Configuration](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e)

[For our three environments from Sally Sue,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=1.24) [she would like us to change the following values based on environment,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=3.79) [the VPC CIDR range, the subnet count, the instance type,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=8.34) [and the number of instances.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=13.16) [She wants us to use the values that you see in this table.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=15) [We can accomplish this goal by using a map for each variable](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=18.56) [and the special value terraform.workspace,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=23.34) [which resolves to the currently selected workspace.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=26.15) [Let me show you what I mean by making an update to our configuration.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=29.81) [As I just mentioned, there is a special value called terraform.workspace,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=34.44) [which evaluates to the currently selected Terraform workspace.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=37.82) [Let's bring up the terminal now,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=42.17) [and I'll go ahead and enter the terraform console.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=44.64) [We can retrieve the special value by simply typing in terraform.workspace.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=47.16) [The current terraform.workspace value is default,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=53.64) [and that's the only workspace we have available.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=56.33) [The default workspace cannot be deleted,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=59.54) [and it's selected by default When you create a new Terraform configuration.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=61.62) [we can make use of the terraform.workspace value throughout our configuration.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=65.67) [For example, we could update a setting in our locals.tf file.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=70.84) [Let's go ahead and expand the globo\_web\_app directory](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=74.83) [and open up the locals.tf file.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=78.24) [I'll go ahead and hide the terminal to give us some more room,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=80.54) [and if you remember from earlier, we created a name\_prefix local value,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=83.74) [and we added ‑dev to the end of that value.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=88.78) [But instead of doing that, why don't we use the name of the terraform.workspace?](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=92.29) [So I'll go ahead and delete dev off of the end and](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=96.55) [update the value to terraform.workspace.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=100.17) [Now the naming prefix will reflect the environment that it's deployed in.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=103.24) [We can also add an additional common tag called environment](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=107.13) [and set that equal to terraform.workspace.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=110.97) [Now any resource that uses the common tags will have an](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=114.56) [environment tag equal to the terraform.workspace.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=117.67) [We can also use the value of terraform.workspace to select](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=121.14) [a value from a map in our variables.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=125.09) [So let's open up our variables file and update the type for one](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=128.44) [of the variables that Sally Sue specified.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=132.69) [As a quick reminder, those variables are the CIDR block,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=135.22) [subnet count, instance type, and instance count.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=138.62) [Let's update the variable vpc\_cidr\_block with the three CIDR](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=141.74) [block values she wants for development, uat,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=145.77) [and production.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=148.39) [I'll update the type to a map of strings,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=150.04) [and I will remove the default value and make sure that we specify an](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=153.8) [appropriate map value in our terraform.tfvars file.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=158.54) [Speaking of which, let's go ahead and open that up.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=162.74) [In our terraform.tfvars file, we will add a value for that variable.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=165.31) [So let's go into split‑screen mode here.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=170.3) [We'll have terraform.tfvars open on the right and variables.tf open on the left.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=173.34) [I'll grab the variable name from the left side and paste it in here,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=179.04) [and it has to be set to a map.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=183.34) [And we'll add three map values in here, one for development,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=185.14) [one for uat, and one for production.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=189.21) [We'll set Development to 10.0.0.0/16, UAT to 10.1.0.0/16,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=191.58) [and Production to 10.2.0.0/16, just like Sally wanted us to.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=199.9) [Now how do we make use of this in our configuration?](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=205.45) [I'll go ahead and save the terraform.tfvars file and](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=208) [exit out of split‑screen mode, and let's open up the network.tf file.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=211.46) [Within the arguments for our VPC module,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=216.31) [we now have to update the way that we are getting a value](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=219.43) [out of our variable vpc\_cidr\_block.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=222.29) [And since it's now a map,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=225.11) [all we have to do is add square brackets at the end and set the](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=226.47) [value we want to retrieve to terraform.workspace.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=230.62) [Now Terraform will evaluate what workspace it's currently in and select that](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=233.81) [value from the map that we have stored in vpc\_cidr\_block.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=239.52) [That means we have to make sure when we create our workspaces,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=244.14) [we name them to match the keys that are in the map for the vpc\_cidr\_block.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=247.1) [My challenge to you is to update the other three variables and add](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=252.24) [values into terraform.tfvars and update all the variable references in](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=256.36) [the configuration to use terraform.workspace.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=261.68) [Once again for your reference, here are the values to use for each environment.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=265.14) [Go ahead and try to make those changes now,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=270.15) [and when we come back we'll take a look at my updated configuration.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=272.06) [Okay, let's see how you did.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=276.44) [In the variables file, the vpc\_subnet\_count should now be a map of numbers,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=278.45) [the instance\_type should be a map of strings,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=283.26) [and the instance\_count should be a map of numbers,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=286.32) [and all of them should have no default value. In our terraform.tfvars file,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=289.12) [you'll now have an entry for each of those variables with](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=294.31) [the values set for each environment.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=297.69) [Over in our network, just to take a look at how the vpc module is configured,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=300.27) [we already updated the CIDR block,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=305.15) [for the availability zones we had to add the](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=307.44) [terraform.workspace to the vpc\_subnet\_count,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=310.11) [and then also add it for the public subnets for the](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=312.56) [vpc\_subnet\_count and the vpc\_cidr\_block.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=316.11) [The easiest way to update everywhere is to do a simple find and](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=320.44) [replace of all the instances of those variables with the appended](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=324.29) [square brackets and terraform.workspace.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=328.95) [All right, now that our configuration is updated,](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=331.51) [it's time to make use of Terraform workspaces.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=334.06) [But before we do that, we have to talk a little bit about dealing with sensitive data.](https://app.pluralsight.com/course-player?clipId=85946fbb-f01a-415b-8183-e0ce876ada6e&startTime=336.55)

