## [Course Overview](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2)

### [Course Overview](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2)

[Hi.](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=0) [My name's Mark Heath and welcome to my course, Azure Functions Fundamentals.](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=0.95025) [I work as a software architect at NICE systems where I'm](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=11.494) [currently helping to create Azure-based digital evidence](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=14.837500000000002) [management systems for the police.](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=18.475) [Azure Functions opens the door to a style of programming known as serverless,](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=21.395) [which enables you to develop rapidly, scale out automatically,](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=26.341) [integrate easily with a host of other Azure services and all](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=30.584) [the while keep your costs to a minimum.](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=34.45400000000001) [In this course,](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=37.889) [I'm going to explain everything you need to know to get started](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=38.641999999999996) [with the new version 2 of Azure Functions.](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=42.243) [And we're going to see loads of demos of how simple it](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=45.864) [is to create your own functions.](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=49.07833333333334) [In particular,](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=51.761) [we'll create a simple pipeline of C# functions that demonstrates](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=52.467000000000006) [many of the supported triggers and binding types,](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=57.361) [including interacting with queues and blob storage,](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=60.2114) [as well as sending emails.](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=64.010125) [We'll also see how you can develop in Visual Studio or from the](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=66.352) [command line with a text editor if you prefer.](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=69.77399999999997) [We'll learn how to automate deployments,](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=73.586) [as well as how to debug and monitor our functions.](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=75.997) [By the end of this course, you'll be ready to create,](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=79.654) [deploy, and manage your own Azure Functions application.](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=82.50171428571427) [And I also hope that you'll have lots of ideas for how you can incorporate](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=86.894) [them into your own cloud-based applications as I really think they're](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=90.75724999999997) [applicable in a very wide range of scenarios.](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=94.89299999999999) [You'll be able to follow along with this course even](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=98.718) [if you're never used Azure before.](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=100.84825000000001) [And although I'll be using C# for most of the demos,](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=103.234) [you can actually use several different languages to create Azure Functions.](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=106.00142857142858) [So much of what we'll be learning is relevant](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=111.053) [whichever your language of preference is.](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=113.1444) [So I hope you'll join me on this journey to learn about Azure Functions with the Azure Functions Fundamentals course at Pluralsight.](https://app.pluralsight.com/course-player?clipId=1b05ee17-cfcf-4c67-8ed4-473ecf16b3d2&startTime=115.20755555555556)

## [Introducing Azure Functions](https://app.pluralsight.com/course-player?clipId=36b56af1-217c-4f45-8815-6ccd8704fb6e)

### [Version Check](https://app.pluralsight.com/course-player?clipId=36b56af1-217c-4f45-8815-6ccd8704fb6e)

[♫(Music)♫](https://app.pluralsight.com/course-player?clipId=36b56af1-217c-4f45-8815-6ccd8704fb6e&startTime=0)

### [Course Introduction](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab)

[Hi.](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=0) [Mark Heath here,](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=0.4995) [and welcome to this Azure Functions Fundamentals course on Pluralsight.](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=1.998) [This course covers the latest version 2 of Azure Functions.](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=8.292) [And in this module,](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=11.875333333333334) [I'll be introducing you to what Azure Functions are](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=13.552) [and what benefits they bring.](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=16.670714285714283) [The goal of this course is to teach you everything you need to know](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=19.59) [in order to get started using Azure Functions.](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=22.68822222222222) [But also I want you to get excited about the possibilities that Azure](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=26.8) [Functions open up because I think this is a technology that has the potential](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=30.550999999999995) [to transform the way you architect your applications.](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=35.562499999999986) [So I'm going to start off by explaining what Azure Functions](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=39.955) [are for and how they fit it with all the other multitude of](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=43.669) [services that Azure has to offer.](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=47.389) [So if you're already using Azure and you're wondering why](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=50.274) [would I need or want to use Functions,](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=53.21088888888888) [then I'll be explaining which scenarios would be a good fit for using them.](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=55.79966666666667) [But if you're completely new to Azure, don't worry.](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=61.685) [Azure Functions are really easy to get started with,](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=64.715) [and I'll be including plenty of step-by-step demos](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=67.69850000000001) [as we move through this course.](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=70.98666666666668) [Also in this module, I want to discuss the concept of serverless computing.](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=74.22) [Microsoft's own marketing material says that with Azure Functions](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=79.741) [you can process events with serverless code.](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=83.82100000000001) [But what on earth does serverless mean?](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=88.192) [I'll be giving you a high-level overview of what this](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=90.922) [architectural style is all about.](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=93.94042857142858) [And we'll explore what benefits it can bring to your own applications.](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=95.994) [As we move through the rest of the modules in this course,](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=100.391) [we'll learn how to create functions in your language of choice,](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=102.82337500000003) [such as C# or JavaScript.](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=106.496) [And we'll be showing off the capabilities of Azure Functions,](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=109.096) [including various event triggers and bindings that they support.](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=112.29100000000003) [And we'll also see how you can deploy your functions,](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=116.985) [as well as how to manage and monitor them.](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=119.34775) [So let's get started. What are Azure Functions, and what's the point of them?](https://app.pluralsight.com/course-player?clipId=9dc285a7-c5bc-4481-ae5b-b8b6615fa6ab&startTime=122.53599999999999)

### [Introducing Azure Functions](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd)

[At the heart of Azure Functions is the idea of events and code.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=1.266) [You simply supply some code,](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=5.693500000000002) [which is just a single function usually written either in C# or JavaScript,](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=7.937428571428572) [and you tell Azure Functions what event should trigger it.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=14.296) [So for example, you can use Azure Functions to run a function every hour.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=18.2085) [So the event, or trigger in this case, is a scheduler.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=23.724) [And I might use this sort of event trigger to run a nightly batch](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=27.202999999999996) [process that cleans up some data in my database.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=30.874) [Another source of event that can trigger a function](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=34.664) [is new data becoming available.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=37.19716666666667) [This might be a new message appearing on a queue or a new](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=40.023) [file being uploaded to Azure blob storage.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=43.423222222222215) [And I might use this sort of event to trigger sending an email](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=45.815555555555555) [whenever a message appears on a particular queue.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=50.16614285714285) [Another really useful example of an event that can](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=53.549) [trigger a function is an HTTP request.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=56.724777777777774) [Whenever someone calls a specific URL,](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=60.063) [your function is executed and can respond to that request.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=62.959) [So an example might be that I need to handle a web-hook callback from a](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=66.76162500000001) [payment provider like Stripe whenever I sell a product online.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=71.84899999999999) [But we could also use this trigger type to implement a REST API.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=76.095) [Now if you've used Azure before or any other cloud provider for that matter,](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=80.664) [you might be thinking hang on a minute.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=85.63) [Can't we already do this?](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=88.18188888888892) [If Azure Functions is about letting your code run in response to event triggers,](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=89.918) [doesn't Azure already offer multiple ways of achieving exactly the](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=94.765) [same thing with offerings like virtual machines,](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=98.8574285714286) [web apps, and web jobs?](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=101.85466666666667) [After all, we can already use these to listen to queue events,](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=103.893125) [respond to web-hooks, and do things on a schedule.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=108.336) [So why would we need another way?](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=111.547) [Well,](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=115.119) [the best way of explaining this is to first consider the](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=115.36888888888889) [other ways of running your code in Azure,](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=118.22942857142856) [and then we'll be in a position to understand why functions are](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=120.28600000000002) [different and why you might want to use them instead.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=124.318) [So bear with me for a few minutes.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=127.10679999999999) [This won't take too long.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=129.702) [But let's quickly discuss a few of Azure's existing offerings for running code in the cloud.](https://app.pluralsight.com/course-player?clipId=7b7be8df-904b-4a76-90bf-e1dc0ae155fd&startTime=131.103)

### [Running Code in Azure](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144)

[Let's start off at the lowest level, which is using virtual machines.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=1.158) [In Azure, I can spin up a virtual machine and install anything I want on it.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=6.039) [I can install IIS and run an ASP.NET website on it.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=10.897) [Or I could create Windows services to do some background work,](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=14.661750000000001) [like processing messages on queues or executing scheduled tasks.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=18.417) [And this approach is known as IaaS, Infrastructure as a Service.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=23.712) [And its great benefit is that it gives me complete control of the server.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=28.631) [I can install whatever I want on it, including my choice of operating system,](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=32.934) [and I can fine-tune it to my exact needs,](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=37.988) [including choosing exactly how much RAM and CPU it has.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=41.412) [But with this freedom comes several responsibilities.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=45.196) [I must ensure that the operating system and the software](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=50) [I'm using is kept patched and up to date.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=53.15725) [If I want to scale out, I have to manage that myself,](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=55.88666666666666) [deploying additional virtual machines and configuring](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=59.904) [my own load balancing between them.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=62.78257142857143) [And this operational overhead comes at a significant cost.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=65.774) [You need to have people dedicated to ensuring that your virtual](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=68.97085714285714) [machines in production are running smoothly.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=73.099) [So wouldn't it be nice if we could hand that responsibility off to](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=76.855) [Microsoft and get them to manage our service for us so that we can](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=80.39366666666669) [just focus on writing our application.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=85.31433333333332) [Another option for running code in Azure is using](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=87.973) [what's called Azure App Service.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=90.786) [Azure App Service could be described as Platform as a Service or PaaS.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=93.621) [In this model, unlike with virtual machines,](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=99.072) [the cloud provider takes responsibility for managing and patching the servers.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=101.4106) [All you need to do is provide the code for your website or background tasks.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=106.60255555555555) [Azure Web Applications run on Azure App Service and are designed to](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=112.725) [make it super easy to deploy a website into Azure.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=117.04837499999998) [You simply create a regular website, which might be using ASP.NET Core,](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=121.266) [but it also supports many of the most popular web development frameworks,](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=126.545) [including Node.js and PHP.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=130.564) [And then you tell Azure to host your website in what's called a hosting plan.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=134.057) [And we'll be talking more later about what a hosting plan is,](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=139.77) [but basically it gives you the freedom to host multiple websites on](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=142.78650000000002) [a single server for cost-saving purposes or to give your website](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=147.54542857142857) [its own dedicated server and turn on auto-scaling if your web](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=152.42687500000005) [application is in high demand.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=156.866) [Azure App Service also supports the concept of web jobs.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=159.391) [Web jobs offer a simple way to get your own background tasks,](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=162.73499999999999) [such as key processing,](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=167.253) [deployed to the same service in your hosting plan that](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=168.50899999999996) [are running the web application.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=171.59124999999992) [So what we have with web applications and web jobs is a very](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=173.903) [programmer-friendly model that makes it super easy to create and deploy](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=178.16150000000005) [multiple websites along with background processing tasks and bundle them](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=182.1076666666667) [all up onto one server to keep your costs down,](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=186.748) [but with the flexibility to scale up as the demands of your application require.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=189.72674999999998) [Now the reason I've taken the trouble to talk you through all this is](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=196.657) [that Azure Functions is actually built on top of the web jobs SDK and](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=200.27399999999997) [it's hosted on the App Service platform.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=205.03533333333328) [So in many ways you can think of it as just another part of this same offering, but with a few additional powerful new capabilities that we'll see shortly.](https://app.pluralsight.com/course-player?clipId=a675e948-0415-46d6-bf40-6c92baac7144&startTime=207.59625)

### [What's Different About Azure Functions?](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd)

[Let's talk now about Azure Functions,](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=0.923) [which were originally introduced as part of the App Service](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=4.098) [platform in 2016 and are now at version 2.](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=7.954125000000001) [What do Azure Functions offer that we can't already do](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=12.271499999999998) [with web applications and web jobs?](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=15.835999999999997) [Well first of all, Azure Functions offers a simplified programming model.](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=18.947) [Creating your first Azure function, as we're going to see in our next module,](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=24.077) [is trivially easy.](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=27.963) [All you have to write is the code that responds to](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=29.014125) [the event you're interested in,](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=32.18575) [whether that's an HTTP request or a queue message for example.](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=33.64750000000001) [And all the boilerplate code that you'd normally write to](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=38.528) [connect these events to the code that actually handles them](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=41.418000000000006) [is abstracted away from you,](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=44.90514285714285) [and this makes for a very lightweight and fast-moving style of](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=46.82442857142856) [development where you're really just focused on the code that](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=51.297000000000004) [meets your business requirements and eliminating a lot of](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=54.267499999999984) [repetitive boilerplate code.](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=58.67475) [Another major benefit that Azure Functions offers is a](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=60.849) [consumption-based pricing model.](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=65.008) [With the more traditional Azure offerings we just discussed,](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=66.911) [virtual machines and web applications,](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=69.95842857142857) [you need at least one server running constantly,](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=71.77314285714286) [and you have to pay for that.](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=74.91422222222224) [But with Azure Functions,](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=77.715) [you have the option to select a pay-as-you-go pricing option.](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=78.62128571428573) [In other words, you only pay when your code is actually running.](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=83.488) [So if you're listening on a queue and no messages ever arrive,](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=88.329) [then you pay nothing.](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=91.49757142857145) [And the Azure Functions framework will automatically scale the number](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=93.269) [of servers running your functions to meet demand.](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=96.53333333333332) [So if there's no demand,](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=100.4) [there might actually be no servers at all actively running your code.](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=101.756) [But the framework is able to spin one up very quickly if needed.](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=106.028) [And so this pricing model can result in dramatic cost savings](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=110.16) [compared to the more traditional approach of paying a fixed monthly amount to reserve one or more servers.](https://app.pluralsight.com/course-player?clipId=5abb4e45-0f8b-49fe-9050-6f055a9e20cd&startTime=113.29357142857141)

### [Azure Functions Pricing](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71)

[Like Azure web applications and web jobs,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=1.646) [Azure Functions run inside of what's called an App Service Plan.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=4.65) [In addition to letting you use some of the existing](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=9.47) [pricing models for App Service,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=11.829333333333334) [you also have access to what's called the consumption pricing plan.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=14.426) [And here's how the consumption app service plan works.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=19.192) [You're charged by two metrics, how many times your functions run,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=22.925) [so the number of executions,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=27.759) [and the time your function runs for in seconds multiplied by the RAM allocated.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=29.761500000000005) [So the units of billing are GB seconds.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=36.565) [Now the great news is that you get a very generous free grant,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=40.455) [which is currently 1 million executions and 400 thousand GB- seconds per month.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=43.726714285714294) [And this means you can achieve a lot with Azure](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=49.99562499999999) [Functions without paying anything at all.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=53.018571428571434) [And even when you go over the free limit, the costs are very reasonable.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=55.567) [And so with this pricing model,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=60.046) [the main way to keep your costs down is by ensuring](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=61.643) [that when you do run a function, it completes as quickly as possible.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=64.288) [And obviously,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=70.072) [invoking the functions less frequently and keeping their memory](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=70.803) [requirements to a minimum will also help.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=74.204) [In fact,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=77.244) [the consumption plan actually limits function execution time to 5 minutes,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=77.87866666666667) [and this is a good thing as it prevents costs from accidentally](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=81.91944444444444) [running away if you hit a deadlock in your code.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=85.87580000000001) [And another nice feature is that you can set an optional maximum daily quota.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=89.389) [Now you're not forced to use the consumption pricing tier.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=95.363) [You can also host Azure Functions apps on a regular App Service Plan,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=98.721) [which means you're back to paying for dedicated servers rather than](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=103.134) [paying for the duration of time your functions run.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=106.4666666666667) [This makes your monthly costs predictable,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=110.218) [and you can also choose from a variety of the pricing tiers that](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=112.674) [App Service offers depending on your needs.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=116.5802857142857) [And it also means that you're free from that 5-minute](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=119.66) [execution time constraint as the length of time a function](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=122.19066666666667) [runs no longer has an impact on your costs.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=126.38950000000003) [And you may also be interested to hear about the](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=129.471) [premium Azure Functions pricing plan.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=132.35699999999997) [At the time of recording, this is only available in preview.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=134.932) [But hopefully it will be publically available soon.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=138.533) [And this offers advanced features like VNet connectivity,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=140.9623333333333) [as well as improved performance.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=145.832) [Of course, the pricing options do change from time to time,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=148.957) [so make sure you visit this page on the Azure website,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=152.35099999999997) [which has details of the pricing of the consumption](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=156.018) [plan and the free grant limits.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=158.29314285714284) [And you can configure this page to show prices in your own local currency.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=161.558) [If you want to see the pricing options for the dedicated App Service Plans,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=166.556) [then you can visit this page on the Azure website.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=170.497) [Although you need to be aware that even though](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=173.864) [there is a free and a shared tier,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=175.75366666666667) [these aren't able to host Azure Functions apps.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=177.999) [You'd need to choose the basic pricing tier or higher.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=180.876) [Finally,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=185.685) [I should mention that the Azure Functions runtime is](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=185.99257142857144) [available as a Docker container.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=189.348125) [This means that you can run an Azure Functions app on any](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=191.865) [computer that's able to run Docker,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=195.02499999999995) [including on-premise datacenters or in other cloud providers.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=197.57619999999997) [And so obviously if you chose this option,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=202.504) [the pricing would simply be whatever you're paying for your container host.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=204.715) [So as we've seen,](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=209.137) [there's a lot of choice about how you host your Azure](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=210.10011111111106) [Functions apps and how you pay for them.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=213.02) [Well I suspect for most use cases that consumption plan is going to be the most attractive option.](https://app.pluralsight.com/course-player?clipId=4124a5da-e376-4da9-b363-ca691c002b71&startTime=215.538)

### [Benefits of Azure Functions](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af)

[So now we're in a position to understand the major](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=1.702) [benefits of using Azure Functions over the alternative](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=4.690714285714286) [options for hosting our code in Azure.](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=8.1355) [First of all, it offers a very rapid and simple development model.](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=11.097571428571428) [In fact, as we're going to see in the next module,](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=15.728857142857144) [you can even create functions by coding directly in the Azure portal.](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=18.92499999999999) [And by eliminating all the boilerplate that you normally have to write](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=23.14757142857143) [just to listen for the event that triggers your function,](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=27.873) [you can focus instead on writing the code that really matters,](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=30.373142857142856) [the code that responds to that event.](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=34.847) [Second, because it's built on top of the Azure App Service,](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=37.879) [it comes with a very rich feature set,](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=41.10175) [all of the core stuff from App service including continuous integration,](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=43.88462499999999) [the Kudu portal, Easy Auth, support for SSL certificates and custom domain names,](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=48.86366666666666) [easy management of application settings,](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=55.93) [and much more are all available to you with Azure Functions.](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=58.23685714285714) [And don't worry if you don't know what all of those are.](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=63.474) [We're going to be seeing several of them in action as we go through this course.](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=65.502875) [Third, as we've just mentioned,](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=69.97866666666667) [there can be dramatic cost savings with the consumption plan](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=72.209) [as you're only paying for what you use.](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=75.65542857142859) [And this makes Azure Functions a very attractive proposition for startups.](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=78.962) [You pay almost nothing initially as you're within the free grant.](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=83.399) [And only when you attract a high volume of users do you need to start paying.](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=87.805) [Finally,](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=92.877) [this model takes away the need to manage and maintain](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=93.194125) [servers that you have with virtual machines,](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=96.44257142857143) [and it even abstracts away scaling.](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=98.879) [You simply trust the framework to provide enough servers](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=101.959) [to meet the needs of your functions,](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=104.60274999999999) [which could be anything from zero to dozens or even hundreds of servers. And that brings us nicely on to the concept of serverless computing.](https://app.pluralsight.com/course-player?clipId=155bc2a9-0428-4c8c-a946-774de3b968af&startTime=106.4565)

### [Introducing Serverless Architecture](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697)

[Azure Functions is a serverless platform,](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=1.566) [or at least it's serverless when you choose the consumption pricing tier.](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=4.712) [And the concept of serverless has grown rapidly in popularity over recent years,](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=9.039) [and many cloud providers are offering similar serverless platforms,](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=14.164) [such as Amazon's AWS lambda.](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=18.028) [Now, of course,](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=20.987) [in one sense the name serverless is a bit silly because of](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=21.778999999999996) [course there are servers needed to run your code.](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=26.019749999999995) [But one of the key ideas behind serverless is that we want](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=29.38) [to delegate the management and maintenance of our servers](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=33.3775) [to third parties so that we, as developers,](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=36.14228571428572) [can focus exclusively on the business requirements.](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=39.513) [So in a serverless architecture,](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=43.676) [you'd rely on third party platform or Backend as a](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=45.785) [Service offerings wherever possible,](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=49.918000000000006) [so for example using Azure Cosmos DB for your database instead of](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=51.57414285714286) [provisioning your own database server on a virtual machine or](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=56.954) [using Auth0 for your logging and authentication rather than](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=60.456714285714284) [hosting your own identity service.](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=64.668) [And there's a growing number of services that meet many of the common](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=67.663) [needs of modern cloud applications whether that be logging or email](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=71.58150000000003) [sending or search or taking payments.](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=76.22900000000001) [Now, of course,](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=79.56300000000002) [there will still be the need for you to write some](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=81.468) [of your own custom back end code,](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=84.05775) [and that's where a framework like Azure Functions fits into serverless.](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=85.97800000000001) [Instead of provisioning a virtual machine to host](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=91.447) [your APIs or background processes,](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=94.50214285714286) [you simply tell Azure Functions which events you need to respond to,](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=96.79) [what to do when those events fire,](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=101.11099999999996) [and let the framework worry about how many servers are actually needed.](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=103.37928571428569) [And this model of lightweight hosting of functions is sometimes](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=108.085) [referred to as FaaS or Functions as a Service.](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=112.50571428571429) [On its own, Azure Functions isn't a serverless framework.](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=116.684) [But it fulfills the FaaS part of serverless.](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=120.977) [And so you could use it in conjunction with other cloud offerings](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=124.016) [to create an overall serverless architecture.](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=127.63671428571429) [Now that was just a very brief introduction to serverless. So let's consider a simple, real-world example.](https://app.pluralsight.com/course-player?clipId=1e309782-8881-45b2-955e-23911aa50697&startTime=131.627)

### [Serverless - A Real-world Example](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0)

[A while ago,](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=1.659) [I needed to create a simple website on which I could](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=2.4956666666666667) [sell a Windows application I'd written.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=5.5865) [The website was just some static HTML with a Buy Now button that](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=8.43) [integrated with a third party payment provider.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=12.5905) [So far, quite simple.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=16.039) [I've got a web server responding to web requests from](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=17.933) [the browser and responding with HTML, CSS,](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=20.715333333333334) [and JavaScript.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=24.8058) [But I also needed to handle the web-hook callback from the](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=26.315) [payment provider when someone bought my product.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=29.7725) [So I added a web API method to handle that.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=33.04) [And that needed to generate a license file and email it out.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=37.043) [And so the web server posted messages to a queue.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=40.55788888888888) [And because I needed somewhere to put the code that listened on the queues,](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=44.459) [well that ended up on the web server too.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=47.888) [Before long, there were more and more little bits of code being added.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=51.457) [The application let the user report an error, which called a web API.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=55.504) [And the application needed to phone home to check that the license was valid.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=59.942) [And then I wanted a nightly process to summarize all the](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=64.604) [activity from each day and email it to me.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=67.82028571428573) [And so what had started out as a very simple website was growing into a](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=70.87644444444443) [full-blown application with lots of responsibilities.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=76.083) [At one point,](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=79.868) [I was thinking about changing the website to use WordPress to](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=80.66562499999998) [make it easier for me to manage content.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=83.78824999999998) [But I realized that I couldn't easily make that change now because](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=87.18) [there was so much custom .NET code that would need a new home if I](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=89.99499999999999) [switched the website over to PHP.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=94.96625) [And this is a familiar story to many developers.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=97.496) [Your application starts small and so it only makes sense to have one server.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=100.843) [But before you know it, that one server is doing everything,](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=105.64) [and you've ended up with a monolithic architecture that's hard to scale.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=108.05442857142857) [Let's see how serverless could help us in this scenario.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=113.471) [Serverless lets us break bits off our monolithic application.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=117.145) [So let's start by saying that the new purchase web-hook is handled by](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=121.905) [an Azure function that posts a message onto a queue,](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=125.5515714285714) [and that message is handled by another Azure function that](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=129.479) [generates the license and puts it into blob storage.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=132.28699999999998) [And that blog triggers another Azure function that emails it to the customer.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=135.941) [The reporting error endpoint is another Azure function that](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=140.88) [writes a row into Azure Table Storage.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=143.82924999999997) [The Validate License API is another Azure Function that](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=146.47199999999998) [performs a database lookup of that license code.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=150.72033333333337) [And the nightly background process is another Azure function triggered by](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=154.686) [a timer that produces a report and sends it via email.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=158.6714285714286) [Now we've still got our web server,](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=163.154) [and some serverless advocates might go even further and get rid of that too,](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=165.164) [replacing it just with static content hosted in blob storage.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=169.779) [But even if we don't do that, our web server has now got a lot less to do.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=174.075) [And we've managed to decompose our monolith into a](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=178.99) [set of loosely coupled functions.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=182.55014285714287) [You could even think of them as microservices taken to the next level.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=184.988) [And like with microservices,](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=189.261) [we've got freedom on deploy and scale them independently.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=191.007) [Now there is one more concept that we need to understand,](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=195.128) [and that's the idea of function apps.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=197.565) [Azure Functions lets you group related functions together into a function app,](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=199.97766666666666) [which allows them to share configuration settings and local resources.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=205.478) [So in this application,](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=211.349) [it would probably make sense to put them all](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=212.4501428571429) [together into a single function app. And we'll be using function apps in our next module.](https://app.pluralsight.com/course-player?clipId=5f0e3226-acc5-4950-bee9-d0afc27d4ed0&startTime=214.93600000000004)

### [What Are Azure Functions Good For?](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d)

[You might be wondering what sort of applications are Azure Functions](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=1.577) [and serverless architecture actually good for?](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=5.3138) [Well, they're not necessarily the right choice for every application.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=9.483) [But here's some examples of when they make a lot of sense.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=12.884) [First of all, they're brilliant for experiments and rapid prototyping.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=16.49028571428571) [It takes just a few minutes to get one up and running.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=21.923) [So you can have a prototype application with a](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=24.509750000000004) [functioning back end in next to no time.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=27.26257142857143) [They're also great for automating some of your internal development processes.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=30.288000000000004) [So for example,](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=35.76) [you might want to use a web-hook to integrate a slack channel](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=36.56166666666667) [with your continuous integration server.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=40.24442857142858) [And here it wouldn't make sense to deploy a whole web](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=43.284) [server just to handle a single web-hook.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=46.468222222222224) [But with Azure Functions, you just need to write a single function,](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=49.108) [and you don't need to worry about what server that will run on.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=52.10599999999999) [They're also great for decomposing or extending](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=56.575) [existing monolithic applications.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=59.72) [You can break a bit out, say an existing queue handler into an Azure function.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=62.651) [Or you can extend an existing application by adding](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=68.785) [on a couple of extra functions.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=72.6195) [And Pluralsight author, Troy Hunt,](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=75.435) [gave a great example of this a while back in a blog post where he shows](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=77.631) [how he uses Azure Functions to automate blocking and unblocking users](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=81.84390000000005) [of his web API to avoid server overloads.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=86.181) [Just by adding a couple of Azure Functions to his existing architecture,](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=89.33300000000001) [he greatly reduced the load on his web server.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=94.09783333333333) [And I've provided a link to this blog post in the course download materials](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=97.756) [along with a number of others that will give you inspiration of the types of](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=101.77857142857144) [scenarios in which Azure Functions are a good fit.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=106.59557142857142) [Azure Functions are also great if you've got a number of queue handlers,](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=110.06) [but they might all need quite different scaling requirements.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=113.898) [When you're managing servers yourself,](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=118.082) [it can be quite a headache to decide which handlers to group](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=120.065) [together onto the same server to balance the considerations](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=123.07214285714288) [of cost versus scalability.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=126.41866666666667) [But with Azure Functions, you can let the runtime solve that for you.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=129.407) [Another great use case is integrating systems together.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=133.627) [Often you need to create intermediate adapters to connect together two systems,](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=136.8447142857143) [and Azure Functions is a really convenient place to do that.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=142.36542857142857) [And of course finally, if the whole idea of serverless really appeals to you,](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=147.232) [then Azure Functions will let you build your entire application that way, composing the whole thing out of lots of loosely coupled functions.](https://app.pluralsight.com/course-player?clipId=b00bceb3-fd44-4b66-a268-6645ef251d5d&startTime=151.685)

### [Module Summary](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6)

[We've covered a lot of ground in this module,](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=1.046) [so let's recap some of the key concepts that we've learned.](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=2.981625) [An Azure function is simply a small piece of code in a language of your choice](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=7.329) [that runs in response to an event also called a trigger.](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=12.192888888888884) [An Azure function app is the unit of deployment and](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=16.945) [consists of one or more functions.](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=20.60425) [Azure Functions is built on top of the existing Azure App](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=24.352) [Service and offers many of the same features and pricing](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=27.678571428571427) [options that you can use for Azure Web Apps.](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=31.28600000000001) [But it also offers what's called a consumption pricing](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=34.681) [plan where you pay only for what you use,](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=37.300142857142866) [and it has a generous free monthly grant,](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=40.73566666666666) [which means that during development, you're quite possibly paying nothing at all.](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=43.35585714285715) [Serverless describes a style of architecture where the service,](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=48.747499999999995) [scaling,](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=52.828) [and even wiring up of events are transparently managed for](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=53.21625) [you so you can focus purely on writing the code that solves](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=57.1832857142857) [your business requirements.](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=62.205) [And Azure Functions doesn't force you to go all in on serverless.](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=64.404) [In fact,](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=68.564) [it's very easy to introduce a few Azure functions](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=69.10222222222222) [alongside a more traditional architecture,](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=71.83720000000001) [and they're also great for rapid prototyping.](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=74.1292) [Now I know I've made you wait quite a while to](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=78.457) [actually see an Azure function in action.](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=81.12162500000001) [So you'll be pleased to know that in the next module, we're going to see how easy it is to create your first Azure function.](https://app.pluralsight.com/course-player?clipId=0530ed0a-a8aa-48d4-9050-7beb76e848f6&startTime=83.926)

## [Creating Your First Azure Function](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f)

### [Module Introduction](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f)

[Hi, Mark Heath here.](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f&startTime=0) [And in this module,](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f&startTime=2.616) [we're going to see how easy it is to create your first Azure function.](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f&startTime=3.6311111111111107) [We'll start off by creating our first Azure function using a free trial](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f&startTime=8.889) [experience designed to get you up and running really quickly.](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f&startTime=13.380666666666663) [Our first function will be a simple web- hook,](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f&startTime=17.404) [and we'll see how easy it is to code and test it within the portal.](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f&startTime=19.4581) [And you'll be able to follow along as we go,](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f&startTime=24.374) [even if you don't have an Azure account.](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f&startTime=26.584555555555557) [Then,](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f&startTime=29.645) [we'll explore in more detail the options available in the](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f&startTime=29.969714285714286) [Azure Functions section of the Azure portal,](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f&startTime=33.544000000000004) [including how to create a function app and what options we](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f&startTime=36.708) [can configure for our function apps.](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f&startTime=40.220000000000006) [And I also want to give you a bit of a behind-the-scenes look at](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f&startTime=41.967555555555556) [what's actually going on in your Azure Functions app.](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f&startTime=46.279750000000014) [And so we'll take a quick look at what's inside the storage account that Azure Functions makes for us.](https://app.pluralsight.com/course-player?clipId=a9b9328a-05a2-4851-874c-440e738c373f&startTime=49.588)

### [Creating Our First Function](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589)

[We're going to jump straight into a demo now and](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=1.282) [create our first Azure function.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=4.039) [So let's see how we can do that.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=6.174) [Now you can actually try out Azure Functions for free without even needing](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=8.715) [an Azure account by visiting www.tryfunctions .com /try.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=12.738571428571428) [So why don't you join me in your browser now,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=20.49) [and let's create our first Azure function together.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=22.47342857142857) [When we visit this page,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=25.271333333333335) [we get offered the option to quickly start with a premade function.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=27.167749999999998) [I can choose a webhook for a function that we can trigger with an HTTP request,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=31.661) [but there are other options available as well.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=36.258) [We can also choose between C# and JavaScript,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=39.091) [which are the two best- supported languages on Azure Functions,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=41.50916666666667) [but other languages are also supported.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=46.161) [Let's accept the defaults, and you can see that it prompts me to log in.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=49.221) [Now don't worry.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=53.127) [We're not going to have to pay for anything.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=53.649375000000006) [This just links your trial experience to a user account.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=55.972) [I'm going to sign in with my GitHub credentials.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=58.82166666666666) [And once that's completed,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=63.019) [it's going to drop me into a window that shows my function app](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=64.495) [containing the function that we just created.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=68.64533333333334) [As you can see,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=71.2762857142857) [this Azure Functions trial experience just lasts an hour](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=72.882) [after which it will get completely reset.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=76.33987499999999) [So this is a nice sandboxed environment that you can use to](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=78.665) [experiment without worrying about what you might break.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=82.721) [And you can see over here on the left that it's showing me my function app,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=86.1001111111111) [which has been given a randomly generated name,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=91.03114285714287) [has got a single function in it called HttpTriggerCSharp 1.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=93.93571428571428) [Now I know that's not the greatest name, but it'll do just fine for this demo.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=99.937) [And here on the right, we get to see the code for this function,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=105.149) [which is in a file called run.csx.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=108.13333333333331) [Now I'm not going to go into too much detail here](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=110.53075000000001) [because later on in this course,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=114.65112500000001) [I'm going to show you a better way to create C# functions.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=116.09099999999998) [But the basics are that this run method is going to get](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=120.711) [run whenever our function is triggered.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=124.15366666666668) [And when the function runs,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=126.573) [it tries to find a query string parameter called name.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=127.71612499999996) [And if that wasn't supplied,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=131.395) [it looks to see if the body of the request contains a name.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=132.459375) [Then if no name was supplied, it will return a HTTP 400 Bad Request.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=136.337) [But if you did supply a name,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=142.114) [then we return 200 OK with a Hello message in the response body.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=143.632) [Now one really nice thing about this portal experience is](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=149.106) [that we've got a code editor built right in.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=151.92524999999998) [So if we wanted, we could edit this function right here.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=154.815) [Now obviously you wouldn't want to write your](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=158.845) [production code in the Azure portal.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=161.23942857142856) [But as a quick way to try out Azure Functions, this is really convenient.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=163.792) [If I expand this View Files tab over on the right,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=168.761) [I can see the files that make up this function.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=171.73122222222221) [There's the run.csx, which we were just looking at,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=175.047) [a readme file that we don't need to concern ourselves with now,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=178.94) [and there's also a function.json file.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=182.4577142857143) [Now this is important as this is the file that defines](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=185.084) [each Azure function in a function app.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=189.3957777777778) [It specifies important things like what event triggers this function.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=192.504) [In this case, it's an HTTP trigger.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=196.408) [It also specifies that we're going to support both](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=199.372) [the get and post HTTP methods.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=202.03949999999998) [And it says that this function has an authorization level of function,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=205.626) [meaning only people who know a special secret code can call it.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=209.668) [Normally, you won't need to generate one of these function.json files yourself.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=214.464) [In most cases, the tooling will generate it for you.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=219.55) [But it's still really useful to know about it as it's a](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=222.3295) [fundamental part of how Azure Functions are defined and can](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=226.14966666666675) [be useful for troubleshooting.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=229.37249999999997) [And the editor actually allows us to add more code in here too.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=231.803) [So we could put in more C# files if we wanted.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=235.354) [Although the spirit of Azure Functions is to keep your function](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=238.618) [code as small and lightweight as possible.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=241.76850000000002) [So hopefully you won't find yourself needing to do that too often.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=244.663) [There's also a handy test window,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=248.958) [which makes it really easy for us to trigger our function.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=251.357) [I can choose what HTTP method to choose.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=254.684) [Post is fine.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=257.75) [And I can set up the request body.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=258.86600000000004) [Let's set the name to Pluralsight, and we'll click Run.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=261.842) [As you can see,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=265.954) [quite soon it tells us that the function call succeeded with a 200 OK response.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=266.8568000000001) [And it pops up this Logs window showing us the live](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=273.294) [log output from our function.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=276.6051428571429) [We can see here that the log output shows us when](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=278.843) [the function started and stopped,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=281.7748571428571) [as well as showing the actual log message that we omitted at](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=283.912) [the start of our function in the C# code.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=286.7389999999999) [And if I scroll down in this test view,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=290.608) [it also shows us the message that our function returned in its response body,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=293.324) [Hello Pluralsight, which is what we were expecting.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=298.496) [Of course, since this is an HTTP-triggered function,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=302.825) [I don't have to use this test window.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=305.7534444444444) [If I know the URL, I can call it from anywhere.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=308.445) [If I click this Get function URL link, it shows me the URL for this function.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=311.922) [And you can see in this dialog,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=317.95) [the domain name is made up of the randomly generated function](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=319.599) [app name followed by azurewebsites.net.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=322.76733333333334) [You can also see the function name in there,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=326.938) [HttpTriggerCSharp1,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=329.26183333333336) [and you can also see the security code that we do need to provide,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=329.9136666666667) [or we'll get a 401 Unauthorized response.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=335.15475) [Let's copy this link to the clipboard,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=339.115) [and I'll open a new browser tab and visit that link.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=341.231) [As you can see,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=344.18222222222215) [we get the warning message saying that we need to provide a name](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=345.4146666666665) [in the query string or in the request body.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=348.9480000000001) [So let me do that by appending a query string parameter for the](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=351.5636666666666) [name with a value of Mark to the end of our URL.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=355.539) [And sure enough, once we run this, we get Hello Mark back in the response body,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=359.79) [which is defaulted to XML simply because there was no](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=364.507) [content negotiation header on the request.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=368.3236666666667) [And so it show it chose the default of XML instead of JSON.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=370.7) [We've just seen how we can use the tryfunctions.com website](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=375.436) [to get a free 1- hour trial experience.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=377.8901428571429) [We saw how easy it is to create our first function based on a template,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=382.729) [and we saw that we can view and edit code in the portal.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=386.268125) [We also have had our first look at the function.json file,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=390.938) [which is a file that every Azure function will have.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=393.4795714285714) [We saw how we can view the diagnostic log output from a](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=398.03) [function execution in the portal,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=400.74828571428577) [and we also saw how we can test our function from within the portal,](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=402.1165) [as well as how to access the URL for a HTTP-triggered function, including its secret code.](https://app.pluralsight.com/course-player?clipId=3863547b-ad81-4cd7-bc92-17a34a537589&startTime=405.8135)

### [Creating Functions from Templates](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7)

[In this demo, we'll create another function by using a different template.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=1.26) [And this time, we'll also use a different language, JavaScript.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=5.66) [So what happens when we want to create another function?](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=10.348) [Well,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=12.708857142857143) [we can do that quite easily because what we've got](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=13.042285714285715) [here is an Azure function app.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=15.842249999999998) [and as we said in the last module,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=18.158) [an Azure function app can continue many functions.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=19.93) [So back here in the portal,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=24.421) [we just need to click this plus button to the right of](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=25.6642) [Functions to create a new function.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=28.705) [And you can see here that we've got a whole host of options for](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=31.737) [different types of functions we can create.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=34.74342857142858) [So there's an HTTP trigger, which is what we used last time.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=37.451) [But I can also choose queue triggers, blob triggers.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=40.21577777777778) [And if I scroll down, you can see a whole bunch of other templates are available.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=44.216) [And function templates serve as a great quick start for you to save](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=49.38) [you having to remember all the syntax for the various triggers and](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=52.92166666666669) [bindings that you might want to use.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=56.70514285714286) [And we'll be making a lot of use of templates as we go through this course.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=58.852000000000004) [You'll also notice that these templates have been](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=64.408) [offered to us in three languages, C#, F#,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=66.55324999999999) [and JavaScript.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=70.103) [And if we were to enable experimental languages,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=71.798) [we'd see even more choices here.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=74.15414285714286) [Azure Functions is designed to be extensible and to support many languages.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=77.143) [And at the time of recording, there's also Python and Java support available.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=81.943) [And a few other options, like TypeScript and PowerShell,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=86.836) [are currently in development.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=90.333) [Now in this course, we're going to focus mainly on C#.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=92.812) [But I will show you in this demo how to create a JavaScript function.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=94.98189999999998) [and so let's create a timer-triggered function we're](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=99.592) [just going to run on a schedule.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=102.23988888888888) [This opens a dialog where I can choose the name for our new function.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=104.973) [TimerTriggerJS1 is fine.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=108.635) [And we can also set a cron expression that governs](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=111.31) [how often this function will run.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=114.468) [If you've not see cron expressions before, they can look a little confusing.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=117.042) [But this simply means that this function is going to run every 5 minutes,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=120.961) [which is just fine for our purposes.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=124.74266666666668) [Let's click Create to create this new function.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=128.383) [Now one important thing that I should mention at this point is that](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=132.408) [the reason that we were able to create a JavaScript function](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=135.60375) [alongside a C# one is that this trial experience website is still](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=138.703875) [using version 1 of Azure Functions,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=143.51599999999996) [which allows you to mix and match languages in the same function app.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=146.33) [With version 2 of Azure Functions,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=150.961) [the language extensibility mode has been rewritten,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=153.497) [which brings better performance,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=156.2238) [but at the cost that you have to pick a single runtime for your function app.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=158.635) [You'd either be using .NET and running C# or F# functions or](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=163.044) [Node if you were running JavaScript functions.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=167.31033333333332) [And so that's why you can see this warning message telling me a](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=171.116) [new version of Azure Functions is available.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=174.16750000000005) [Anyway, you can see that for a JavaScript function,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=177.263) [we have an index.js file, which again we could edit in this window if we wanted.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=179.83183333333332) [When the timer fires, our function is called.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=185.44333333333333) [And all this function does is logs a message.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=188.811) [It's also able to detect if the function invocation](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=191.931) [was running late for some reason.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=194.6614285714286) [In JavaScript Functions, you get passed a context object,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=197.442) [which you can use to log messages.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=200.04522222222224) [And you call done on the context when your function is complete.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=202.916) [If we go over to the View files tab,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=207.301) [we can see that this function also has a](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=209.415) [function.json file in addition to index.js.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=211.579) [As we said earlier, all Azure functions have a function.json file,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=216.401) [and this one contains the same information.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=220.09699999999995) [What triggers this function, in this case,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=223.349) [is a timer trigger and any configuration specific to the trigger type,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=225.51) [which for a timer-triggered function is the cron expression](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=230.605) [defining the schedule that we're going to run on.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=233.53333333333333) [Now we could wait 5 minutes for this function to run,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=237.443) [but we can also run it on demand by clicking the Run button.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=240.33399999999997) [So let's do that.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=244.372) [And as you can see, down here in the logs,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=245.57288888888894) [we see messages indicating that our function has started and completed,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=248.50337500000003) [as well as the log message we omitted in the function code itself.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=252.122) [And there's still a couple of minutes to wait before](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=257.3) [our function is actually due to run.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=259.48299999999995) [It runs every 5 minutes, so I'm going to fast-forward in time a little.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=261.625) [And if we watch the logs, we'll see that almost exactly 40 minutes past the hour,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=265.956) [our function runs again.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=270.762) [Obviously,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=273.067) [a real-world scheduled function would do something a bit more](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=273.469) [interesting and interact with other services,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=276.8187142857141) [and we'll be learning how to do that later on in this course.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=279.193) [But I hope these quick demos have shown you how easy it is to try out Azure](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=282.1972222222223) [Functions and get your first function up and running.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=287.3618571428571) [In that demo,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=291.703) [we saw how easy it is to create additional functions in your function](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=292.29850000000005) [app based on a whole host of built-in templates,](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=295.518875) [and we created a JavaScript timer-triggered function and saw how we could run it on demand.](https://app.pluralsight.com/course-player?clipId=32a4c276-0bdd-4adb-96f8-be9938952ec7&startTime=298.5526666666666)