### [Managing Sensitive Data](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc)

[Credentials and other sensitive data is going to be](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=1.14) [part of your Terraform configuration.](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=4) [The question is how to deal with that information and keep it secure.](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=6.54) [One option is to store it in a variables file that is](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=10.84) [not committed to source control.](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=13.78) [That is not especially secure, but it sure is easy.](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=15.74) [The option we've selected for our AWS credentials is to store](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=19.84) [them in environment variables, and you can use that for any](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=23.9) [variable in your configuration.](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=27.1) [It's not uncommon in a deployment pipeline to load sensitive values from a](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=29.25) [secrets management service into environment variables on the system running](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=33.36) [the deployment. That is definitely more secure.](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=37.27) [You want to make sure to mark those variables as sensitive so the](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=40.81) [values aren't displayed in clear text in your logs.](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=44.43) [The most secure way is to directly integrate a secrets](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=47.84) [management service as a data source or a resource in Terraform.](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=51.19) [When the configuration is being deployed,](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=54.7) [Terraform can dynamically retrieve the sensitive data and use](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=57.16) [it in the configuration without it ever being stored even in](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=60.7) [environment variables. In each case,](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=63.9) [sensitive data in variables should be marked as sensitive and](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=66.33) [state data should be written to a secure location.](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=69.76) [State data will contain sensitive information stored in clear text.](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=72.94) [Be sure to properly store, secure, and encrypt that data as needed. Now let's head back to the configuration and make use of workspaces](https://app.pluralsight.com/course-player?clipId=197e60f2-5ffc-4365-98ee-883a28e55bcc&startTime=77.12)

### [Deploying the Development Workspace](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847)

[Okay, back in the configuration.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=1.24) [Let's go ahead and open up the commands m9,](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=2.88) [and before we do anything else, let's run terraform format.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=5.32) [I'll go ahead and open up the terminal and run terraform format.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=8.92) [Okay, now all of our files are properly formatted.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=12.54) [Next, we'll run terraform validate to make sure our configuration is valid.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=15.67) [Excellent.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=20.84) [Our configuration is valid.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=21.41) [Now if you haven't already exported your environment](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=23.64) [variables for your AWS access key and secret key,](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=26.07) [go ahead and do that now.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=28.83) [Scrolling down, we are going to create a new workspace called development.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=30.75) [And why don't I expand the terminal a bit so we have some more room.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=34.79) [The command is going to be terraform workspace new Development.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=38.5) [Okay, Terraform not only created the new workspace development,](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=44.54) [it also automatically switched us over to the Development workspace context.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=47.97) [If we look over to the left in our globo\_web\_app directory,](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=52.46) [there is a new directory called terraform.tfstate.d.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=56.8) [If we expand that directory, we can see there is a Development folder in there,](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=60.94) [which will hold our state once we've run a Terraform plan and apply.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=65.26) [If we'd like to get a list of all the existing workspaces,](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=69.52) [we can run terraform workspace list,](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=73.07) [and here it shows the default workspace and our Development workspace,](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=76.64) [and the asterisk shows which workspace is currently selected.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=80.43) [With our Development workspace selected,](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=84.27) [let's go ahead and run terraform plan and send the output to m9dev.tfplan.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=87.04) [I'll go ahead and copy this command and paste it down below.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=92.81) [This is going to be a brand‑new deployment,](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=97.14) [so it's going to have to create all of the resources](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=99.52) [we've defined in our configuration.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=101.89) [It's a total of 24 resources that it is going to create.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=104.14) [Let's kick off the terraform apply, and obviously this is going to take awhile,](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=107.64) [especially creating the load balancer,](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=111.32) [so go ahead and pause the recording now and resume once](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=113.05) [the environment has been created.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=116.33) [All right, our deployment is successful, our development environment is up.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=118.44) [Before we check out that public DNS link,](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=122.5) [I do want to point out that this is separate from your default deployment.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=124.74) [If you still have that up and running,](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=129.27) [you're probably going to want to switch to the default workspace and](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=131.17) [destroy it so you're not paying for those instances.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=134.94) [You'll also need to add a default key to the values in tfvars for the values](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=138.04) [that match what was deployed in the default environment.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=143.36) [With that in mind,](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=145.84) [I'll grab the public DNS for our development](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=147.14) [environment and go over to a browser, paste that into the address bar,](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=149.58) [and after a few moments, there we go,](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=153.87) [our website is up in our development environment and you'll](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=156.45) [note that in the address it says development because it used](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=159.33) [that as part of the naming. Now let's try to deploy an instance of our UAT environment.](https://app.pluralsight.com/course-player?clipId=715a6b72-13cf-44bb-90fd-71e4e0368847&startTime=163.07)