### [Creating a Function App in the Portal](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2)

[Our previous demos just used the completely free Try Azure Functions experience,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=1.306) [which lets you play around for up to 1 hour with no financial commitment at all.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=7.041) [But in this demo, we're going to create our own function app.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=12.114) [And for that, we will need to have an Azure account, which is free to create.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=15.02) [But we're going to be using an existing one.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=19.879) [We'll visit the Azure portal and create a new function app.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=22.772) [And we'll see that we've got exactly the same experience](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=26.175) [that we saw before with easy editing and testing of our](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=29.104999999999993) [code right within the portal.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=32.679) [And we'll explore around a bit more to see what](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=35.368) [additional options we have at our disposal.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=37.790625) [So here we are in the Azure portal,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=41.099) [which you'll be already familiar with if you've got an Azure subscription.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=43.455) [You can visit the portal at portal.azure .com.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=47.758) [And even if you don't have an Azure subscription at the moment,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=51.512) [you can sign up for free,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=54.18300000000001) [and that will actually give you some free credit to use in your first month.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=55.7735) [So how do we create a new function app?](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=60.721) [Well, we can press plus here in the top left to create a new resource.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=63.579) [And in this window,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=68.672) [we can either search for function app or navigate to it by](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=69.45750000000001) [looking in the Compute category for function app.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=72.87) [And this brings up a window that lets us enter options for our function app.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=75.91524999999999) [We need to give our function app a name,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=81.924) [and this name is going to form part of a domain](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=84.144) [name so it does need to be unique.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=86.20644444444444) [I was thinking of calling this function app Pluralsightfuncs,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=89.114) [but you can see that that name has already been taken.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=91.35542857142858) [So let's keep appending numbers until we find one that's free.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=95.432) [And there we go, Pluralsightfuncs1234 is free.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=99.404) [Next, I can choose which Azure subscription to use if I've got more than one.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=104.013) [And I can put it inside an existing resource group.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=109.295) [But here we're going to create a new resource group,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=111.82442857142858) [and the default name it suggests is fine.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=115.448) [You also notice that I can choose an operating system to run on.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=118.479) [The original version 1 of Azure Functions was based on the .NET Framework,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=122.328) [so it was tied to Windows.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=126.728) [But version 2 of Azure Functions is based on .NET Core,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=128.632) [which is cross-platform, so it's able to run on Linux.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=132.02749999999997) [However, as you can see at the time of recording,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=135.679) [Linux support is still in preview.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=137.93900000000002) [So we'll choose Windows.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=140.735) [Next, I can choose an app service plan.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=142.875) [This allows me to choose between the consumption plan,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=146.198) [which uses the serverless billing model,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=148.5793333333333) [or I can just select App Service Plan,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=150.85025) [and this would allow me to host this function app on any app service](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=153.271) [plans that I've already created in this subscription.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=157.522) [And as we discussed in the last module,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=160.646) [during this we'll use the dedicated VMs that were already](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=162.725) [allocated to the App Service Plan to run the functions on top of](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=165.80285714285716) [whatever else they were already doing.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=169.872) [However, in most cases,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=172.575) [choosing the consumption plan makes a lot of sense as you can](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=173.917) [take advantage of the free grant and all the power and](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=177.8531111111111) [flexibility of the serverless model.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=180.931) [If I choose the consumption plan, I need to pick a location,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=184.031) [which really should be in the same region as any other Azure resources](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=187.743) [that I'm planning to use from within the function.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=191.2745714285714) [And as you can see, there's a lot of supported regions.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=194.566) [I'm going to pick West Europe.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=197.5605) [The next option is what runtime stack we're going to use.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=201.483) [This is something we touched on earlier.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=204.51825) [With Azure Functions version 2,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=206.77233333333334) [the expectation is that you typically use the same](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=208.79442857142857) [language for all your functions.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=211.99687500000005) [So if I'm writing C# or F# functions, then I pick .NET.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=214.32) [If I'm writing JavaScript, then I'll pick the JavaScript option here,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=218.48842857142856) [which will also be able to support functions written in](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=222.26125000000002) [TypeScript when that becomes available.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=225.68979999999996) [And you can also see here that it's offering me Java as a preview.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=228.031) [And by the time you watch this, there may be other runtimes available.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=231.906) [For example, support for Python is well under way,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=235.91) [so you might see that listed here.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=238.6483333333333) [I'm going to be creating C# functions, so I'll pick .NET.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=241.11) [Finally, a storage account will be created for you.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=246.15060000000003) [This is for Azure Functions to store information relating to your function app.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=249.536) [I'm going to be a bit nosy in a minute and take a look at what's inside here.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=254.22) [You'll notice it does offer us an option to use an existing storage account,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=258.77) [but I recommend that you let it create a new storage account.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=263.066) [And you can see here that it's auto- generated a unique name](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=266.39) [that it can use for that storage account.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=269.0496666666668) [You can also see that it's offered to create an](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=272.83) [Application Insights nstance for us,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=274.95400000000006) [which is going to store log and diagnostic information.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=276.917) [This isn't strictly required,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=281.036) [but it does come highly recommended as it provides a much richer logging and](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=282.2365714285715) [diagnostics experience that we're going to be seeing later.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=287.41639999999995) [So let's go ahead and create this function app by clicking Create.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=291.055) [It will take about a minute to provision,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=295.479) [so I'll fast-forward to when it's done.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=297.366) [And we get a notification telling us that deployment is completed.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=299.833) [When we click on it, it launches us into a function app navigation experience,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=303.902) [which is actually the same as we saw earlier when we](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=308.65) [used the tryfunctions website.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=312.14314285714295) [And on this same page,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=314.502) [we get to see some basic information about our function app,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=315.538) [including the URL,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=319.227) [which will be the base address for any HTTP-triggered functions that we create.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=320.08912499999997) [So we've seen that if you have an Azure account,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=325.74933333333325) [you can create a new function app directly from the portal at portal.azure .com.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=329.09444444444455) [And we saw that when you create a function app,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=335.205) [you can specify the function app name, subscription,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=337.231125) [resource group.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=340.3603333333333) [You can choose the operating system, Windows or Linux,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=341.969) [the hosting plan,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=345.298) [allowing us to choose between the serverless](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=346.793) [consumption plan or regular app service plan,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=348.66616666666664) [and the runtime stack,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=351.933) [which governs what languages we're writing our functions in.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=354.135) [An Azure Functions app requires an Azure Storage account,](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=357.4177142857142) [and we usually create a dedicated one that can be](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=361.733) [associated with our function app.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=365.01000000000005) [And we can choose whether to create application insights if](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=367.015) [we want the improved logging experience.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=369.4454999999999) [So next, let's look around in a bit more detail at the function that we've just created.](https://app.pluralsight.com/course-player?clipId=39babbf1-2e3d-48e4-b1cd-b31384fa28c2&startTime=373.056)

### [Exploring the Function App](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b)

[In this demo,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=1.273) [we'll be exploring the function app that we just created in the Azure](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=2.2454285714285716) [portal and seeing some of the settings and options that are available to us](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=5.8265714285714285) [beyond simply editing the code for our functions.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=10.06111111111111) [Let's start off by navigating into our resource](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=13.822) [group and seeing what got created.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=16.486428571428572) [There are four resources here, the function app itself.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=19.741) [But there's also a storage account, an Application Insights instance,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=23.203) [and here's the App Service Plan, which governs pricing,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=28.045) [and this is the consumption plan.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=30.73285714285714) [Let's navigate back into our function app,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=32.91266666666667) [and we'll take a look at some of the settings.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=35.61366666666666) [If I visit the Platform features tab,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=38.909) [you can see that there's a very large number of things that we](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=41.244) [can configure in here related to development,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=43.958874999999985) [networking, monitoring, and much more.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=47.23220000000001) [As we've said, Azure Functions is built on top of Azure App Service,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=50.285) [and that means that the majority of features that you can use with](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=54.09075000000001) [Azure web apps are also available to function apps.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=57.74625) [Let's go in to look at the function app settings.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=60.705) [This lets us access some key settings related to the function app as a whole.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=65.114) [And you can see that here we're using version 2 of the Azure Functions runtime,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=70.177) [which is the latest version, and I recommend you use it if possible.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=74.88) [We've got the ability to set a daily usage quota,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=79.516) [which can protect you against accidentally running up a large bill.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=81.95616666666666) [And the function app edit mode is shown here as read/write,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=86.311) [meaning that we can create and edit functions in the portal if we want to.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=89.0132857142857) [But we're actually not going to be doing that anymore in this course.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=94.05275) [Instead, we're going to write our function code in a regular code editing tool,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=98.108) [and then we're going to push it to Azure when we're ready.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=102.449) [In this view,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=105.65649999999998) [we can also access or renew the secret keys that can](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=106.957) [be used to call our functions.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=110.69000000000001) [Let's navigate to the application settings next.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=113.303) [In here, we get to see a whole bunch of settings.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=118.123) [And if you're wondering why there's things like PHP version,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=121.627) [which isn't even currently a supported language for Azure Functions,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=124.72649999999999) [that's because these settings come from the same](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=128.612) [underlying platform that web apps use, and they do support PHP.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=132.03428571428566) [But generally, you won't need to modify most of the settings in here.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=136.515) [The most relevant part of this page is the](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=140.74) [subsection called Application settings,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=143.039) [and this contains settings that are used by the Azure Functions runtime,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=146.63) [but you can also add your own settings in here as well,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=149.83842857142855) [which can be accessed from within your functions.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=153.971) [And anything set here will appear as environment](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=156.993) [variables that you can access in your code.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=159.344) [And these settings include things like the Application Insights key,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=162.53271428571426) [the version of the Azure Functions runtime,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=167.098) [which has the value of ~2,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=169.498) [which means use the latest release of Azure Functions versions 2,](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=171.07266666666663) [and the FUNCTIONS\_WORKER\_RUNTIME setting is set to dotnet as we're](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=175.27499999999998) [going to be writing C# functions for this function app.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=179.95312499999997) [And you'll also see that the connection string to the storage](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=184.353) [account that we created is here as well.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=186.81571428571434) [Now I'm not going to take you through all of the features shown here.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=191.85) [That will take a long time and probably be quite boring.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=195.179) [But it's worth you taking a little bit of time to look around](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=198.0135) [here in the portal and familiarize yourself with what's](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=201.4022222222222) [available when you get the chance.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=204.70657142857144) [And we will be returning here and using some of these other settings later on in this course.](https://app.pluralsight.com/course-player?clipId=3fe4995b-1be8-4436-8b62-da2b2ee16b5b&startTime=207.014)

### [Exploring the Storage Account](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d)

[Now one final thing before we wrap up this module.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=1.232) [Let's be nosy and take a peek at what's inside the storage](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=4.451) [account that got created for our app service.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=7.665) [And just to make things a little bit more interesting,](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=10.871) [I've created two functions just like we did in the tryfunctions website,](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=13.407) [one is HTTP-triggered, and the other is a scheduled function,](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=18.13625) [and both are in C#.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=22.606) [So let's navigate to the storage account associated with our function app.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=24.573222222222224) [We'll navigate to the resource group that contains our storage](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=28.857666666666667) [accounts and then into the storage account itself.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=32.444) [And there's a really nice new feature in the Azure](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=36.526) [portal called Storage Explorer, which allows us to look inside a storage account.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=39.30066666666667) [We can see that there are two blob containers,](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=44.804) [and these are used by the Azure Functions runtime for things like holding locks,](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=46.682) [timers, and secrets.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=51.692) [But there's also a file share in here.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=54.143) [Let's explore inside this file share, and we'll navigate into the site,](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=56.721) [wwwroot folder, and we can see that here's the code for our function app.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=60.918) [There's a host.json file,](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=66.376) [which can be used to configure some global settings for your function app.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=67.6115) [And then we can see that each function has got its own folder.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=71.50099999999999) [So if I navigate into the HTTP-triggered function folder,](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=75.807) [we can see the function.json file and the run.csx file are stored in](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=78.77733333333333) [here just like we saw in the tryfunctions website.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=84.35155555555555) [Now there are no queues or tables in use currently in this storage account,](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=88.691) [but some of the more advanced features of Azure Functions,](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=92.846) [such as durable functions, can make use of these.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=95.27000000000001) [Now most of the time, you won't need to look into this storage account.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=98.817) [But it's nice to know that that option's available if you want it.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=102.519) [In fact,](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=106.582) [now is a good time to mention that all of the code](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=106.952) [for Azure Functions is open source.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=109.83719999999998) [It's all on GitHub in these repositories.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=111.945) [So you can find out as much as you'd like about how it](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=114.767) [works by exploring these repositories.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=118.18074999999999) [But you can also raise issues here if you're having problems.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=120.597) [And you'll find that the development team are very responsive.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=123.627) [Even better, because Azure Functions is open source, it means that you can contribute your own features.](https://app.pluralsight.com/course-player?clipId=5efe1641-df2f-4644-ac5d-c6ebd1b9de9d&startTime=127.008)

### [Module Summary](https://app.pluralsight.com/course-player?clipId=f9fa4503-2488-4e49-8815-654bcd6fa1fb)

[Okay, let's wrap up what we've learned in this module.](https://app.pluralsight.com/course-player?clipId=f9fa4503-2488-4e49-8815-654bcd6fa1fb&startTime=1.19) [We've seen that the try Azure Functions experience gives you a no commitment,](https://app.pluralsight.com/course-player?clipId=f9fa4503-2488-4e49-8815-654bcd6fa1fb&startTime=3.8289999999999997) [one-hour,](https://app.pluralsight.com/course-player?clipId=f9fa4503-2488-4e49-8815-654bcd6fa1fb&startTime=8.813666666666666) [free trial where you can give it a go for yourself and code in a](https://app.pluralsight.com/course-player?clipId=f9fa4503-2488-4e49-8815-654bcd6fa1fb&startTime=9.250333333333334) [variety of languages directly in the portal.](https://app.pluralsight.com/course-player?clipId=f9fa4503-2488-4e49-8815-654bcd6fa1fb&startTime=13.492) [We've seen how if you do have an Azure subscription,](https://app.pluralsight.com/course-player?clipId=f9fa4503-2488-4e49-8815-654bcd6fa1fb&startTime=17.171) [you can create your own function app within the portal.](https://app.pluralsight.com/course-player?clipId=f9fa4503-2488-4e49-8815-654bcd6fa1fb&startTime=19.340833333333332) [We saw how you can access the Function App settings directly to modify](https://app.pluralsight.com/course-player?clipId=f9fa4503-2488-4e49-8815-654bcd6fa1fb&startTime=23.814) [your application settings and connection strings.](https://app.pluralsight.com/course-player?clipId=f9fa4503-2488-4e49-8815-654bcd6fa1fb&startTime=27.461199999999995) [And we also looked inside the storage account to get some low-level](https://app.pluralsight.com/course-player?clipId=f9fa4503-2488-4e49-8815-654bcd6fa1fb&startTime=31.298) [insight into what's going on in your function app.](https://app.pluralsight.com/course-player?clipId=f9fa4503-2488-4e49-8815-654bcd6fa1fb&startTime=34.6352857142857) [In the next module,](https://app.pluralsight.com/course-player?clipId=f9fa4503-2488-4e49-8815-654bcd6fa1fb&startTime=38.175) [we're going to start learning about all the triggers and](https://app.pluralsight.com/course-player?clipId=f9fa4503-2488-4e49-8815-654bcd6fa1fb&startTime=38.939499999999995) [bindings that Azure Functions support.](https://app.pluralsight.com/course-player?clipId=f9fa4503-2488-4e49-8815-654bcd6fa1fb&startTime=41.435) [And we're also going to see some better ways to write Azure functions that don't involve coding directly in the portal.](https://app.pluralsight.com/course-player?clipId=f9fa4503-2488-4e49-8815-654bcd6fa1fb&startTime=44.178)

## [Understanding Triggers and Bindings](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf)

### [Module Introduction](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf)

[Hi, Mark Heath here.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=0) [And in this module,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=3.086) [we're going to learn more about the various types of triggers](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=4.1274999999999995) [and bindings available in Azure Functions.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=7.37) [In the last module, we already used a couple of the available trigger types.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=11.658) [We created a schedule function triggered by a timer and a](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=16.244) [web-hook triggered by a HTTP request.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=20.8212) [But there's actually loads of additional trigger](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=23.949) [types supported in Azure Functions,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=26.306833333333334) [such as responding to queue messages or new items appearing in blob storage,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=28.481) [and even new documents being added to a Cosmos DB database.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=33.811) [In addition to triggers, Azure Functions provides input and output bindings,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=37.61249999999999) [which make it really easy to connect your functions to](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=43.30499999999999) [all kinds of external resources.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=46.69974999999999) [Whether your function needs to post a message to a queue or](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=50.082) [write a file to blob storage or send an email,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=53.08950000000001) [bindings can greatly reduce the amount of code you](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=56.985) [need to write to achieve this.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=59.95099999999999) [And in this module,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=62.198) [we'll be making use of some of these triggers and bindings as](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=63.18333333333333) [we start to build a series of functions that will work together](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=66.45199999999998) [as an order processing pipeline.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=70.56900000000002) [I'll also be taking the opportunity to introduce you](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=73.134) [to the Azure Functions core tools,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=75.49542857142858) [which are a cross-platform command line set of tools that enable us](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=77.8405) [to develop our Azure functions on any platform.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=82.41044444444441) [And as we use these triggers and bindings,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=86.073) [we'll see how they're represented in the function.json file.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=88.773) [This documentation page on docs.microsoft .com is a great place to](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=93.178) [bookmark if you want to get an idea of all the various triggers and](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=98.099) [bindings supported by Azure Functions.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=102.28499999999997) [If we navigate down to the Supported bindings section,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=104.36674999999998) [we can see that there's lot of supported triggers and bindings,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=108.22099999999998) [and there's a slight difference between what you can use in](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=111.77866666666667) [version 1 and version 2 of Azure Functions.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=115.45266666666663) [And this is a very comprehensive list,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=119.069) [especially when you consider that some of these triggers,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=121.251) [like HTTP and Event Grid, are very general purpose in nature,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=124.08971428571428) [allowing you to easily integrate with almost any external system,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=128.885) [even if it isn't natively Azure Functions aware.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=132.33371428571425) [From this page,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=136.801) [you can drilldown into each of these different binding types](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=137.745625) [individually and discover all of the options available for](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=141.07) [your language of preference.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=144.80714285714288) [For example, if I navigate to the Cosmos DB binding,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=146.678) [we'll see there's a page for how bindings work with](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=150.06237499999997) [version 1 and version 2 of Azure Functions.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=153.15612500000003) [And if we look at the version 2 page, we'll see that examples are provided,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=155.73633333333336) [not just in C#, but also for the other main supported languages.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=160.39033333333333) [So this really is a very comprehensive reference.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=165.537) [Now in this course,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=169.12) [we don't have the time to cover all of the permutations of different bindings,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=169.904) [triggers, and languages because there's so many of them.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=173.953) [But I do want to introduce you to some of the most important ones.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=177.154) [If you remember earlier in this course,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=181.415) [we looked at a real-world example of how we might refactor an](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=183.377) [existing ecommerce application to use Azure Functions.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=187.47740000000002) [There was a web-hook from a payment provider that posted a message into a queue.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=191.99) [And when that message was processed, it triggered the creation of a license file,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=196.92) [which was stored in Azure blob storage.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=200.893875) [And then the creation of that license file blob resulted](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=204.008) [in an email being sent to the customer.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=206.88799999999998) [And there were several other functions in this example as well.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=209.796) [But in this module, we're going to create the first of these functions,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=212.84) [which means we'll be working with the HTTP trigger and the queue output binding.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=216.711) [And then later on in this course,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=222.312) [we'll be building out more of this pipeline to make use of additional triggers,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=223.753) [as well as input and output bindings, including blob storage,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=228.35) [table storage, and sending emails.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=232.6084) [And we'll get to work creating this pipeline soon.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=234.82449999999997) [But first,](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=238.466) [let's talk in a bit more detail about the language support in Azure Functions and the two different ways of writing C# functions.](https://app.pluralsight.com/course-player?clipId=8a13559e-3030-4bd2-ba84-df103e2455cf&startTime=238.9575555555556)

### [Supported Languages in Azure Functions](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40)

[I've mentioned a few times that Azure Functions supports several languages.](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=1.243) [And a good web page to check for the latest information is here](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=6.201) [on the official Microsoft documentation site.](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=9.571) [As you can see,](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=13.62) [there were some changes to the supported languages in the](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=14.571999999999997) [move from version 1 to version 2 with a few of the](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=17.262714285714278) [experimental options being dropped, but with Java support being newly added.](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=20.979) [And just like the rest of the Azure Functions runtime,](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=26.695) [the language workers are open source.](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=29.193333333333335) [So you can always visit the repositories on GitHub to find out the](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=31.684250000000002) [latest news and get involved in design discussions.](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=36.031) [In fact,](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=40.064) [if we visit the Azure organization page on GitHub and search for](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=40.714499999999994) [repositories with the word worker in their name,](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=45.227999999999994) [we can see the Python, Java, and Node.js workers here,](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=47.866) [as well as a PowerShell one that's still in its early](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=51.73049999999999) [stages at the time of recording.](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=55.121) [So there's plenty of language options.](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=57.864) [But I also want to highlight the fact that there are](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=60.198) [two ways of writing C# functions.](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=62.9855) [And you can see here in the documentation table of contents](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=65.798) [that there's C# class library and C# script.](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=69.005) [So what's the difference?](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=73.801) [Well,](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=75.701) [C# script is the way of writing C# functions that we saw in our last](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=76.03299999999999) [module when we wrote code in the Azure portal.](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=80.91762500000002) [C# script files are compiled on the fly and lend](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=84.082) [themselves well to programming in the portal.](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=87.66275) [However, this is not the most efficient approach to running C# functions.](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=90.279) [It's better to precompile your functions into a DLL,](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=94.848) [and that's what the class library approach is.](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=98.03437499999998) [In fact,](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=101.277) [you'll sometimes hear this approach referred to as pre-compiled functions.](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=101.76899999999999) [With the C# class library approach,](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=107.046) [your functions are created in a regular C# project](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=109.167) [that compiles to a .NET Core library.](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=112.2915) [And with this approach,](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=115.438) [a function.json file will get automatically created for each](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=116.613) [of your functions and will point to the method in the DLL](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=120.74712499999998) [that implements your function,](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=124.25750000000005) [and this is the approach that we're going to be](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=125.65500000000002) [using for the rest of this course. Let's see next how we can install the tooling that helps us do this.](https://app.pluralsight.com/course-player?clipId=23815599-d622-4c97-9e32-3b7c9a2d5a40&startTime=128.41225)

### [Azure Functions Core Tools](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66)

[What do you need in order to develop C# class library Azure Functions?](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=1.313) [Well, there are two options.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=6.617) [First of all, you can use Visual Studio,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=8.495) [either 2017 or 2019,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=11.49) [which is just about to be released at the time I'm recording this.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=13.16733333333333) [And if you're using Visual Studio,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=18.256) [you do need to make sure that you've selected the Azure development workload,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=20.204) [which will enable all the tools you need.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=24.366) [And then you'll be able to create an Azure Functions](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=27.007) [project and run and debug it locally.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=29.238125) [And this is a great option if you're on Windows and particularly if you're](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=32.83) [.NET developer already very familiar with Visual Studio.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=36.50933333333334) [But Azure Functions development can also be done cross-platform](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=41.026) [with the aid of the Azure Functions core tools.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=43.831714285714284) [And these give you a command line experience that](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=48.346) [simplify creating new Azure functions apps,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=50.937) [adding new functions from templates, as well as other useful tasks,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=53.63833333333333) [like deploying your application.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=58.486) [And if you're planning to use these tools to develop](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=60.949) [class library C# function apps,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=63.751000000000005) [then you will also need to make sure that you've got the .NET SDK installed,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=66.476) [which is also cross-platform, and you can download that at dot.net.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=70.742) [As you'd expect, the Azure Functions core tools are open source.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=76.396) [And you can find the project here on GitHub in the](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=81.006) [azure-functions-core-tools repository.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=85.414) [And there's a page here on the docs.microsoft .com site](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=87.17) [where you'll find instructions for installing the Azure](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=90.1775) [Functions core tools on Windows, Mac, or Linux.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=93.854) [I'm on Windows,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=98.25122222222222) [and so I've used this npm install command to install it on my machine.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=99.46055555555557) [And if you'd like to follow along with the demos in this module,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=105.15) [then why don't you get the Azure Functions core tools and the](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=109.544) [.NET SDK installed now on your machine.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=112.95899999999997) [I'll also be using Visual Studio Code,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=115.766375) [which is a really great open source cross-platform text editor that's](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=118.23375) [got excellent support for Azure Functions development.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=122.842) [So you might want to consider installing that too.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=126.255) [Once you've installed the core tools,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=128.61085714285713) [you can check that they're working by typing func version,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=130.9642857142857) [and this will show us the version number of the core](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=134.1895) [tools that we've got installed.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=137.56537500000007) [If I just type func,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=140.17) [then I get some helpful output showing me what subcommands are available.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=141.41444444444448) [Let's use the Azure Functions core tools to create a new function app.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=145.80499999999998) [I need an empty folder, so let's create one called Pluralsightfuncs.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=150.55614285714287) [And we'll change directory into that folder,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=156.569) [and we'll run the func init command, which creates a new function app.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=158.5544285714286) [It prompts us to select which worker runtime we'd like,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=164.708) [and so I'm going to chose dotnet.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=167.71175000000002) [Now if we take a look at what it's created,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=169.728) [we can see a csproj file, which is just a C# project file,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=173.58937500000002) [a host.json file,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=178.905) [which is where some configuration settings for your](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=180.12899999999996) [function app as a whole can be stored, a gitignore file,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=183.32899999999998) [which is useful if we're going to initialize a Git repository here,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=186.79299999999998) [and a local.settings .json file,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=190.901) [which is a place to store the settings that you](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=193.726) [want to use when running locally.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=196.435) [You'll also notice there's a vscode folder,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=199.219) [and this contains some settings that will prompt Visual Studio](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=202.196) [Code to install some useful extensions that improve the Azure](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=204.89985714285717) [Functions development experience.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=209.121) [So let's open this folder in Visual Studio Code.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=211.861) [And if we take a look at the csproj file,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=215.967) [we can see that it's a regular .NET Core project file with a few](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=218.752) [extra settings related to Azure Functions and what files should](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=222.80771428571435) [be copied into the output folder.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=227.11514285714284) [We're referencing the Azure Functions SDK as well.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=229.57) [And the host.json file and the local.settings .json file are](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=233.03699999999998) [populated with sensible starter values.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=238.05000000000004) [You'll notice that Visual Studio Code pops up some messages because](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=241.829) [it's detected that this is an Azure Functions project and that we](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=245.51957142857148) [need to restore the NuGet references.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=249.59142857142857) [So I'll accept both of these prompts.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=252.228) [And if we take a look at my Visual Studio Code](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=255.552) [extensions and search for functions,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=258.40433333333334) [you'll see that there's an Azure Functions Visual Studio Code extension,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=261.496) [which I've already got installed.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=265.79) [and if you don't have it,](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=267.841) [you'll be prompted to install it when you open this](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=268.969) [project in Visual Studio Code.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=271.8434285714286) [And so this makes Visual Studio Code a great environment for](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=274.467) [cross-platform Azure Functions development.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=278.039) [So now we've got our development environment all set up, we're ready to create some functions.](https://app.pluralsight.com/course-player?clipId=c8a18177-bfbc-4299-942e-0a347472ea66&startTime=280.999)

### [Demo: Webhook Trigger](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21)

[The first function we're going to create is for a webhook](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=1.388) [coming in from a third party payment provider,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=4.422) [and we're going to handle that by posting a message onto a queue.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=6.980857142857143) [The first step is to create a HTTP triggered function,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=12.085) [and we're going to do that by making use of the Azure Functions core tools,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=15.333142857142857) [and we're also going to see how we can test and run our function locally.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=19.701999999999998) [Here we are back in our command prompt.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=25.385) [And to add a new function to our function app, we simply need to type func new.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=27.582) [And, you can see,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=33.687) [this gives us the option to select from a whole](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=34.51411111111112) [bunch of example function templates.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=37.08549999999999) [And the nice thing about these templates is that not only](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=38.95933333333334) [will they give us a quick start to show us the syntax needed](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=42.739750000000015) [for each of these trigger types,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=45.664857142857144) [but they'll also install any necessary additional NuGet packages](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=47.81616666666667) [that are required to support the triggers.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=52.083) [Now for this function, we just need an HTTP trigger,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=55.744) [which we're going to use to receive the web-hook from our payment provider.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=58.73457142857143) [So I'll select that.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=63.144) [And it prompts us for a function name,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=64.987) [so I'll call this function OnPaymentReceived.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=67.088) [And now it's going to create some template code for our function.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=69.09316666666666) [By the way, if you're wondering what's going on with my command prompt here,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=75.006) [I've got a PowerShell extension called PoshGit installed,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=79.023) [which gives me useful information about the Git](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=81.96166666666666) [repository in my working directory,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=85.38785714285714) [such as what branch I'm on and how many files are currently modified.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=87.22771428571428) [Let's jump back into Visual Studio Code,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=92.7) [and we can see here that there's a new OnPaymentReceived C# file,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=95.295) [and so let's take a look at what's inside there.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=98.441) [We can see here we've got a static class called OnPaymentReceived,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=103.3) [and there's a static method in here called Run.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=106.5394) [And here we can see the main difference to the C# script](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=110.726) [functions we created in the portal.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=114.09166666666667) [This approach is using attributes to hold information about](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=116.693) [the triggers and bindings for the function.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=120.01466666666666) [There's a FunctionName attribute.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=123.30842857142858) [And since every Azure function needs to have a trigger,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=125.605) [we've got a HttpTrigger attribute defined for the HttpRequest parameter.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=129.025) [And this attribute lets us configure various settings for the trigger.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=135.792) [We can choose the AuthorizationLevel.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=139.937) [We're going to leave it as Function,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=142.537) [which means that a secret code will be required in order to call](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=144.542) [this function when it's deployed in Azure.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=148.08171428571433) [If we didn't want that and we wanted to make it publically available,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=151.251) [we could just use the anonymous AuthorizationLevel.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=153.95028571428577) [But with this option,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=158.291) [we'd need to share the full URL of this function including the secret code with](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=159.238) [our payment provider to enable them to call our function.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=164.2387142857143) [We can also specify which HTTP methods we want to accept.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=168.326) [By default, it's allowing the get and post methods,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=172.78160000000003) [but we only want to support post.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=176.798) [So let's delete get.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=178.767) [Finally, there's an optional Route template.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=180.885) [By default,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=184.167) [the URL for a HTTP-triggered Azure function will](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=185.261) [include /api and then the function name,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=188.9907142857143) [which in our case is called OnPaymentReceived.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=191.8947142857143) [But we could use the root parameter to overwrite this our own custom path.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=194.04183333333333) [For example, if you had a function called getCustomer that took a customer ID,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=200.02700000000002) [the default root would require you to pass the ID as a query string parameter.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=205.7597142857143) [But you can also set up a root template that looks like this if you](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=211.598) [prefer with the customer ID as part of the URL path.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=215.01466666666664) [If we jump back now to the code,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=219.794) [we can see that this function also takes an ILogger,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=221.5307272727272) [which allows us to write to the logs.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=224.976) [Let's update the function body to say that we've received a payment.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=227.505) [And instead of expecting a name in the query string,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=232.068) [for now we're simply going to deserialize the body into a dynamic object and](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=234.692) [then respond with a Thank you for your purchase message.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=240.65866666666668) [Now one really great thing about this Visual Studio integration is that we can](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=243.88366666666667) [run our function app directly from inside Visual Studio Code.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=249.7975) [If I go to the Debug menu and select Start Debugging,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=254.228) [it will compile a code and then start a local instance of the Azure](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=257.44437500000004) [Functions runtime to run our functions locally.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=262.426) [By the way,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=266.461) [if you're not running in Visual Studio Code and you want to](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=267.0723333333333) [start your function app from the command line,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=269.84675) [you can do that with the FuncHostStart command,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=272.231) [which is part of the Azure Functions core tools.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=275.3737142857143) [And you can see that once our code is complied,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=279.632) [the local Azure Functions runtime starts up,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=281.57383333333337) [and it helpfully tells us all the functions that it's found and what the URL is.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=284.62750000000005) [Our PaymentReceived function is available at localhost port](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=290.05533333333335) [7071 on the api/OnPaymentReceived root, which is,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=294.5462857142857) [of course, the default root.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=299.706) [So let's see if we can trigger this function.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=302.405) [Now we could use something like Postman or cURL to do this,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=304.878) [but I'm using PowerShell.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=307.89250000000004) [So I'm going to use PowerShell's invoke web request command or iwr for short.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=309.049) [We're going to post to that URL and specify that we're sending JSON.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=316.099) [But we're just going to pass an empty JSON object in the body for now.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=321.074) [And if you're wondering why we don't also need to](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=325.393) [provide the function's secret code, that's because when we're running locally,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=327.9328571428571) [the code's aren't needed.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=331.744) [But if we were running this function in Azure, then we would need it.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=333.293) [And we can see that our function responds with the](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=337.955) [Thank you for your purchase message.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=340.81725) [If we jump back into Visual Studio Code,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=343.692) [we can see that our Received a payment log message,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=346.179) [which was emitted from our code,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=348.96842857142855) [is visible alongside some other diagnostic output from](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=350.999) [the Azure Functions runtime itself.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=355.01685714285713) [I'll stop the local Azure Functions runtime with Ctrl+C,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=357.869) [and now let's take a quick look at what's in the bin folder.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=360.8705) [We can see that when we compiled our project,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=365.668) [it copied a couple of files across,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=367.5525714285714) [the host.json and the local.settings .json file.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=370.059) [But there's also a folder OnPaymentReceived, which is named after a function.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=375.469) [If we take a look inside, we can see there's a function.json file,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=380.514) [and this has been autogenerated for us based on the attributes in our C# code.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=384.21914285714286) [If we take a look at its contents,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=391.052) [we can see it's similar to the function.json file that](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=392.69) [we looked at in the last module.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=395.4117499999999) [It's got details of our httpTrigger,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=397.7471428571429) [including the supported HTTP methods and the authorization level.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=400.3256) [But it also includes details of where the Azure Functions runtime](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=407.007) [can find the compiled code for our function.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=410.5419999999999) [It's in Pluralsightfuncs.dll,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=414.295) [and the method containing our function code is OnPaymentReceived.Run.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=416.818) [Let's just make one quick enhancement to this function](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=422.704) [before we move on to look at output bindings.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=424.99755555555555) [The real web-hook that we get from our payment provider](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=427.75142857142856) [contains details of the order that's been placed.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=432.0716666666666) [And I've created a strongly typed order class,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=435.581) [which will deserialize the data from the payment provider into.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=438.23828571428567) [So let me paste that in here.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=442.546) [And you can see we've got an OrderId, the ProductId of the item ordered,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=444.533) [the customer email address, and the price paid.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=449.511) [And now let's update the code to make use of this.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=453.01699999999994) [The DeserializeObject method will now deserialize](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=456.539) [into a strongly typed Order object,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=459.31850000000003) [and let's add another log statement to capture some](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=461.991) [details of the incoming order.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=466.22100000000006) [Now we've made those changes,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=468.271) [I'll press F5 to build and run this function app](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=469.8785000000001) [locally and wait for it to start up.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=473.33674999999994) [And now let's return to PowerShell and send an example order.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=476.038) [We'll use exactly the same invoke web request command as before,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=479.5907142857143) [except that now in the body,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=484.353) [we're going to send some dummy order data in JSON format.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=485.8236666666666) [And when we run this,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=490.752) [we get a 200 OK with Thank you for your purchase back again.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=492.1633636363638) [And if we head back to Visual Studio Code,](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=496.588) [we can see that the log message has successfully picked out the](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=499.101) [details of the order that's been submitted.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=502.31328571428566) [So that's our HTTP-triggered function created. Next, we're going to see how we can update it to post a message to a queue.](https://app.pluralsight.com/course-player?clipId=0ae118c5-b6a3-4b32-bdf6-b957ee9f1c21&startTime=505.722)

### [Demo: Queue Output Binding](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee)

[The Azure function we just created is able to receive an](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=1.415) [incoming payment provider web-hook,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=5.0805) [but we also want it to post a message to a queue in order to](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=6.598777777777777) [trigger our license file generation code.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=11.133444444444445) [Generally speaking,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=14.639) [it's a good idea when you're receiving a web-hook to avoid taking actions that](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=15.233) [might take a while to complete as the sender of the web-hook might end up](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=19.688499999999998) [thinking that the call has failed and sending it again.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=24.015) [So that's why we're going to post a message onto a queue,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=26.964428571428567) [which will allow us to generate the license file asynchronously.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=30.882) [So let's see how we can do that.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=34.806) [As we said earlier,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=37.006) [the docs.microsoft .com site is a great place to come to find details on all](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=38.707714285714275) [of the many bindings that are supported in Azure Functions.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=43.201499999999996) [And so here I'm looking at the Azure Functions](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=46.927) [documentation in the Bindings section,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=49.4438) [and we're looking specifically at queue storage bindings.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=51.958999999999996) [That is because we're going to send our message to Azure Storage queues.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=56.461) [And the reason I've chosen that instead of say Azure Service Bus is](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=60.83) [simply that we've already got a storage account,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=64.311125) [which was created with our Azure function app and so it's](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=67.558) [really convenient just to use that.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=70.8385) [Now this is a very long and detailed article and explains how we'd use](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=72.78266666666667) [queue triggers and bindings from a whole host of languages.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=78.107) [And they're actually many different ways of defining the binding.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=81.1755) [But I'm just going to point out two key bits of information.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=85.288) [First, here in the Packages section for Functions 2.0,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=88.984) [it tells us which NuGet package contains the binding](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=92.51) [attribute definitions for queue storage bindings.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=96.53320000000001) [And it's Microsoft.Azure .WebJobs .Extensions .Storage.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=100.218) [And we'll be adding that as a project reference shortly.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=105.585) [Also, if we navigate all the way down to the Output section,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=108.51966666666667) [we'll see a series of examples showing us how an Azure](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=113.533) [function can output a message to a queue.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=117.04674999999999) [And the most important detail to notice is that it uses the Queue attribute.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=119.85312499999999) [And the Queue attribute can be applied against a function parameter or to the](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=125.671) [return value of the function as this example is showing.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=129.824) [In this example,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=133.05849999999998) [the string that the function returns will be sent as a](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=134.373) [message to a queue called myqueue-items.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=137.57733333333329) [But I don't want to bind to the return value of my function](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=139.45925) [because I'm using a return value to send the Thank you for your](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=144.22899999999996) [purchase response to the webhook.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=148.04099999999997) [And if we navigate to this Output-usage section,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=150.321) [we can see all the other types that we can bind to.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=153.169) [We can bind to an out parameter of our function,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=157.293) [but that also isn't going to work because our function is asynchronous,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=159.55612499999998) [and that means the C# compiler won't allow us to use output parameters.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=163.926) [But there's another option here called IAsyncCollector of T.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=168.887) [And this slightly oddly named type turns out to be really useful](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=173.969) [for output bindings in asynchronous functions,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=178.12012499999997) [and that's what we're going to be using.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=180.676) [So let's get to the code.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=183.434) [First,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=185.787) [we're going to add the NuGet reference to allow us to use storage bindings.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=186.0567142857143) [I can do that in my csproj file by adding a new package reference to](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=191.063) [Microsoft.Azure .WebJobs .Extensions .Storage,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=195.52) [and it's currently at version 3.0 .3.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=200.235) [Visual Studio Code helpfully suggests that we do a NuGet](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=203.723) [restore to download this new dependency,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=207.16122222222225) [so I'll do that.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=209.13559999999998) [And obviously if you're working with Visual Studio,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=211.542) [then you can use the NuGet Project References window](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=213.694375) [to add this automatically for you.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=216.918) [And now it's time to add the queue binding to our function,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=219.51799999999997) [and we're going to use the Queue attribute to do that.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=224.056) [The Queue attribute has one required parameter,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=227.29399999999998) [which is the name of the queue to write to.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=230.01657142857144) [Here I'm saying that we want to write to a queue called orders.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=233.382) [And the documentation we looked at earlier told us that there were](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=237.716) [many different parameter types we could bind to here.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=240.9041428571428) [But the one I've selected is an IAsyncCollector of type Order,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=243.802) [and this will allow me to send messages to this queue from inside my](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=248.772) [function by calling the AddAsync method on the IAsyncCollector.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=252.72442857142863) [Let's do that.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=257.15425) [And after we've deserialized the incoming order,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=260.08) [we'll send it to the queue with await.orderQueue .AddAsync,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=262.716) [passing in the order.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=266.67099999999994) [And when this method is called,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=270.465) [the queue binding will handle all the work of connecting to the queue for us.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=272.313) [And it will even create the queue on demand for us if it doesn't already exist.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=276.742) [It will also serialize the Order object to JSON before placing it on the queue.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=282.311) [So all the usual boilerplate code that you'd need](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=287.802) [to write to connect to a queue, ensure it exists,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=290.3814444444444) [serialize your message,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=293.669) [and send it has been abstracted away into this very simple syntax,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=294.974) [which is one of the key benefits of using Azure Functions bindings.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=299.0615) [Now you might be wondering how Azure Functions](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=304.895) [knows which storage account to use.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=307.15957142857144) [And the Queue attribute has an optional parameter called Connection,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=310.085) [which lets us identify which storage account to use.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=313.3705) [The value of the Connection property isn't a connection string.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=318.204) [You wouldn't want to put connection strings in your source code directly anyway.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=322.12) [Instead,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=326.497) [it's the name of the application setting that contains](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=326.84785714285715) [the storage account connection string.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=330.19050000000004) [And this means that when you're running in Azure,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=332.4366666666666) [it will use the app setting that we saw when we looked in the](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=335.85149999999993) [portal to resolve this connection string.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=339.39500000000004) [But when you're running locally,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=341.744) [it will find the one stored in your local.settings .json file.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=343.289) [If we delete the connection property,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=348.272) [it will look for a connection string called AzureWebJobsStorage,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=350.435) [which points at the default storage account for our function app.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=352.9874) [If I take a look in our local.settings .json file,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=358.906) [which contains the settings that will be used when we're running locally,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=361.979) [we can see here that there's already an AzureWebJobsStorage](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=366.456) [connection string that got generated for us.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=368.9975) [And it's value, UseDevelopmentStorage=true,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=373.354) [is a special connection string that refers to the Azure Storage Emulator.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=377.388) [The Azure Storage Emulator is a free emulator that's brilliant](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=382.788) [for testing your Azure Functions locally.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=386.27700000000004) [If you've installed the Azure workload in Visual Studio,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=389.766) [then you've already got the storage emulator installed.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=392.53671428571425) [However, it isn't cross-platform.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=396.579) [And so that means if you're developing Azure Functions apps on a Mac or Linux,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=398.883) [then you'll need to use a real Azure storage account.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=403.703) [And we'll do that anyway here just for demonstration purposes to](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=406.2251428571428) [prove that Azure Functions runny locally can connect to a](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=410.724) [storage account running in the cloud.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=414.3740000000001) [I'll jump over to the Azure portal and navigate into my storage account.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=416.58475) [And under Access keys,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=422.614) [I can get hold of the connection string for this storage account.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=424.0953333333334) [So I'll copy that to the clipboard and come back here to my](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=429.335) [local.settings .json file and paste it in.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=433.87042857142865) [And by the way,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=436.70950000000005) [the default gitignore file that gets created for you is set up](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=438.103) [to ignore this local.settings .json file.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=442.24666666666667) [And so this file doesn't typically get stored in source control.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=445.865) [And that's good because it prevents you from checking](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=449.668) [secrets like this into source control.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=452.10474999999997) [But it does mean that you need to fill in the values again if](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=454.639) [you clone the repository to another machine.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=457.6899999999999) [Okay, we're finally ready to test this function.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=460.964) [I'll press F5 to compile our function app and](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=464.485) [launch the Azure Functions runtime.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=468.305) [And once we can see that it's fully started up,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=471.775) [I'll jump across to a PowerShell prompt.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=474.108125) [And once again, I'll use invoke web request to post a new order to our function.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=476.846) [And of course if you are Mac or Linux, you could just use cURL instead.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=482.701) [And I've just changed the order number and product ID for this example.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=487.777) [And we can see that the order has been accepted.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=492.102) [So I'm going to jump back into the Azure portal and take a](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=495.229) [look at that queue in the Storage Explorer.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=498.4040000000001) [If I expand the QUEUES node,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=500.9688571428571) [we can see that here's an orders queue that's been automatically created for us.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=503.603125) [And if I look inside,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=509.892) [we can see that there's one message in the queue](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=510.8242222222221) [that's been serialized into JSON,](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=513.2320000000002) [and its properties match the order that we just submitted.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=515.749) [Great, we've successfully created the first function in our pipeline. Let's recap what we've learned in this module.](https://app.pluralsight.com/course-player?clipId=07e02681-4e47-4be6-80a8-c60131b40cee&startTime=519.5683333333334)