### [Deploying the UAT Workspace](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371)

[We've created the Development workspace and](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=1.24) [deployed our development environment.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=3.4) [Now it's time to create our UAT workspace and deploy it to the UAT environment.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=5.47) [First we have to create the Terraform workspace,](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=10.17) [so we'll run terraform workspace new, and the name of the workspace will be UAT.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=12.77) [Terraform has created that new workspace and switched us over to that workspace.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=19.44) [If we expand the terraform.tfstate.d directory,](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=23.95) [we can see there's a development directory with a terraform.tfstate file](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=27.66) [in it and a UAT directory that is currently empty.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=32.43) [Let's run a plan in our new UAT environment.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=35.59) [We'll run terraform plan and send the output to m9uat.tfplan.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=39.14) [Once again, this is a wholly new environment,](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=45.84) [so it's going to have to create all of the resources for that environment.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=48.25) [Now the number of resources is different.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=51.94) [It's 28 now, and that's because we're using the UAT environment.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=54.53) [Remember, if we look at the tfvars file,](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=58.73) [for our UAT environment, we are deploying two subnets,](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=61.94) [so that stays the same, we're deploying slightly bigger instance types,](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=65.21) [t2.small,](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=69.12) [but now we're deploying four of those instances to be](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=70.31) [distributed evenly across those two subnets.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=73.24) [Okay, with that in mind, let's go ahead and run the apply.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=75.85) [Just like the previous deployment, this is standing up all new infrastructure,](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=79.4) [so this will take a little while.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=83.31) [I'll pause the recording and we'll resume when all of](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=85.01) [the resources have been created.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=87.63) [All right, our deployment is complete.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=90.14) [Let's go ahead and grab that public DNS address,](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=92.52) [and we'll head over to a browser and paste that value in.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=95.84) [And after a few moments,](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=99.75) [there's the Globomantics test site for our UAT environment?](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=102.14) [If we take a look at the EC2 Management Console,](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=105.92) [there are now eight instances in the account.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=109.54) [Two are from the default workspace, two are from the development workspace,](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=112.11) [and four are from the UAT workspace,](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=117.25) [and all of them are named in a way that is very obvious.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=119.78) [If we select one of them and take a look at the tags associated with it,](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=122.66) [we can see that environment is set to UAT.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=126.89) [So we could search on that tag within our account to find](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=130.23) [everything associated with the UAT environment.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=133.59) [If you would like to set up and deploy the Production workspace,](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=136.59) [I invite you to do so now. The last thing I want to show you](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=139.99) [is how to select and destroy an environment so you can tear](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=143.11) [all of these environments down.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=146.15) [We currently have the UAT workspace selected.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=148.24) [Let's see how we select a different workspace.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=151.74) [The command for that is terraform workspace select, and then the name of the](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=154.36) [workspace. In this case we'll select Development, and now we can destroy our](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=158.14) [development deployment by running terraform destroy ‑auto‑approve. That will](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=162.19) [tear down the development environment, If you'd like to repeat that for the UAT](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=167.92) [environment, go ahead and do so, and you should definitely do that for the](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=171.86) [default workspace as well.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=174.68) [You can also delete those workspaces with the delete](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=176.77) [command except for the default workspace,](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=179.38) [which cannot be deleted.](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=181.54) [Now we can tell Sally Sue we have successfully achieved her](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=183.34) [goal of multiple environments with a single configuration](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=187.11) [and different input values. Well done everybody!](https://app.pluralsight.com/course-player?clipId=18e5c340-9504-4d54-982b-3ad4d6629371&startTime=190.66)