### [Module Summary](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570)

[In this module,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=1.368) [we started off by learning about the supported languages in Azure Functions,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=2.22) [which include C#, F#, JavaScript, and Java with more on the way.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=6.5078) [And we also learned that there are two ways of writing C# Azure Functions,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=13.137) [the C# script file way where you create CSX files that we saw in the](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=17.963) [last module and the precompiled way or the C# library way where you](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=22.617) [compile the function code into a DLL,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=27.455) [and the function.json files get automatically created for you based](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=29.475) [on the attributes you decorated your C# code with.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=34.49071428571429) [And that's the approach we used in this module.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=39.328) [And unless you're just creating short-lived throwaway experimental functions,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=41.801) [I recommend that you always use the precompiled approach for C# functions.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=46.741) [We also used the Azure Functions core tools,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=52.736) [which is an open source cross- platform command line tooling](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=55.287) [experience that allows you to easily create new function](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=60.54540000000001) [apps in a variety of languages.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=63.58471428571429) [And it also simplifies creating new functions by](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=66.187) [providing you with a choice of templates.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=69.19233333333332) [And it's a great option if you're not planning to use Visual](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=72.515) [Studio for developing your function apps.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=75.37666666666664) [And we also saw how Visual Studio Code has got some really](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=78.634) [great Azure Functions tooling support,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=81.899) [and so that's a great option again if you're not using Visual Studio.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=83.53785714285715) [We discussed the broad range of triggers and](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=89.176) [bindings available in Azure Functions,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=91.76816666666667) [and the function we created made use of an HTTP](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=94.254) [trigger and a Queue output binding.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=97.08528571428572) [To indicate in C# that a function has an HTTP trigger,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=100.519) [we apply the HttpTrigger attribute to a function parameter of type HttpRequest.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=104.42933333333335) [And we can specify the authorization level,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=112.039) [they're requiring a function-level code in this example,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=114.995) [and the supported HTTP methods.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=118.83800000000001) [Here's we're supporting post.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=122.223) [And we can specify the route.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=124.586) [And null means to use the default rate.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=127.072) [So this function's rate will be /api/OnPaymentReceived.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=130.234) [To use the queue output binding in C#,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=135.995) [we need to reference the Microsoft.Azure .WebJobs](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=138.366) [.Extensions .Storage NuGet packet and then apply the queue](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=142.24249999999998) [attribute to a function parameter.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=146.625) [And there are several different parameter types that you can bind to,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=149.654) [but we chose to use the IAsyncCollector of T,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=152.81620000000004) [which works well in asynchronous functions.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=156.638) [We called the AddAsync method on it to post a message to a queue,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=160.392) [and it automatically serialized the custom order DTO](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=164.94674999999995) [that we gave it into JSON for us.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=167.88157142857145) [The Queue attribute also allows us to specify the queue name,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=172.173) [which is orders in this example.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=175.47699999999998) [And you can also configure the name of the](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=177.56400000000002) [connection string to the storage account,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=180.20949999999996) [although we're just allowing it to use the default](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=181.8462) [storage account in this example.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=184.61357142857148) [And if the orders queue doesn't exist in the storage account,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=186.985) [this output binding will create it automatically for us.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=190.459) [Now I realize we've not got very far through our demo scenario yet.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=194.932) [We've only created the first function,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=198.882) [which receives the payment web-hook and writes a message to a queue.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=201.174) [In the next module,](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=205.714) [we're going to continue to build our function pipeline by](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=206.805) [receiving the message we posted to a queue and creating a](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=210.05000000000004) [license file in blob storage, as well as sending an email. So join me in the next module to see some more triggers and bindings in action.](https://app.pluralsight.com/course-player?clipId=c9ff932e-7e8a-4146-b4de-e1c967ef5570&startTime=213.279)

## [Building a Function Pipeline](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428)

### [Module Introduction](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428)

[Hi, Mark Heath here.](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=0) [And in this module,](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=2.842) [we're going to continue our look at Azure Functions triggers and](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=4.0515) [bindings by building more of the function pipeline that we](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=7.511) [started to create in the last module.](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=11.040250000000002) [If you remember,](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=14.742) [last module we built a simple web-hook that accepted order](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=15.628500000000003) [details sent to us by a payment provider,](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=19.55933333333333) [and we wrote a JSON message onto a queue whenever that function was called.](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=22.21) [In this module,](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=27.777) [we're going to create the next two steps in the function pipeline,](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=28.422750000000004) [first of all,](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=32.428) [handling that key message by creating a license file and storing it in blob](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=33.32162499999999) [storage and then responding to the creation of that license file by sending an](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=38.14442857142857) [email to the customer with the license file attached.](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=43.018) [We'll also be upgrading our function pipeline to use Azure Table](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=48.047) [Storage as both an additional output of our first function and as](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=51.897499999999994) [an extra input to our last function.](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=57.535333333333334) [In this module, we'll be using the Queue trigger,](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=61.383) [the Blob output binding and Blob trigger,](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=63.524142857142856) [the SendGrid output binding for sending email,](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=66.666) [and the Table Storage input and output bindings.](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=69.86899999999999) [And we're going to be using Visual Studio in this module,](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=74.6) [so you can get to see the tooling support that it has for Azure Functions.](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=77.5006) [We're also going to be learning about some more advanced binding](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=83.088) [techniques by using the IBinder interface.](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=86.19250000000001) [And the function pipeline that we're building is designed to](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=90.269) [demonstrate how you can chain together several small,](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=92.91314285714286) [single-purpose functions,](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=96.639) [which is a much more reliable and maintainable way than having one giant](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=97.50266666666666) [long-running function that tries to do everything. So let's get started by building the function that listens on a queue.](https://app.pluralsight.com/course-player?clipId=14f6d431-3051-40d7-9498-617357750428&startTime=103.06949999999999)

### [Demo: Queue Trigger, Blob Output](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c)

[In this demo,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=1.291) [we're going to listen on a queue for a message containing details](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=2.0106666666666664) [of incoming orders and create license files,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=5.800285714285714) [which we're going to place into a blob storage container.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=9.623) [Let's see how we can do that.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=12.336555555555554) [We're going to be using Visual Studio for the demos in this module.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=15.597) [If you've got Visual Studio 2017 or newer with the Azure workload selected,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=19.607) [then you're already good to go.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=25.331) [And you can check if you've got it set up correctly simply by going to File,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=27.466) [New project, selecting the Cloud category,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=31.883) [and seeing if the option to create an Azure Functions app is offered.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=35.828) [And here you can see that it's available.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=40.103) [But we're actually going to carry on working on the project that we created](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=42.571) [in the last module with the Azure Functions core tools.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=46.09000000000002) [So I'm going to cancel out of this dialog,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=48.986000000000004) [and we're going to use the File, Open dialog to open an existing project.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=51.52125) [If I navigate to that project that we created in our last module,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=57.407) [we can select the csproj file.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=60.64949999999999) [And when it loads,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=63.243) [we can see our function app complete with the](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=65.387) [OnPaymentReceived function that we already created.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=68.3356) [If you remember, this had a queue output binding,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=71.5692) [which allowed us to send a message to a queue.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=75.899) [So now we're going to create a queue- triggered](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=79.163) [function to receive that message.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=81.4975) [I'll navigate to Project, Add New Item, and select Azure Function.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=84.605) [And we'll call this function GenerateLicenseFile.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=90.949) [And I'm going to select a queue trigger template.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=96.304) [The connection string setting we're going to use is AzureWebJobsStorage,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=100.32) [which is the default value.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=104.07571428571427) [And I'm going to set the queue name to orders.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=106.2035) [So let's create this function now.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=111.112) [I'm going to reformat the code a little bit just so we can see it.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=115.151) [And we can see that our Queue attribute is bound to a string parameter.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=119.586) [Now our queue message contains a JSON serialized order object.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=124.365) [So let's update this parameter to be of type Order,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=129.415) [and we'll also rename it to order.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=132.53966666666665) [Another thing I'm going to do is jump back into my local.settings .json file,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=136.63) [and we're going to update the value of the](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=142.232) [AzureWebJobsStorage connection string.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=144.008) [Remember, this setting is only used when we're running locally.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=147.433) [When we run in Azure,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=151.979) [we're going to pick up the value of this connection string from an app setting.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=153.11622222222223) [And in the last module,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=157.062125) [you might remember that we set this to a real connection](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=158.834) [string for an Azure storage account.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=161.5475) [So we could test this without needing to use the Azure Storage Emulator.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=164.186) [But since we're running in Visual Studio,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=168.772) [which means we have got the Azure Storage Emulator available,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=170.984) [I'm going to update this to use the connection string for the emulator,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=173.65033333333332) [which is UseDevelopmentStorage=true.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=178.575) [Let's head back to our GenerateLicenseFile function,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=182.942) [and we'll add a blob output binding.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=186.07737500000002) [I'm going to paste in the definition for the binding here,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=189.699) [and the attribute that defines the binding is a blob attribute.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=192.50414285714285) [We're binding to a parameter of type TextWriter,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=197.473) [and there are actually multiple types that we could bind to here](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=199.95966666666666) [depending on whether it's an input or an output binding.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=204.13587500000008) [Since this is an output binding, which means we're going to be creating a blob,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=207.782) [and we're writing text to that blob, then a TextWriter is a good choice here.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=211.80337500000002) [But if we take a quick look at the documentation,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=218.208) [you can see there are many other choices for a blob output,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=219.9347142857143) [including Stream, which you might use for writing binary data into your blob,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=224.417) [and also CloudBlockBlob,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=229.934) [which gives you the flexibility to set the blob's metadata if you need to.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=231.105) [Now we're not using a blob input binding in this example,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=236.17519999999996) [but you can see that a similar variety of choices is available.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=240.606) [For example, if you choose string for a blob input binding,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=244.644) [then the entire contents of the blob would be read into that string.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=248.19299999999998) [But you could also get it as a byte array if,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=252.45455555555554) [for example, it contained binary data.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=255.5843333333333) [Back here in our code,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=258.952) [I also want to point out that the Blob attribute takes a](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=260.0879999999999) [parameter that specifies the blob name.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=263.586) [In this case, I want it to go into a blob storage container called orders,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=267.371) [which is going to be created on demand for us.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=272.221) [And for the filename, we know we're generating a license file.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=275.134) [But what name should we give it?](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=278.858) [For now,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=281.239) [I'm just showing how we can use a special syntax that lets me make use of a](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=281.65439999999995) [random GUID by using this rand-guid in curly brackets notation.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=286.15) [And then after that, I'm putting the extension I want.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=291.655) [And we'll see how to improve on this naming code a bit later on.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=294.121625) [Next, I'm going to paste in some code that actually writes to our blob.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=299.658) [We're creating a license file that we're going to email to the customer,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=304.635) [and so it's just going to be a text file containing details of their order,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=307.8640000000001) [their email address, and so on.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=312.295) [Often in a license file,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=315.027) [there's a special code that we can use to prove that this is a genuine customer.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=316.42887499999995) [So I've just created a very simplistic hash of their](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=320.889375) [email address as a secret value, which is fine for demo purposes.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=324.49857142857144) [But of course a real-world application would maybe use a more](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=329.385) [secure license code generation algorithm.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=333.33925) [And I've noticed that I didn't give the blob the extension I intended to,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=336.397) [so let me fix that up to .lic.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=340.10699999999997) [And while I'm hear, licenses would actually be a better name for the container.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=344.333) [So let me change that as well.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=348.717) [Great, we're ready to test this now.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=351.288) [So I'm going to build and run my function app.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=353.165) [It will take a moment to start up.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=356.23) [But once it's ready,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=358.453) [we're going to be able to submit another order using](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=359.40544444444436) [PowerShell just like we did in the last module,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=362.92683333333326) [and this is going to test our pipeline end to end.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=365.613) [We're going to be calling the OnPaymentReceived HTTP-triggered function,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=368.05375) [which posts the message to the queue.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=372.919) [And then our new GenerateLicenseFile queue- triggered method](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=375.122) [should pick that up and write to blob storage.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=378.51457142857146) [And it looks like that worked.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=382.395) [So if we take a quick look at the functions runtime output,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=384.215) [we can see that not only did our OnPaymentReceived function run successfully,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=387.20975) [but our GenerateLicenseFile method has also run.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=392.3845) [I'm going to use the free Microsoft Azure Storage Explorer tool to look inside](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=398.185) [the storage account and see what's in the licenses container.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=402.8944285714284) [This tool is great for exploring Azure Storage accounts,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=406.39028571428565) [but it also allows me to look inside the local storage emulator](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=410.964) [account if I navigate to Local and Attached,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=414.49899999999997) [Storage Accounts, Emulator, Blob Containers,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=419.299) [then we can see our licenses container.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=422.99614285714284) [And notice that this licenses container automatically got created.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=426.4866666666666) [And in here, we have a blob with a .lic extension and a GUID filename.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=432.513) [I'm going to download that license file.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=439.589) [And once it's downloaded, if I load it up in a text editor,](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=444.128) [we can see here that sure enough our license file has been successfully created and contains the details that we expected.](https://app.pluralsight.com/course-player?clipId=e1bb7cec-a55e-4fb8-a353-0fa03a10eb1c&startTime=447.5356)

### [Queue Trigger, Blob Output Recap](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95)

[Let's quickly recap the bindings we used in the last demo.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=1.34) [We used a queue trigger so we could respond to a new order](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=5.183666666666667) [message in a queue and a blob output binding so we could](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=9.222444444444443) [write a license file to blob storage.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=13.481625000000001) [To use the queue trigger in a function,](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=16.839) [we added the QueueTrigger attribute and specified the name of](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=19.191) [the queue we wanted to monitor for messages.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=22.997) [We were also able to provide the name of an application](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=26.354) [setting that contained the connection string to the storage](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=28.5034) [account that this queue was in.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=32.07083333333334) [And for local testing,](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=34.027) [we chose to use the Azure Storage Emulator so the connection](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=35.126111111111115) [string's value was UseDevelopmentStorage=true.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=38.883) [And in our example,](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=44.18) [the QueueTrigger binding was applied to a parameter of type Order,](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=45.609) [which means that when the message is read off the queue,](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=49.06671428571428) [it's assumed to be a JSON serialized order.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=52.374) [And so the binding automatically attempts to](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=56.153) [deserialize the message into an Order object.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=59.055125000000004) [Then we set up a blob output binding, which we used the Blob attribute to define.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=62.92) [A Blob attribute requires us to specify the name of](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=68.616) [the blob that we're writing to.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=71.86224999999999) [And we made use of a special syntax that lets us use](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=74.164) [a random GUID as the filename, and we put it in a container called licenses.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=77.13966666666666) [And in a bit, I'll be showing you other ways that we can control the filename.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=82.373) [And just like we could with the QueueTrigger,](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=87.033) [we can also supply the name of an application setting that](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=88.48528571428571) [contains the blob storage connection string.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=92.31914285714288) [We bound it to a TextWriter,](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=95.555) [which is a great choice if we want to write a text file.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=97.07300000000001) [And anything we write to that TextWriter gets](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=100.922) [written to the blob in blob storage.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=103.555625) [But you don't have to use a TextWriter.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=106.381) [As we saw in the documentation,](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=108.733) [there are several supported types that the binder will](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=110.419) [connect to making it easy to create JSON,](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=112.8975) [plaintext, or binary blobs depending on your requirements.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=115.90266666666668) [So we've completed the first two steps of our Azure](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=121.651) [Functions order processing pipeline.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=125.307) [We've got the payment web-hook posting to the queue and](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=127.477) [our new function receiving from that queue and creating a](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=130.4632857142857) [license file in blob storage.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=134.10925000000006) [So next up, when that license file is created,](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=136.06100000000004) [we want it to be automatically emailed to the customer. So let's do that next.](https://app.pluralsight.com/course-player?clipId=e772ba4d-0060-4c89-84f3-650f9ed90b95&startTime=139.571)

### [Demo: Blob Trigger, SendGrid Output](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a)

[In this demo,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=1.344) [we'll be creating the third step in our ordering processing pipeline.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=2.2357500000000003) [When the previous function creates a license file in blob storage,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=7.109) [we'll trigger a new Azure function that emails the license file to the user.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=10.93) [Let's head into Visual Studio and create our new function.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=16.342) [As before, we're going to create a new function by selecting Project,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=21.045) [Add New Item, Azure Function.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=25.625) [And we'll name this function EmailLicenseFile.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=29.688) [Next, let's select the template.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=32.073499999999996) [This function will be triggered by a blob being](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=37.166) [created in the licenses container.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=39.334) [So we'll choose the Blob trigger.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=41.679) [And for the connection string setting,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=43.989) [we'll again use the default value of AzureWebJobsStorage.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=45.657) [And we'll set the path to simply licenses,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=50.306) [which is the name of the container that we're watching for new blobs.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=53.601) [So let's accept this and take a look at the function that gets created for us.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=57.995) [Here we can see that it has the BlobTrigger attribute,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=63.597) [and the path has been expanded automatically for us to licenses/name.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=66.0657142857143) [And this name in curly bracket syntax simply allows us to easily get the](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=73.612) [actual name of the blob as another function parameter.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=78.37662500000002) [Although in our case,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=82.081) [it doesn't really matter as we don't need to use](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=82.98042857142859) [the blob name for anything here.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=85.29922222222223) [It's bound to a Stream parameter.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=88.059) [But in our case, it would be more useful as a string.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=90.426) [So I'll make that change, and I'll call it licenseFileContents.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=92.99400000000001) [Let's quickly jump into the documentation,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=99.394) [and we're on the blob storage bindings page here.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=102.116) [And it tells us that we can bind to a byte array,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=105.754) [which would be good if our blob contains binary data,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=107.7675) [or to a string if the blob contains a text file,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=110.71733333333334) [which is perfect for our needs.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=114.54762500000001) [But you can also see we can bind to a string,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=116.28020000000002) [which is great for large files that we don't want to read entirely into memory.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=119.33411111111108) [And we can use ICloudBlob and its derived types,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=123.8065) [which would be great if our incoming blobs contain](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=127.6615) [metadata that we needed to access.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=130.7768571428571) [Great, what do we need to do inside this function?](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=133.44337500000003) [Well, we actually want to email this license file to the customer.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=138.818) [So we need to know who the customer is.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=143.113) [For now,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=145.99) [I'm going to extract the customer email address out of](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=146.52100000000002) [the license file with a simple regex.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=149.45199999999997) [But we'll improve on this later on in the module.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=151.81975000000003) [Now how we can actually send an email from an Azure function?](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=156.26) [To do that, we're going to use the SendGrid binding.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=159.98049999999998) [SendGrid is a third party service that supports sending emails,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=164.175) [and it has a binding extension for Azure Functions.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=167.28314285714288) [And all the Azure Functions triggers and bindings with the exception of HTTP](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=172.127) [triggers and timer triggers are defined in NuGet packages.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=176.605) [So let's go to Project and Manage NuGet Packages.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=180.05374999999998) [And we'll search the NuGet repository for NuGet packages whose name](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=185.521) [starts with Microsoft.Azure .WebJobs .Extensions.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=189.3996666666667) [And, as you can see, there's quite a lot.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=195.227) [We're already using the storage extension.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=198.358) [But you can see there are multiple services that we can integrate with.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=201.281) [In our case, we're looking for the SendGrid extension.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=205.318) [So I'm going to select that and install it.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=208.648) [And so once we've accepted the license and it's finished installed,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=212.969) [we can head back to our function code.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=216.67299999999997) [And I'm going to add a new parameter to our EmailLicenseFile function.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=220.74) [I'll just paste it in, and we need to add a few using statements,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=226.2) [which Visual Studio will helpfully automatically fill in for me.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=230.2035) [We're using the SendGrid attribute,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=234.921) [and we're binding to an object of type SendGridMessage.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=237.286) [I've made this an out parameter.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=240.01842857142856) [And so in the body of the function,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=244.029) [we're going to need to create a new SendGrid message.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=245.861) [And we're able to use an out parameter because this](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=248.31324999999998) [function is not asynchronous.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=252.6255) [If it was,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=254.708) [we'd have to specify this parameter as an IAsyncCollector of SendGridMessage,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=255.39087499999997) [similar to the technique that we used to post to a queue in](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=259.5706) [a function earlier on in this course.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=263.60989999999987) [You'll notice as well that we need to provide an API key.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=266.617) [But, of course, this isn't the actual API key itself.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=269.65957142857144) [Instead,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=273.939) [it's the name of an application setting that contains the SendGridApiKey.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=274.2677142857143) [And that allows us to keep the secret key out of source control.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=280.533) [Of course, when we're developing locally,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=284.768) [I will need to put my SendGripApiKey into my local.settings .json file,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=286.981) [but that's a file that you typically don't check into source control.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=291.8195714285714) [In the body of our function,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=296.38514285714285) [all we need to do is create a new SendGridMessage object and configure it.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=298.44579999999996) [And I've pasted some code in here that does exactly that.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=304.618) [And it sets up who the email is from and to,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=307.56111111111113) [and the recipient of this email is going to use the customer email](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=311.698888888889) [address that we passed from the license file contents.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=315.769) [And we're adding an attachment that contains the license file itself.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=319.10166666666663) [We do need to base64-encode it first, so that's what these two lines are doing.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=324.755) [Finally, we're setting the subject and content of the email,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=330.084) [and that's all there is to it.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=333.0535) [By the way, just in case you're wondering what these little parameter labels are,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=335.1044) [this is actually a nice feature that comes from a Visual](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=339.95099999999996) [Studio extension called Resharper.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=343.4955714285713) [And I think it's actually quite helpful for understanding code because we can](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=344.92999999999995) [see what each of the parameters of a method call actually are.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=349.5667777777778) [So I've left it on here.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=353.496) [You'll notice here that I've not hardcoded the EmailSender.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=356.223) [Instead, I've asked for that to come from an environment variable.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=359.087) [And that's a really easy way of accessing application settings in your code.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=363.965) [All of your application settings will appear as environment variables.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=368.764) [So it makes them very easy to access.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=373.203) [Let's jump into our local.settings .json file so that we can configure](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=376.929) [the settings that are needed for testing locally.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=381.29) [I need to add an EmailSender and a SendGridApiKey.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=384.986) [And if you're trying to follow along with these demos,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=388.15383333333335) [then you do need to create a SendGrid account to get your own](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=392.23737499999993) [key as I'm not going to be showing you mine.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=395.8202) [But there is a free trial option.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=398.37811111111114) [So you shouldn't have to pay to try this out.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=401.434) [And we'll be learning later on in this course how you can automate](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=404.897) [setting values like this on your function apps running in Azure](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=408.2934285714286) [without having to go into the portal and setting them manually in](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=411.64487499999996) [the applications settings view.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=415.3334999999999) [Great, I'm going to put in my real SendGridApiKey now.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=418.464) [And once I've done that, we're ready to test this.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=421.231) [So I'm going to build my code and start the Azure Functions runtime app.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=425.544) [Once again, we're going to test our whole function pipeline end to end.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=430.986) [I'm going to call my OnPaymentReceived function in the same way that](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=435.142) [we've been doing throughout this course from PowerShell.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=437.9450000000001) [But this time, I do need to make sure that I provide a real email address.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=440.947) [So I'm just going to send this to myself.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=444.97) [When we send this payment web-hook, that's going to post a message to a queue,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=447.693) [which will create a license file in blob storage,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=452.157) [which triggers our new function and causes an email to be sent.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=454.3106666666667) [And if we take a quick look at the log output from](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=459.697) [the local Azure Functions runtime,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=462.29566666666665) [we'll see that our EmailLicenseFile function has been called.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=463.97360000000003) [And soon enough in my email inbox,](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=469.913) [I'll get an email through that contains an attachment.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=472.459) [And if I look at that, I can see the contents of the license file generated in blob storage.](https://app.pluralsight.com/course-player?clipId=8617315a-bbd8-4b41-9445-c791e9d80d8a&startTime=476.181)

### [Blob Trigger, SendGrid Output Recap](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9)

[Let's quickly recap what we learned in the last demo where we used a blob](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=1.432) [trigger to trigger our function whenever a new license file was created in blob](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=5.482222222222222) [storage and a SendGrid output binding to send an email.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=10.206000000000003) [To create a blob-triggered function,](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=14.435) [we used the BlobTrigger attribute and specified the](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=16.253) [name of the blobs we wanted to match.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=19.287750000000003) [In our case, it was blobs in the licenses container,](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=21.604999999999997) [which had the .lic extension.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=25.332142857142856) [And we used this special syntax to take the filename of the blob and to put it](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=28.51) [into another function parameter that had the name orderId.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=33.15022222222224) [The blob attribute was applied to a string,](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=36.547) [meaning that the contents of that blob would be read](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=39.96300000000001) [out and written into that string.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=42.72055555555558) [And that worked great for us as our blobs contained](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=45.53) [text and weren't particularly large.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=48.24516666666666) [But we saw that you could bind to several other parameters besides string.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=51.661) [You can bind to a custom object if your blob contains a JSON serialized](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=56.532) [version of that object just like we saw with the queue trigger.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=60.705000000000005) [You can bind to a string,](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=65.032) [which is really great for large binary blobs that you](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=66.42266666666667) [don't want to load entirely into memory.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=69.26874999999997) [And you can bind to a CloudBlockBlob,](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=72.747) [which is useful if you also want to access the blob's metadata,](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=74.788) [as well as its contents.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=78.45275) [And there are other options available too.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=80.839) [We also saw how to use the SendGrid output binding for](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=83.41) [which we used the SendGrid attribute.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=87.11428571428571) [We needed to provide an ApiKey, which was stored in our function app settings,](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=89.78) [and then we simply needed to assign a SendGridMessage object to our](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=94.31214285714285) [message parameter in order for it to get sent.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=99.001) [And SendGrid is just one of many examples of really easy-to-use](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=102.986) [integrations with third party services in Azure Functions.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=107.17879999999998) [For example, if we wanted to send a text message,](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=111.723) [we could've done that just as easily by using the Twilio binding.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=113.75842857142857) [Now you might be wondering, what if I don't want to use SendGrid for my emails?](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=118.468) [Maybe you're using a rival email-sending service or you have your](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=123.185) [own email server you want to connect to directly.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=126.70625) [The important thing to remember is that you don't have to use output bindings.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=129.974) [There's nothing stopping you just writing the code to directly](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=134.9) [call whatever external services you need to communicate with](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=138.27528571428576) [from within your Azure function.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=142.03685714285706) [Output and input bindings are just provided for convenience.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=144.827) [They make it really quick and easy to connect to other services.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=148.57685714285714) [But if the service you need isn't supported,](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=153.378) [or if the existing bindings are too limited for what you need to do,](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=155.47585714285714) [then feel completely free to ignore the bindings](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=160.21) [and just write the code yourself.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=162.61314285714286) [Great,](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=165.5) [we've successfully created the three functions we set out](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=165.92866666666666) [to build at the start of this module.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=169.12266666666665) [But we're not quite done yet.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=171.5956666666667) [In the next demo,](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=173.915) [we're going to see how we can also store details of our incoming order in Azure Table Storage.](https://app.pluralsight.com/course-player?clipId=b16048e1-6e05-4081-974e-f261f638c0f9&startTime=174.6654)

### [Demo: Table Storage Output](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513)

[The Azure Functions pipeline that we've created so far takes us all the way](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=1.296) [from receiving a payment web-hook to emailing the user.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=5.389333333333332) [But we've still not stored the fact that we made a sale in a database.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=8.902999999999999) [And we'd probably want to do that in a real-world application.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=14.028) [So how can we achieve that with Azure Functions?](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=17.516) [Well, there are some database bindings that we can use,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=21.087) [including Azure Cosmos DB if you want a document database or Azure Table](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=24.6335) [Storage if you just want something very lightweight and cheap.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=29.696) [Unfortunately, there is no Azure SQL database binding at the moment.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=33.999) [Of course,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=38.758) [it's still possible just to use Entity Framework from inside your own functions,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=39.24575000000001) [but you would need to bring your own model classes along.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=42.93875) [So it can be quicker and easier to use one of the supported](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=46.841) [bindings if that fits with your requirements.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=49.86549999999999) [For our next demo,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=53.9) [we're going to add an additional output binding to our payment web-hook.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=54.828888888888876) [And it's completely fine to have multiple output bindings in a function.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=59.891) [Although if the number of output bindings gets too high,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=64.473) [that's probably a sign that your functions are breaking](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=67.14474999999999) [the single- responsibility principle.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=70.34799999999998) [But we're going to add a table storage output binding](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=73.57) [to our payment web-hook function.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=76.38857142857142) [Every sale we make will result in a new row in Azure Table Storage,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=79.175) [as well as sending a message to a queue to trigger license file generation.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=83.56) [And both of these options are going to be very quick to execute.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=87.86500000000001) [So I'm not particularly worried about the extra](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=92.395) [output slowing down our web-hook.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=94.75483333333334) [And the reason I've chosen table storage over a more powerful,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=97.689) [fully featured database like Cosmos DB is simply because](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=101.715) [we've already got a table storage account.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=105.48257142857142) [And the local storage emulator also supports emulating table storage.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=107.80833333333332) [And so this is just going to make it really easy for us to test,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=113.14) [and you'll be able to follow along easily if you're](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=115.90350000000001) [trying out these demos yourself.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=118.62328571428574) [First, in our OnPaymentReceived function, let's add a new output binding.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=121.59) [It will be almost identical to the queue output binding.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=127.139) [We'll use the Table attribute,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=130.275) [and the Table name is also going to be orders just like the queue name was.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=132.384875) [Again, we'll use the IAsyncCollector so that when we call the AddAsync method,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=138.312) [we'll add a row to table storage.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=143.732) [And I've even reused the same order type here.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=146.665) [Now that is a little bit of a shortcut.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=150.377) [In a real-world application, you might have several DTO classes,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=152.978) [one that represents the incoming web-hook payload,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=156.2385) [one that holds the data we want to be serialized onto the queue,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=159.753) [and one that represents the data we want in our database.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=162.96242857142857) [But since in our example all three hold basically the same information,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=167.301) [I'm just reusing the same class to cut down on code.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=171.502) [However,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=174.8468888888889) [I will need to add a couple of properties to the Order object](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=175.22433333333336) [to allow it to be stored in table storage.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=179.73250000000007) [Table storage actually uses a composite key.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=182.945) [Every row has got a PartitionKey and a RowKey,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=186.151) [and a row in table storage can be uniquely identified](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=188.759) [by the combination of these keys.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=192.42666666666668) [So in our code before we add the Order object to table storage,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=195.2237777777778) [I need to set up these properties.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=200.619) [I'm hardcoding the partition key to orders just to](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=203.771) [keep this example really simple.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=207.03342857142854) [But in a real-world system, if you had potentially millions of orders,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=209.297) [then you would want to spread them across more than](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=212.856) [one partition for efficiency.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=215.67933333333335) [And for the RowKey, I'm just using the OrderId.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=217.77) [And now just like we did with the queue,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=221.937) [we can add the order to table storage with AddAsync on the IAsyncCollector.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=223.875) [Now this function, which has an HTTP trigger,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=230.463) [has two output bindings, queue output binding and a table storage output binding,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=233.47840000000002) [and that's absolutely fine.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=240.0776666666667) [Every Azure function must have exactly one trigger,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=242.271) [but it can have zero or more bindings.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=245.41144444444444) [Usually, you wouldn't have more than one output binding.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=248.887) [But I did want to show that it's possible to have more than one.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=251.135) [So let's try this out now.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=256.192) [I'm going to start up the local functions runtime in the usual way,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=258.264) [and we'll wait for it to start up.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=262.24474999999984) [And, again, I'm going to use the same technique as before to test the function.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=265.78342857142866) [I'll use PowerShell to post to the HTTP- triggered function.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=270.5) [And this is the function that is now going to both send a message to the](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=273.87299999999993) [queue and add a row to our table storage order database.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=278.74629999999996) [And it looks like everything's worked fine.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=284.142) [So if we take a quick look at the log output from the Azure Functions runtime,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=286.779) [we can see that everything looks good here too.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=291.254) [Our functions pipeline has been successfully executed.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=294.465) [Let's prove this worked by loading up the Azure Storage Explorer again.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=299.073) [And sure enough, if we navigate into the node for the local storage emulator,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=304.345) [we can see that there's now an orders table,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=308.963) [which got created automatically for us.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=311.62271428571427) [And you can see here that there's a row with a](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=315.143) [Partition and RowKey as we expected,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=317.885) [as well as columns for all the other properties of my Order object,](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=320.474) [which also got created automatically.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=324.207) [So this is a super easy way for you to save data from an Azure function into table storage with the use of an output binding.](https://app.pluralsight.com/course-player?clipId=3ecbb1c2-ad3c-4e1a-b0cb-e7357e949513&startTime=327.431)

### [Table Storage Output Recap](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074)

[Let's quickly recap how we added an additional output binding to](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=1.347) [our function to add a row to table storage.](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=5.306333333333334) [It was very straightforward to add the additional output binding.](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=9.099) [We just added a function parameter with the Table attribute,](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=12.734) [and we specified the name of the table we wanted to use.](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=15.982714285714287) [We bound to an IAsyncCollector of type Order,](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=21.065) [which allowed us to add a new row to table storage simply by](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=23.8175) [calling AddAsync on the IAsyncCollector.](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=28.41885714285715) [And the IAsyncCollector of T interface allowed us to](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=32.388) [easily add a row in table storage,](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=35.382333333333335) [and it meant that we could pass in a strongly typed object,](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=37.11855555555555) [and the binding would automatically create a column in the](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=40.82299999999999) [table storage row for each property.](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=44.605) [But it did mean that we needed to add two special](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=47.873) [properties to our Order object,](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=50.713166666666666) [a RowKey and a PartitionKey because together they form the](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=53.199) [unique key for each row in table storage.](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=57.486000000000004) [So this is what our pipeline looks like now.](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=61.571) [We've upgraded it to write a row to table storage.](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=63.968) [But before we wrap up this module, I want to make a few final improvements,](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=67.41) [including using our first input binding,](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=72.338) [which is going to let us access the data that we've just stored in table storage.](https://app.pluralsight.com/course-player?clipId=6194e6e2-7a79-436b-b807-ac32ebb04074&startTime=75.086)

### [Demo: IBinder and Table Storage Input](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75)

[We've successfully achieved what we set out to do in this module,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=1.444) [which was to create a pipeline that receives a payment web-hook,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=4.722500000000001) [generates a license file, emails it to the customer,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=8.527) [and stores it in a database, in our case table storage.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=11.446857142857143) [But there are a few things I don't like about our code,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=16.926) [and maybe you spotted some of these issues as we worked through the examples.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=19.386375000000005) [And the first issue is when we create the license file,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=24.727) [the filename we gave it consisted of a random GUID.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=27.24328571428571) [Wouldn't it be nicer if the license file was named by something](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=31.283) [like the order number so it was order number .lic.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=34.207571428571434) [And in this demo,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=38.655) [I'm going to show how we can use the IBinder interface to take control of the](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=39.381) [filename of the license file we create in blob storage.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=44.22675) [The second issue is when we email out the license file,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=48.674) [we're working out who to send it to by pausing the contents](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=51.359249999999996) [of the license file from blob storage.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=55.332750000000004) [And that's a bit ugly,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=58.845) [and it assumes that the license file actually contains the email address.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=59.835) [Wouldn't it be better if we could look up the email address of](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=63.07025) [the order from our table storage database.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=66.60025) [And we can do that by using our first input binding so that our license](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=70.475) [emailing function is not only triggered by blob storage,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=74.7803333333333) [but also uses our orders table storage table as an input that we can](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=78.07571428571428) [query against to find the customer email address.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=83.51155555555559) [And the third issue we're going to address is that it might be](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=87.89) [a bit annoying that we always have to send an email every time](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=90.44950000000001) [we test our function out locally.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=94.13655555555555) [So I'll show you how by switching to use the ICollector of T interface,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=96.692) [we can make email sending optional.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=100.46737499999998) [Great, let's tackle our first issue.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=104.369) [In the GenerateLicenseFile function,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=106.771) [which has got a queue input and a blob output,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=109.186) [I want to take full control over the output blob filename.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=111.47725) [And we've currently got a TextWriter parameter called outputBlob,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=116.62) [and it currently uses a path of licenses/random- guid.lic.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=120.391) [How can we ask it to use the order number instead?](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=126.771) [Well,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=130.691) [what we can do is defer the binding until we know what filename we want to use.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=130.975) [I'll get rid of the TextWriter outputBlob parameter and](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=136.957) [replace it with a new parameter of type IBinder,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=139.83614285714285) [which I'll just name Binder.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=142.83185714285713) [And now I'll paste in a small code snippet to show how we can use this.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=144.84877777777777) [I am also going to need to make this function asynchronous](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=151.77) [because we've used the await keyword.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=154.062) [And that's easy enough to do.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=156.75042857142856) [I replace void with async Task and make sure I add in the appropriate namespace.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=159.15055555555554) [What we're saying here is the outputBlob is the result of binding to a](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=166.08) [TextWriter and passing in a BlobAttribute that has the exact filename](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=171.48375) [we want including the container name.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=175.94299999999998) [So it's going to be the licenses container,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=178.24875000000003) [and the filename will be the order number,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=180.91400000000002) [which we know from the incoming queue message with a .lic extension.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=183.8597777777778) [We're also specifying the name of the app setting that](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=190.087) [contains the storage account connection string.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=192.77266666666665) [In our case, it's just the default, which is AzureWebJobsStorage.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=195.3044) [The great thing about the IBinder interface is that it can be](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=201.302) [used for any binding that has a parameter value that we don't](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=205.21449999999996) [know the value of until runtime.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=208.41500000000008) [When we call BindAsync on the IBinder,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=211.623) [we need to provide two bits of information.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=214.537) [The first is the binding attribute that normally would've](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=217.713) [been part of our function signature.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=220.53875) [In this example, it's a BlobAttribute.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=223.199) [But this technique would also work for any other binding attribute,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=225.913) [such as a QueueAttribute or a SendGridAttribute.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=229.56550000000001) [Because we're constructing the attribute in the function body,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=234.802) [we've got complete freedom to calculate the attribute parameters on demand.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=238.16949999999997) [So not only could we customize the blob path parameter like we're doing here,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=243.0175) [but we could dynamically switch between different storage](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=248.9747142857143) [account connections as well if we wanted to.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=252.28979999999999) [The other piece of information we provide is the type we're binding to.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=255.997) [In this case, we're binding our BlobAttribute to a TextWriter.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=260.231) [But as we saw in the Azure Functions documentation,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=265.243) [most binding attributes support binding to a variety of different types.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=267.91999999999996) [So again,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=273.919) [you'd have the flexibility to pick the most appropriate one on](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=274.595) [demand in your function code if you needed to.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=278.3662500000001) [And this flexibility makes the IBinder interface a very](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=282.009) [powerful way to customize your Azure Functions bindings to](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=285.5852857142857) [work just the way you need.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=289.3858571428572) [So now our license file uses the filename that we want.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=292.318) [Next, let's update our EmailLicenseFile function to make sending emails optional.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=296.00300000000004) [If you remember,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=301.47920000000005) [we used an out SendGridMessage parameter for the SendGrid binding.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=303.191) [But quite often, if I'm testing, I might not want to always send an email.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=308.423) [So I'm going to change this to an ICollector of](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=312.922) [SendGridMessage and call it sender.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=315.67942857142856) [And ICollector is basically the same as IAsyncCollector,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=319.173) [just it's a non- asynchronous version.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=321.63120000000004) [I'll need to create a new variable to hold the message object.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=325.878) [And finally,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=329.6844) [we'll only send the email if the email address doesn't end with test.com.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=330.934) [So that's two of our issues resolved.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=337.431) [Let's also make the final change.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=339.565) [I don't want to have to pass the licenseFileContents with a regular expression.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=342.048) [Instead,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=347.389) [I'd like to look up the order in the database and use that](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=347.6497777777778) [to find out what the email address is.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=351.3932222222223) [And this is where a table storage input binding can help us.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=354.925) [First of all,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=358.96) [I'm going to make use of the fact that now we can get the](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=359.42679999999996) [order number from the license filename.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=362.6735555555557) [Let's change the BlobTrigger attribute to say that we're](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=365.862) [interested in blobs in the licenses container that have a](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=368.53675) [name in the form orderId.lic.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=371.6529999999999) [And that means we also need to update the name parameter to be orderId and](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=374.27642857142854) [update our email attachment name to make use of the orderId.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=381.657) [And we'll also update this log message to show the orderId.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=388.112) [And now I'm going to paste in a new function parameter that's going to](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=391.850375) [perform the lookup of the order in our table storage database.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=397.6912222222222) [The binding type is a Table attribute binding,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=402.648) [and we're saying that we want to look in the table called orders for a](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=405.32737499999996) [row with a PartitionKey who has a value of orders because remember](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=409.78722222222206) [that's what we hardcoded it to and a RowKey that matches the orderId](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=413.37350000000004) [we extracted from the blob name.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=418.4425) [And this binding is applied to an object of type Order.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=421.171) [And that means that we can now get the email address directly](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=424.43766666666664) [from the order that we found in table storage.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=428.2298571428572) [So I can delete this ugly regular expression and](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=431.729) [replace it simply with order.email.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=434.73028571428574) [And, of course,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=438.011) [now we've got access to other useful information about this order,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=438.53600000000006) [which we might want to use to construct a more personalized email message.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=441.874) [Now you might be thinking, well,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=447.286) [wasn't that rather convenient that the blob filename just](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=448.959) [happened to contain all the information needed to perform](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=451.6114285714286) [the table storage lookup.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=454.9833333333333) [Maybe in a real-world application it would be a bit more complicated than that.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=456.6733333333333) [Well, we could, of course,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=462.047) [have used the IBinder here as well and bound the table](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=463.21387500000014) [attribute after we'd worked out what the Row and PartitionKey](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=467.121) [we needed to perform the lookup were.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=470.5311428571429) [So there really is quite a lot of flexibility available to you if your Azure](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=473.07450000000006) [functions need to perform some kind of database lookup.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=477.9668571428571) [Great, we've changed quite a few things here.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=481.932) [Let's make sure that it still works.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=484.208) [I'm going to start up the local functions runtime again and](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=487.389) [check that everything still builds correctly.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=490.21999999999997) [And once the Azure Functions runtime is running,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=494.18) [we're going to go back to PowerShell again to test our pipeline.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=496.3877142857143) [This time I'm going to say that the buyer has an](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=501.629) [email address ending in test.com,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=504.2064285714286) [so it won't actually keep spamming my personal email inbox anymore.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=506.565) [And I'm going to be using an order number in this example of 555,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=511.125) [which we'll need to look out for later.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=514.4898888888889) [And everything seems to have worked.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=517.4032857142857) [So let's check the log output.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=520.0123333333335) [Here we can see a message from the EmailLicense function showing us the](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=522.683) [email address that it looked up in table storage and the Order Id that it](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=526.2395) [matched from the new filename in blob storage.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=530.676666666667) [And if we jump over into Storage Explorer and look at the blob storage](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=534.508) [account for our storage emulator in the licenses container,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=538.5699999999998) [here we can see that alongside the old licenses we created](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=542.4935714285714) [earlier that just had random GUID filenames,](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=547.0022857142859) [there's one called 555.lic, which is the order number we just submitted.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=550.167) [And you can also see that there's a 444.lic that I created earlier while I was testing.](https://app.pluralsight.com/course-player?clipId=dc640bb7-8ac7-4039-b3f2-d6f5e0b5bb75&startTime=556.383)