### [Summary and Wrap Up](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938)

[In this module we leveraged a single configuration to](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=1.34) [deploy and maintain multiple environments.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=4.29) [This is like a new superpower,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=7.52) [and it's one of the big benefits of using infrastructure as code.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=9.04) [One thing we had to consider was the variances between the](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=13.34) [environments and make sure our input variables gave us flexibility](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=16.23) [to manage those variances with input values.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=19.92) [We also looked into how we might deal with sensitive](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=23.34) [data like credentials and secrets.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=25.81) [Finally,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=28.56) [we got to use Terraform workspaces to manage our](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=29.01) [environments and state data using the special value](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=31.63) [terraform.workspace to control variable values.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=34.48) [This is the final module in the course, and if I had to summarize things,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=38.94) [some of the key points that I would like to bring forward are,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=43.24) [number 1, it is so beneficial to build your infrastructure automagically.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=45.75) [Removing yourself from the manual build process does](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=50.41) [a lot of great things for you.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=53.5) [Most importantly,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=55.3) [it ensures your deployments are going to be consistent and repeatable.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=56.74) [Doing things manually leads to mistakes.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=60.84) [We are fallible creatures, and that's just the way it is.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=63.19) [When you codify your infrastructure,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=66.2) [you're creating a way to consistently and repeatedly deploy that infrastructure.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=68.23) [You're also creating configurations that are going to be](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=73.54) [reusable for different applications,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=76.1) [especially when you use modules to take common patterns and abstract them to a](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=78.49) [shared resource that a bunch of people can take advantage of.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=82.77) [Removing manual configuration and creating reusable configurations](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=86.65) [allows you to significantly boost your productivity.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=91.05) [You're no longer bogged down in these manual processes.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=94.54) [You're not troubleshooting these weird issues that were](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=97.61) [caused by someone making a mistake,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=100.02) [and the reusable patterns means that you don't have to](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=101.79) [deploy the same thing over and over.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=104.69) [You can do work that is more interesting and more challenging.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=107.76) [Ultimately, it is about making your job better or,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=112.64) [failing that, finding yourself a better job,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=115.89) [and that's really what this course is all about.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=118.68) [I want to help arm you with the skills to make](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=121.08) [deploying infrastructure less of a chore.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=123.68) [And if all else fails,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=125.97) [I want to help give you the skills to find the job that](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=127.62) [you want if you don't have it today.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=130.62) [If you're looking for the next step in the world of Terraform,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=133.31) [I would recommend checking out the other courses about Terraform on Pluralsight.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=137.56) [There are cloud‑specific courses for Azure or AWS,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=142.09) [or you can check out the deep‑dive course.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=145.98) [In fact, if you're planning to try for the Terraform Associate certification,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=148.48) [this course and the deep dive should cover all of the content in the exam,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=153.04) [plus a bit more.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=157.24) [I'd also recommend checking out the other HashiCorp](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=158.84) [products like Vault or Packer.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=161.59) [Vault is a secrets‑management platform that can help solve the](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=163.5) [question of what to do with sensitive data.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=166.96) [And Packer helps with creating gold images for use by something like Terraform.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=169.4) [Lastly, if you'd like to get a regular stream of content from me,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=174.52) [check out my YouTube channel, Ned in the Cloud,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=178.37) [where I have an ongoing series called Terraform Tuesdays.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=180.6) [That does it for this course.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=184.34) [I want to take a moment to thank you for taking the time out of your hectic](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=186.23) [schedule to learn more about Terraform through this course.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=189.83) [I hope you found the content valuable, and I welcome your feedback,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=193.04) [suggestions, and comments.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=196.47) [You can use the discussion boards found on Pluralsight,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=198.4) [or you can ping me on Twitter, @ned1313,](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=201.44) [or on my website, nedinthecloud.com.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=204.36) [I'm very easy to find. Until next time, go build something great.](https://app.pluralsight.com/course-player?clipId=c7c88d83-3600-4bf0-ad55-9939df4c9938&startTime=207.03)