### [IBinder and Table Storage Input Recap](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff)

[In our previous demo, we made three improvements to our function pipeline.](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=1.44) [First,](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=6.489) [we used the IBinder interface to give us greater control over the name](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=6.825142857142857) [of the license file blob we created in blob storage.](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=10.656749999999999) [And that means that in the function body once we know](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=15.203) [the filename that we want to use,](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=17.910333333333334) [we can bind to a TextWriter with a Blob attribute that specifies](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=19.836333333333332) [the desired filename and connection string.](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=24.132999999999996) [And this is a very powerful technique that allows you to defer making](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=28.341) [decisions about what the properties of your binding attribute are or](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=32.919) [even what variable type you want to bind to.](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=37.20514285714286) [With IBinder,](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=41.06) [those decisions no longer need to be made in the function declaration,](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=41.97333333333333) [but can be made in the function body when you've got](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=45.69014285714285) [more information available to you.](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=49.355166666666655) [Second, we used a table storage input binding in our blob-triggered function,](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=52.651) [and this allowed us to perform an automatic lookup of a row in table storage.](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=58.779) [We used the table binding for this,](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=64.255) [specifying the name of the table we wanted to access and the Row](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=66.44) [and PartitionKey of the row we wanted to lookup.](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=70.34874999999998) [In our case, the PartitionKey was hardcoded to orders,](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=73.902) [and the RowKey was taken from the name of the license](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=76.81875) [file blob that triggered our function.](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=80.27612500000001) [And this is another scenario in which IBinder might be useful.](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=83.729) [We might not always have enough information available about which row we](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=88.382) [want to look up from within the function declaration.](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=92.21937499999999) [But if we use IBinder to bind to a TableAttribute,](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=96.354) [then we could write additional code in the function body to determine the](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=99.29560000000001) [RowKey and the PartitionKey that we want it to look up.](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=104.92833333333333) [And third,](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=109.383) [we also switched the SendGrid email binding from using an out](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=110.04642857142856) [parameter to an ICollector of SendGridMessage,](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=114.10757142857146) [and this made sending an email optional.](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=117.355) [If we didn't want to send an email,](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=119.867) [we simply didn't need to call the Add method on the ICollector.](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=121.622) [Let's take one final look at the pipeline we created in this module.](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=126.382) [A web-hook from our payment provider results in a message](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=130.536) [in a queue and a row in table storage.](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=133.6388) [The message causes a license file to be created in blob storage,](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=136.57657142857138) [and it now has a filename that's a bit more meaningful to us.](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=141.548) [And the final function is triggered by that blob being created,](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=144.58385714285717) [but takes an additional input, which is the order row in table storage, which it uses to work out who the license should be emailed to.](https://app.pluralsight.com/course-player?clipId=d8cef9e5-9565-4296-b05a-3b8e1cc7e9ff&startTime=148.852)

### [Module Summary](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67)

[Let's take a step back and look at what we've](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=0) [accomplished in the last two modules.](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=3.899499999999999) [The order processing function pipeline we created](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=5.992666666666667) [uses three different trigger types, four output binding types,](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=9.3175) [and an input binding.](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=13.384) [And we've been recapping each of these triggers and bindings as we go.](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=15.387) [So I'm not going to cover that again now.](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=18.874) [But I do want to point out that we've only scratched](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=21.487) [the surface of Azure Functions.](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=24.047333333333334) [Azure Functions offers many more trigger types,](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=26.614) [input bindings, and output bindings that we haven't had the time to look at yet,](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=29.206333333333333) [including Service Bus, Cosmos DB, and third party services like Twilio.](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=34.169000000000004) [What's more, for each of the bindings that we did use,](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=40.812) [I only showed you one or two of the possible](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=43.258272727272725) [parameter types that you can bind to.](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=45.85128571428572) [So I really encourage you to bookmark the bindings documentation page that](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=47.9255) [we've been referring to in this module as it's an invaluable resource for](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=53.18725) [working out what you can do with each binding type.](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=57.05314285714286) [And, of course, we've been using C# for the functions in our pipeline,](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=61.316) [but you may prefer to use another of Azure Functions supported languages,](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=64.71728571428572) [like JavaScript or F# or Java.](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=68.93700000000001) [And each of those languages have got their own ways of connecting the](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=71.89175) [function parameters to the corresponding bindings.](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=76.268) [One great way of getting up to speed quickly with all of these](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=80.267) [languages and the options for how you bind to parameters is to](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=83.50675) [take advantage of the sample templates.](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=87.77371428571428) [Just create a new function from a sample template using](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=90.85) [the language and binding type you want,](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=93.49466666666667) [and you'll find that there's a readymade code snippet](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=95.991) [that will help you get started.](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=98.678) [So you don't need to memorize all the options.](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=100.66625) [Up next,](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=105.525) [we're going to look at how we can deploy our function app to Azure when we finish developing and testing it locally.](https://app.pluralsight.com/course-player?clipId=e953e415-6a1f-4776-8227-0363235f2a67&startTime=105.922)

## [Deploying Azure Functions](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e)

### [Module Introduction](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e)

[Hi, Mark Heath here.](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=0) [And in this module,](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=2.895) [we'll be learning about the different ways you can deploy your Azure functions.](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=4.262) [Now so far in this course, we've done most of our testing locally.](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=10.346) [We've used the Azure Functions core tools and Visual Studio to run our](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=14.877) [function apps directly on our development machine.](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=19.56350000000001) [But of course at some point, we will want to get our functions running in Azure.](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=23.454) [So in this module,](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=29.282) [I'll be introducing you to the various ways to create function](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=30.617499999999996) [apps in Azure and publish your code to them.](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=34.022375000000004) [We already saw earlier on in this course how to create](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=37.86) [an Azure function app in the portal.](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=41.441700000000004) [But I'm also going to show you two ways to automate that with the](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=44.332) [cross-platform Azure CLI command line tool and by creating an ARM](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=48.93399999999999) [template that defines a function app.](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=54.261714285714284) [And then we'll also see some ways to publish your](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=57.506) [functions into that function app, first of all by using Visual Studio,](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=60.102333333333334) [but then by using the Azure Functions core tools.](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=65.561) [Finally,](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=70.169) [I'll show you how you can host your Azure function app in a Docker container,](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=70.451375) [which opens the door to you deploying your function app in other environments,](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=74.70285714285714) [such as to other cloud providers or to an on-premises data center. So let's get started.](https://app.pluralsight.com/course-player?clipId=46d13346-d638-4711-b2bf-eb65737ed19e&startTime=79.07083333333334)

### [Ways to Deploy Azure Functions](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa)

[Azure Functions gives us a lot of choice over how we can deploy our functions.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=1.506) [To deploy an Azure function app, there are two main steps.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=7.356) [First, you need to create the infrastructure to run your functions on.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=11.657) [This includes the App Service Plan that will host your function app.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=16.487) [And, as we discussed earlier in this course,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=20.898) [you've got a choice here of the consumption plan with its](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=23.024749999999997) [serverless per- second billing model.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=26.899000000000004) [Or you can use a regular App Service Plan.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=29.483) [But we also need to create additional infrastructure,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=32.82) [such as a storage account for blogs, queues,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=35.491) [and table storage and an Application Insights](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=38.97137500000001) [instance for monitoring and diagnostics.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=42.149499999999996) [And then, of course, we need to create a function app itself.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=46.301) [And we saw earlier on in this course how we could create all](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=50.357) [this infrastructure using the Azure portal.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=53.5985) [And you can also create a new function app and all its](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=56.277625) [associated infrastructure from within Visual Studio.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=60.77887500000001) [But I'm sure you know that when you have a production application,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=64.937) [it's not a good idea to use manual processes to](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=67.42666666666666) [provision your cloud infrastructure.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=71.69999999999999) [Instead,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=74.562) [it's better to use an Infrastructure as Code approach that](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=74.84766666666667) [allows you to reliably and repeatedly create the Azure](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=78.75266666666667) [resources needed for your function app.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=82.94071428571428) [And there's a few options available to us here.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=86.359) [In this module, I'm going to be introducing you to the Azure CLI,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=89.61) [which is an open source,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=93.39800000000002) [cross-platform command line interface for automating the](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=95.5325) [creation and management of Azure resources.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=99.65266666666669) [And I'll also show you how to create an ARM template,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=103.744) [which is a declarative JSON document that defines all the resources in an Azure](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=106.73400000000001) [resource group and can be provisioned using the Azure CLI.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=113.03942857142856) [Or you can use PowerShell or even the Azure portal.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=117.729) [Once you've got the necessary infrastructure in place in Azure,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=121.822) [then you need to actually publish your function app](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=125.758) [code and perform configuration tasks, such as setting up application settings.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=128.60028571428572) [Again, this can be done manually through the Azure portal,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=135.107) [which we saw how to do earlier on in this course.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=138.15633333333338) [And the Visual Studio tooling also makes it really easy to](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=141.862) [publish and configure your function app.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=145.3772857142857) [But again, for a production application,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=147.6572857142857) [you'd want to take steps to automate the publishing of your function app code.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=150.41571428571427) [And here, there's a lot of options because Azure App Service,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=155.2995) [which Azure Functions is built on top of,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=160.729) [has historically offered many different ways to deploy your web apps.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=163.212) [And these are all available for function apps as well.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=167.586) [And the available options include zipping up your application and using](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=171.02814285714288) [an API called Kudu to push that to your function app.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=175.72366666666667) [You can also put the zip in Azure blob storage and then](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=179.434375) [set up an application setting that tells your function app](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=183.59011111111107) [where it can find the code, and that option is called run from package.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=187.364) [And you can even get your function app to automatically deploy](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=192.846) [whenever new code is pushed to a Git repository.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=195.5163333333333) [Now the technique I'm going to be showing in this module is using](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=200.14) [the Azure Functions core tools to publish your application with the](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=203.44362499999997) [func azure functionapp publish command,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=208.284) [which will use the run from package technique behind the scenes by default.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=211.464) [But you can also use the Azure CLI with the az functionapp](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=216.772) [deployment source config-zip command to publish a zip file](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=221.61920000000003) [containing the function code.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=226.55942857142858) [And, of course,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=228.76) [if you want your CICD process to automatically publish](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=229.70275000000004) [new versions of your application,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=233.27160000000003) [then you can configure your build server to use one of these techniques.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=235.19385714285718) [For example,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=239.6195) [Azure DevOps pipelines has got some built- in capabilities that](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=240.911) [make it really easy to publish your function apps.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=244.5065) [And many build scripting utilities, such as Cake,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=248.322) [which is a build automation system for C#,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=251.34174999999996) [have also got add-ins that can easily publish function apps.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=254.16412499999996) [So there really are loads of ways to manually provision](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=259.107) [infrastructure and publish application code,](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=261.88500000000005) [as well as many options for automating those processes.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=264.1195714285714) [And so we're going to be seeing several of these options in action as we go through the rest of this module.](https://app.pluralsight.com/course-player?clipId=5fac932e-aea7-4563-bcc4-a343700f7aaa&startTime=268.279)

### [Demo: Creating an Azure Function App with the Azure CLI](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671)

[In this demo, we're going to create an Azure Functions app using the Azure CLI.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=1.331) [We'll use it to create a resource group,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=7.665) [a function app, a storage account, and an Application Insights instance.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=10.437) [The Azure CLI is an open source,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=16.646) [cross-platform command line tool that allows you to create](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=19.295) [and manage Azure resources really easily.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=23.316000000000006) [It's got a very similar set of capabilities to the Azure PowerShell cmdlets.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=27.207) [But I really like the simplicity of the Azure CLI even when I'm on Windows.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=32.42) [So that's what I'm going to be using.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=37.36) [And it also means that if you're on another platform,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=39.571) [you'll be able to use exactly the same commands.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=41.33825) [To install it, you can find instructions on this page,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=44.5665) [on the docs.microscoft .com site.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=49.248) [It's pretty easy to follow no matter what your operating system.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=52.431) [So if you want to follow along,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=56.28) [why not pause the video now and make sure it's installed on your system.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=57.908) [Once you've installed it, you can check it's working by simply typing az.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=62.721) [And the way it's structured is that it supports a whole bunch of subcommands.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=67.93) [And you can see some of them listed here.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=72.468) [So to manage function apps for example, we'd use az functionapp.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=75.072) [And if you add the -h switch to ask for help,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=80.533) [it shows you all of the subcommands for a function app.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=83.50200000000001) [And we're going to be using az functionapp create later.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=86.90322222222221) [So if we wanted to learn about all the options for creating function apps,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=91.48) [we'd use the az functionapp create -h command.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=95.394) [Now there are a couple of preliminary steps that you'll need](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=100.497) [to perform before using the Azure CLI.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=103.69371428571428) [And I go into these in a lot more detail in my Azure](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=105.89010000000002) [CLI: Getting Started course here, on Pluralsight.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=110.14824999999999) [So do check that out if you want a more in- depth guide to the Azure CLI.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=114.003) [But the key thing for our purposes is that you need to log in,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=118.98) [which you do with az login.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=122.64763636363635) [And when you do this,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=124.716) [it will open a browser window in order for you to](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=125.70044444444446) [sign in to Azure in the usual way.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=128.2457777777778) [And once you've signed in, your command line prompt will be authorized.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=130.919) [Secondly, if you've got multiple Azure subscriptions,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=135.215) [then you should use the az account set command with -s and then your](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=137.71657142857143) [subscription name to ensure that you're using the correct](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=144.145) [subscription for creating all your resources.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=147.73350000000002) [And I've already performed both of these steps to](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=150.55299999999997) [log in and select my subscription.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=153.86666666666667) [So let's move on to create our function app.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=156.876) [First of all,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=160.147) [I'm going to create an Azure resource group to hold all of the](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=160.77700000000002) [resources associated with this function app.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=164.69525000000002) [And this is a good idea to keep things organized.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=167.675) [And it also allows us to delete everything in one go when we're](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=170.54) [finished simply by deleting the resource group.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=174.644375) [And so I recommend grouping together Azure resources that are going to](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=177.927) [share a common lifetime into a single resource group.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=181.59612499999994) [I'll declare a couple of variables that we're going to be using later.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=186.124) [The resource group is going to be called Pluralsightfuncs,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=189.889) [and the location I'm going to use is westeurope.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=192.3116) [And so now I can create my resource group with the az group create command,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=197.121) [specifying the resource group name and the location.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=202.759) [And once that's completed,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=207.083) [we're going to create a storage account for our function app to use.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=208.13442857142857) [I need a unique name for our storage account,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=212.07549999999998) [so I'll just call it Pluralsightfuncs2019,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=215.25485714285713) [and then I can create a storage account with az storage account create,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=217.56216666666668) [specifying the name of the storage account,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=224.65014285714287) [the location, the resourceGroup I'm going to put it in,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=227.64233333333334) [and the sku, which is the pricing tier.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=231.816) [And standard locally redundant storage is fine for us.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=234.918) [I'm also going to show you how to create an Application Insights instance,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=238.51433333333335) [which unfortunately at the time of recording is a little](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=243.38466666666667) [bit tricky to create with the Azure CLI.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=246.77299999999994) [But we can use the az resource create command to create one.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=250.037) [And to make that a bit simpler for me,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=254.925) [I'm first going to save a small piece of JSON into a file.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=256.806) [So I'm just going to echo an object where the Application\_Type property](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=260.1571111111112) [has a value of web into a file called props.json,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=265.07444444444445) [and we'll use that JSON file in a moment.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=268.5891428571429) [Now we'll choose a name for our Application Insights instance.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=272.26077777777766) [I'll also call this Pluralsightfuncs2019.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=277.032) [And we can now create it with az resource create,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=281.239) [specifying the resourceGroup we're putting it into,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=284.0988) [the name we want to give it, the resource-type,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=287.1463333333334) [which is what sort of resource we're going to create,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=290.45828571428575) [and the properties of the resource,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=295.066) [and that's where we're using this special @ props.json syntax to](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=296.982) [say that the properties of the App Insights instance are defined](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=300.53100000000006) [in that json file we just created.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=305.183625) [Okay, so now we've got an Application Insights instance,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=308.513) [and hopefully that step will become easier in the future.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=311.5233333333333) [But with that, we are ready to create our function app.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=315.846) [And we'll use the name Pluralsightfuncs2019 for our function app as well.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=318.48628571428566) [Now normally at this point, you would need to also create an App Service Plan,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=324.53299999999996) [but the Azure CLI has got a helpful shortcut to avoid us needing to](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=328.80666666666673) [do that when we're using the consumption plan.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=333.2128749999999) [So we can just jump straight to creating an Azure](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=336.917) [function app with az functionapp create,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=339.507) [specifying the name of the function app,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=342.5305714285714) [the resourceGroup to put it in, the name of the associated storage account,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=345.3301428571429) [and the name of the associated Application Insights instance.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=350.986) [And we're saying we want to use the consumption plan in](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=354.8906666666667) [the same location as our resourceGroup, which in my case is West Europe.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=359.5375000000001) [And I'm telling it that this function app is going](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=365.63) [to be using the dotnet runtime.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=368.09524999999996) [Now this will take a moment or two to complete.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=370.457) [But once this is in place,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=373.351) [we will have successfully created and configured an empty Azure](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=374.7103333333332) [function app all ready for us to publish our code to.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=378.735) [Let me just show you one more thing that will be very useful if](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=383.314) [you're using the Azure CLI to automate your deployments and that's](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=386.09412499999985) [how we can set up application settings.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=390.523) [We can do that with the az functionapp config appsettings set command,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=394.135) [specifying the functionAppName and the resourceGroup and then providing the](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=400.09) [settings in the format of setting name equals setting value with a space](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=404.949) [separating each setting that we want to configure.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=410.255) [So this command would be really useful if we wanted to](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=413.372) [set that SendGridApiKey app setting, for example.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=416.3698571428571) [Now when I run this command,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=419.937) [we see that not only have those two settings been added,](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=421.5003333333332) [but the App Insights key and connection string for the storage](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=424.50842857142857) [account had already been automatically set up for us by the previous](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=428.4971666666666) [command when we created our function app.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=432.73449999999997) [So we've created an Azure function app and the](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=435.46271428571424) [associated infrastructure with the Azure CLI. But next, let me show you another way that we can automate the same thing.](https://app.pluralsight.com/course-player?clipId=ed755900-f397-498b-9027-0413dc60b671&startTime=438.6865)

### [Demo: Create an Azure Functions App with ARM](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c)

[In this demo, we're going to learn how to use Azure Resource Manager,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=1.394) [or ARM templates, to create an Azure function app.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=5.757) [An ARM template is a JSON document that defines all the Azure](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=9.416) [resources that you want to deploy to a resource group.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=14.296) [So we can use one to define the App Service Plan,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=17.360500000000002) [function app, storage account,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=21.543285714285716) [and Application Insights instance all in a single JSON document.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=23.528600000000004) [Not only can you specify what resources to create,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=28.821) [but you've got high-level control over their settings.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=31.500666666666667) [So we can choose the App Service Plan location,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=35.105) [set up function app settings,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=37.3185) [and choose the pricing tier for the storage account all within the template.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=40.231) [ARM templates support parameters allowing you to make the template reusable.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=45.578) [For example,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=50.668) [you might parameterize the resource location or the function app name.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=51.401666666666664) [And ARM templates are idempotent,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=56.503) [meaning that if you deploy one for a second time,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=59.393) [then it will have no effect,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=61.711571428571425) [assuming that all the resources it created the first time are still present.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=64.055) [And that means if you want to update your resource group,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=69.14) [you just need to change your template to include](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=71.73885714285716) [your new settings and redeploy it.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=74.73871428571431) [So let me show you an ARM template that deploys an Azure function app.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=76.96000000000001) [And the first thing to acknowledge is that this might well seem rather](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=82.794) [intimidating if you've never seen an ARM template before.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=86.78657142857143) [We've got 130 lines of JSON here, and some of the syntax is quite complex.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=90.596) [The good news is that you'd never need to write one of these from scratch.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=96.705) [Instead, you'd typically base a template off of an existing sample.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=101.067) [And there's a GitHub project called azure- quickstart-templates](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=106.164) [that contains loads of example ARM templates,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=108.8638) [including several Azure function samples.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=113.11) [And the template I'm showing you is based on one from that repository.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=116.715) [Now I'm not going to go through the whole thing in great detail,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=121.076) [but I do want to highlight some of the most important bits.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=123.46377777777776) [First of all, here we're looking at the parameters section.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=127.694) [This defines the ways in which we can make the template customizable.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=130.57966666666667) [So users need to provide a name for the function app in the appName parameter,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=135.793) [and there are some optional parameters as well,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=141.354) [which have got sensible defaults.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=143.80633333333333) [For example, if you don't specify a storage account pricing tier,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=146.683) [it will pick Standard\_LRS.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=150.56014285714286) [and if you don't specify a location,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=152.951) [it will just use the location the resource group is in.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=155.066) [And if you don't specify what Azure Functions runtime you want,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=158.50600000000003) [I've chosen dotnet as the default.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=162.821) [Next is a section called variables.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=166.507) [Variables allow us to perform operations on parameters](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=169.375) [and other data to calculate new values.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=172.52125) [For example, the storageAccountName uses a special function called uniqueString,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=176.625) [which will generate a random unique name that will always](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=182.134) [remain the same when we redeploy this template.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=185.541625) [The main part of an ARM template is the resources section,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=189.535) [and this defines what resources we want to create.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=192.821) [And here, we're creating four resource types.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=197.318) [First is the storage account whose name,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=200.96) [location, and pricing tier are all derived from parameters or variables.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=203.943) [Next is the App Service Plan, which was historically called a server farm.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=209.597) [And we're again using variables and parameters to get its name and location,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=215.141) [but we're also saying that it's using the dynamic pricing tier,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=220.522) [which was the original name for the consumption plan.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=223.497) [So we're saying here that we want to use the serverless pricing model.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=228.03) [Next up is the function app,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=232.092) [and a function app is an App Service app with a kind of function app.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=233.99066666666667) [Its name and location come from the properties and variables,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=239.3278571428571) [and we're using dependsOn to indicate that it should be](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=243.838) [created after we've created the App Service Plan storage](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=247.735) [account and App Insights instance.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=251.2141428571429) [The function app has a bunch of properties that also need to be configured.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=254.274) [We need to say which app service plan we're hosting it on,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=258.648) [and this uses the serverFarmId property.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=261.7138571428572) [In this siteconfig section,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=265.856) [we're setting up the application settings that we want.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=267.955) [And here,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=270.94887500000004) [we're using a built-in function called listKeys to get ahold](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=271.65212500000007) [of the storage account key to the storage account that we](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=275.63) [created in this resource group.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=278.9148571428572) [And there are several other settings here including FUNCTIONS\_EXTENSION\_VERSION,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=280.6006666666667) [which needs to be set to ~2 to indicate that we're](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=284.519) [using version 2 of Azure Functions.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=289.798111111111) [The node version here would only be relevant if we were using a node](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=293.446) [runtime and creating our functions in JavaScript.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=297.8357500000001) [And we're also using some built-in functions to get ahold of](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=301.141) [the Application Insights instrumentation key.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=304.49542857142853) [And finally,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=308.009) [the FUNCTIONS\_WORKER\_RUNTIME app setting contains](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=309.23900000000003) [the runtime that we've selected, which defaults to dotnet.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=311.58500000000004) [Finally, we're creating an Application Insights instance,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=316.908) [which is going to be used to store the logging and diagnostic](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=319.78442857142863) [information associated with our function app.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=323.489) [Now again,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=327.692) [I do have to admit that these templates can be quite intimidating for new users.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=328.1166666666667) [However,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=333.951) [the approach I tend to take is to initially just use the Azure portal or](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=334.1793333333334) [the Azure CLI to create my resources during the early prototyping and](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=338.4953750000002) [experimentation phase of application development.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=344.2116) [And then once my application is ready for production,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=347.953) [I might invest the time to generate one of these ARM](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=350.25428571428574) [templates like this for much easier deployment.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=353.8099999999999) [And the benefit of creating an ARM template is going to be seen when](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=357.882) [we come to deploy it as it really is very simple.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=361.4485999999999) [I'm going to be using the Azure CLI again to deploy it.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=365.258) [But we could also use the Azure PowerShell cmdlets or the Azure portal directly.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=368.34333333333325) [Here I'm showing a PowerShell script I'm going to](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=373.59666666666664) [use to deploy the function app.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=377.17157142857155) [And there are only two commands needed.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=379.715) [First,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=382.084) [we'll create a resource group to host our function app using](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=382.35914285714284) [az group create just like we saw before.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=386.28750000000014) [And we're going to call this resource group Pluralsightfuncsarm,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=389.731) [and then we'll pick a name for our function app.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=392.367) [I'll just use Pluralsightfuncsarm again.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=396.826) [And then we deploy it with the az group deployment create command,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=399.92) [specifying the resource group to deploy to,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=404.529) [the path to the ARM template that we want to deploy,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=407.339) [in this case azuredeploy.json,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=410.483) [and then we can pass in any parameters that we want to customize.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=413.069) [We only had one required parameter in our template,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=417.758) [which was called AppName and is used to specify the functionAppName.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=420.27628571428573) [So I'm passing that in here.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=425.566) [Now I'm using Visual Studio Code here,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=427.766) [which has got a nice PowerShell extension that allows me to just](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=429.885) [select some lines of script and easily execute them.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=433.5386666666668) [So I'm going to do that.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=437.786) [First of all, I'll create the resource group.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=439.162) [And once that's finished, I'm going to deploy my ARM template.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=442.605) [And deploying the ARM template does take a minute or two,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=448.094) [but I'll fast-forward to when it's complete.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=450.9862857142857) [And we can take a look at what got created with the az resource list command.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=453.3176666666667) [And here you can see the four resources that we specified in our ARM template.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=459.0205) [If we wanted to check that all the function app settings](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=465.946) [we configured were present and correct,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=468.47914285714285) [we could use the az functionapp config appsettings list command.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=470.50242857142854) [And sure enough, we can see that the connection strings,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=477.248) [App Insights keys,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=480.2058) [and function app version and worker runtime settings](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=481.923) [have all been set up correctly.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=485.06128571428576) [So although creating an ARM template can seem a bit daunting,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=488.579) [once it's done,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=492.4335714285714) [it really is really quick and easy to deploy instances](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=493.583) [of your Azure resources with it.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=496.7313333333333) [By the way, when you want to clean up a deployment,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=499.2404444444444) [it's just a one-line command to delete a resource group.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=503.1355) [Here's how you can do it with the az group delete command,](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=506.929) [specifying the name of the resource group to delete and](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=510.1505714285715) [some optional arguments to make execute deletion](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=513.7955714285713) [immediately without asking if you're sure.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=516.937) [But I'm not ready to delete this yet because we've not yet](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=520.066) [seen how to get our function code running.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=523.2967777777777) [We've just created an empty function app with no functions. So next, let's see how we can publish code to these function apps.](https://app.pluralsight.com/course-player?clipId=0bdc2c46-1895-4f6e-882d-199a1f5e433c&startTime=526.312)

### [Demo: Deploying from Visual Studio](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5)

[In this demo,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=1.37) [we'll see how we can publish our functions to a](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=2.244666666666667) [function app in Azure from Visual Studio.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=5.3145) [Here I am in Visual Studio,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=8.812) [and I can bring up the publish dialog by selecting Build,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=10.129) [Publish, from the menu.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=14.166) [Here it gives me an option to create a new function app.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=16.721) [So you can actually do all those steps that we just](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=19.74675) [automated from within Visual Studio if you want.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=23.334714285714277) [But we're going to deploy to an existing function app,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=27.186) [so I'll choose Select Existing.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=30.204285714285717) [You'll notice that there's an option to select Run from package file here,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=33.17) [which is marked as recommended.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=37.21) [When you choose this option, your code gets zipped up,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=39.56) [and special application settings are configured telling](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=42.592666666666666) [Azure Functions where to find that zip file.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=46.037800000000004) [And there are actually two different ways in which this can be set up to work,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=49.639) [which can make it a little bit confusing.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=53.343) [But I'm going to show you both ways in action in this module,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=55.797) [and hopefully it will start to make a bit more sense.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=58.69800000000001) [So I'll select this option.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=62.037) [And now let's choose the function app we want to deploy to,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=64.02) [and I'm going to pick Pluralsightfuncsarm,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=66.69066666666664) [which is the one we just created using an ARM template.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=68.45216666666667) [Now it takes us to this dialog where we can publish.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=74.237) [But there's another useful option here that's worth pointing](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=77.625) [out called Manage Application Settings,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=80.62399999999998) [and this gives me the chance to set up my application](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=82.53342857142856) [settings directly from within Visual Studio.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=87.01814285714288) [If I click on this,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=90.493) [it shows me all my application settings with a text box showing](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=91.37600000000003) [what my local development setting contains,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=95.23366666666666) [which is coming from my local.settings .json file,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=97.432) [as well as what the remote value is,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=100.68471428571426) [which is what our Pluralsightfuncsarm function app contains.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=104.037) [Now the first two settings we can see here are the](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=109.621) [EmailSender and SendGridApiKey.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=113.0278) [These two settings exist in my local.settings .json file,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=115.342) [but not on the remote Azure Functions app yet because](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=118.78399999999999) [they weren't in my ARM template.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=123.11485714285718) [I want my Azure Functions application to use the same values.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=125.813) [So I'll click this Insert value from Local link for both of](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=129.953) [them to copy the value from local to remote.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=133.57811111111113) [If I scroll down a bit further, I can see the AzureWebJobsStorage setting.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=138.675) [This points to the Azure Storage Emulator locally,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=143.239) [but to a real storage account when I'm running in the cloud.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=145.99725) [So for some settings, I do want the values to be different.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=150.601) [But for many other settings like FUNCTIONS\_WORKER\_RUNTIME,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=153.75900000000001) [for example, the value should be the same for both.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=157.664) [When I click OK here,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=160.8555714285714) [it will actually update my function app in Azure with those new settings](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=162.737) [ready for when I push the new version of my application code.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=167.15057142857142) [And I can do that with publish.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=170.64833333333334) [What's happening behind the scenes here is that it's](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=174.3) [building my code in release mode, zipping it up,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=176.9335) [and then uploading that zip to my function app.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=180.41350000000003) [And then it's configuring some more special application](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=184.27828571428572) [settings to point my function app at that zip.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=187.826) [Once it's done,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=192.583) [let's jump over to the Azure portal and take a look at the](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=193.36112500000002) [Pluralsightfuncsarm function app that we just published our code to.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=196.945) [As you can see, if I look at the functions,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=202.577) [we can see that the three functions in our function app are present and correct.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=205.132) [If I wanted to test these functions,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=210.603) [then I'd need to find out the URL of the OnPaymentReceived function.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=212.823) [I can do that by navigating to that function and](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=217.65) [clicking on the Get function URL link.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=220.37242857142854) [And you can see that this not only shows us the URL of that function,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=223.0846666666667) [but also includes the secret function key that we'd need to](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=228.235) [successfully authorize a call to this API.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=232.51999999999995) [Remember we didn't need that when we were testing locally.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=235.2055) [But in the cloud,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=238.976) [it is required because we chose the authorization level of](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=240.00222222222226) [function for our HTTP-triggered function.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=243.86166666666665) [So I've shown you how we can publish from Visual Studio,](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=247.377) [but that's still a manual process.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=250.14825) [How can be automate publishing archived? I'll show you how to do that next.](https://app.pluralsight.com/course-player?clipId=3cf5f274-b201-4311-973e-8e42fcef37f5&startTime=252.963)

### [Demo: Publishing from the Command Line](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458)

[In this demo,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=1.02) [I'm going to show you two different options for publishing Azure](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=1.8786666666666665) [function apps to Azure from the command line,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=5.657) [and these are really useful if you want to automate the](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=8.30875) [publishing of your Azure function code.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=11.65385714285714) [Functions core tools with the func azure functionapp publish command.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=16.791) [And then we'll see how we can use the Azure CLI with the az](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=22.88) [functionapp deployment source config-zip command.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=26.70066666666667) [Both of these demos will use the run from package](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=30.991) [deployment mode that we talked about earlier,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=33.31933333333333) [but we're going to use slightly different variations of it.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=35.77885714285715) [So this will give us the opportunity to look a little bit behind the scenes](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=39.587) [at what actually happens when we use run from package.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=43.227999999999994) [Here I am at a PowerShell prompt,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=47.816) [and I'll very quickly create a new Azure function just so we can](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=50.137) [prove that we really have updated the application.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=53.66837500000001) [I'll just use func new from the Azure Functions core tools to do](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=57.246) [that just like we did earlier on in this course.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=61.28600000000001) [And I'll simply select a HTTP-triggered function, and we'll call it NewFunc1.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=65.262) [And now let's use the Azure Functions core tools to](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=71.255) [publish this function app to Azure.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=74.69550000000001) [We'll use the func azure functionapp publish command,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=77.496) [and we need to specify the name of an Azure Functions app.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=80.94125) [I'm going to choose the Pluralsightfuncs2019 function app](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=85.964) [that we created earlier in this module.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=89.1948) [And currently, that doesn't have any functions deployed to it at all.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=92.727) [when I execute this command, it builds my function app.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=96.765) [It zips it up, and it pushes that zip up to Azure.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=99.78422222222223) [And one nice thing that we get here when it completes is that it shows](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=105.494) [us all the functions in our function app including the URLs and secret](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=108.76925000000001) [codes for any HTTP- triggered functions,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=113.50414285714287) [and we can see the new function that we just added.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=116.00425) [But what happened behind the scenes here?](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=120.433) [Well,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=122.894) [the zip file that got created was actually uploaded into a blob storage](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=123.160375) [container in the storage account associated with our function app.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=127.451) [And then a SAS URI was generated that pointed at that zip file.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=132.275) [And a new application setting was added to our](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=138.011) [function app that contained that SAS URI.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=140.89524999999998) [If we use the az function app config appsettings list command again from the](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=144.509) [Azure CLI to list all the app settings in our function app,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=149.847) [we can see that new setting here.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=153.77300000000002) [In this case, it's called WEBSITE\_RUN\_FROM\_ZIP,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=156.1618) [and it contains the URL with the location of that zipped file,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=159.866) [which includes a secret code, also called a SAS token,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=163.62914285714288) [which is going to secure it from anyone else downloading it.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=167.674) [Now two things to point out here.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=171.232) [First of all,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=173.13) [the app setting WEBSITE\_RUN\_FROM\_ZIP was fairly recently](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=173.98350000000002) [changed to WEBSITE\_RUN\_FROM\_PACKAGE instead.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=177.815) [And unfortunately,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=181.467) [it looks like the Azure Functions core tools version that I'm using](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=182.06557142857142) [hasn't been updated yet to reflect this change.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=186.215) [I expect both application setting names will work for a while.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=189.704) [But by the time you watch this,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=193.475) [I would expect WEBSITE\_RUN\_FROM\_PACKAGE to be what gets generated.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=195.271) [But the second important thing to know about run from package is that the zip](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=200.791) [file doesn't actually have to be stored in blob storage.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=204.71588888888888) [There's another variation of this technique that we're going to see shortly.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=208.204) [Let's run at az functionapp config appsettings list command again.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=212.726) [But this time,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=217.785) [let's point it at the Pluralsightfuncsarm function app that we](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=218.4195) [deployed to with Visual Studio in our previous demo.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=222.517) [Remember that with Visual Studio,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=225.66799999999998) [we did check the box that enabled the run from package option.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=228.151625) [Here we can see that this function has also got the](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=233.073) [WEBSITE\_RUN\_FROM\_PACKAGE application setting.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=236.74566666666664) [But this time, its value isn't a SAS URI.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=239.237) [It's just the number 1.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=242.392) [And what that means is that the zip file we uploaded can be found in a](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=244.689) [special location in the function apps file share,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=248.80000000000004) [and I'll show you where that is in a minute.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=252.103) [Let's just add another function to this project with the func new command again.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=254.814) [And once again, I'll simply select a HttpTrigger,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=260.027) [and this will now be called NewFunc2.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=262.1215) [And now I'm going to publish this function app with the Azure CLI.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=266.22) [So we need to zip it up first.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=270.457) [And the Azure CLI won't automatically zip it for us,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=272.72) [so we're going to create the zip ourselves first.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=275.82060000000007) [This is a .NET function app so we can use the .NET Core SDK and say](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=278.3331428571429) [dotnet publish with a -c release flag to say that we want to create](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=284.435) [a release build of our function app.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=289.9086666666667) [And we can see here that it's showing us the folder](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=292.793) [that it published the application to.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=295.2123333333333) [And if we examine the contents,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=297.05157142857144) [here we can see all the files that we're going to need to zip up in](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=299.328625) [order to publish this application to Azure Functions.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=303.53269999999986) [Now if you were doing this as part of a CI build process,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=307.611) [at this point you'd automate the zipping up of this folder.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=310.6235714285715) [But to save us some time, I'm just going to zip it up manually,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=314.636) [which I've done off screen.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=317.6104444444445) [And here you can see the publish.zip file that I created.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=319.371) [So we've got a zip of our function app,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=322.7309) [and now we can deploy it using the Azure CLI with the az](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=325.654) [functionapp deployment source config-zip command.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=331.0885) [We need to specify the resource group and function name,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=336.042) [and the src argument points at the zip file that we just created.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=339.16871428571426) [Once this is completed, our zipped up function app has been deployed.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=344.866) [So let's check that it works by visiting the portal.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=349.217) [And if we look here at the Pluralsightfuncsarm project,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=351.7956666666667) [we can see that the new version of the function app has been](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=355.028) [successfully deployed including the NewFunc1 and NewFun2](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=359.93679999999995) [functions that we just created.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=363.3998571428571) [So let's quickly look behind the scenes at what's going on with this](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=365.94757142857145) [version of the run from package deployment technique.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=370.378) [First, I'll look at the application settings again.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=374.148) [And we can see that the WEBSITE\_RUN\_FROM\_PACKAGE app](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=376.9155) [settings still has a value of 1.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=381.241) [That tells Azure Functions to find the zip file in a specific](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=384.37587500000006) [place on the function app's file share.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=388.228375) [And there's a handy way that we can explore the file share for our function app,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=391.43) [and that's by using another App Service feature that we can](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=395.248) [find here in the Platform features tab.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=398.3695) [If we select Advanced tools (Kudu),](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=402.44) [it launches a website known as Kudu that gives us some low-level insight](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=405.602) [into the environment that's running our function app.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=409.98228571428564) [If I select this Debug console view, it takes me to an Explorer view,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=413.934) [allowing me to browse around the disk of the app service,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=419.528) [which is actually backed by an Azure file share.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=422.85257142857137) [And if I navigate into the data, SitePackages folder,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=426.413) [you'll notice a bunch of zip files in here.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=429.50766666666664) [These are the zip files that you saw me upload through](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=433.546) [Visual Studio and just now from the command line plus a few](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=436.08657142857146) [others that I did as practice runs.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=440.27862500000003) [And every time you publish a zip with](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=443.597) [WEBSITE\_RUN\_FROM\_PACKAGE set to the value 1,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=445.87) [it will simply copy the zip into this folder.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=448.8033) [And then it will update the contents of this packagename.txt](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=452.973) [file to contain the filename of the latest zip.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=455.97166666666664) [And the Kudu website lets us look inside the packagename.txt file,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=461.231) [and we could even update it here if we wanted.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=464.50299999999993) [So one really nice thing about this feature is that now just](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=468.396) [by changing the contents of this file,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=471.99750000000006) [we could roll back instantly to a previous version of our function app.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=474.2434999999999) [If I navigate back down into the home directory and go to](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=479.256) [the site folder and then into wwwroot,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=482.7690000000001) [this is where that zip file gets unpacked to.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=485.816875) [If we weren't using the run from package feature,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=490.577) [then any function app code that we uploaded would just](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=492.688) [get written directly into this folder.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=496.4225) [So in this demo,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=498.9789999999999) [we've seen a couple of ways we can automate the publishing of](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=500.675) [our function apps from the command line,](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=503.7614285714286) [as well as looking behind the scenes a little at how it's implemented. Let's seen next how we can host our Azure Functions apps in a Docker container.](https://app.pluralsight.com/course-player?clipId=47b5e2f8-c1ba-496b-8cbb-e666db174458&startTime=505.93675)

### [Demo: Deploying as a Docker Container](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618)

[In this demo, I'll show you how to create a Docker container image,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=1.383) [allowing you to deploy your function app to any Docker host.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=5.311000000000001) [Now we could do this by writing our own Docker file,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=11.014) [but the Azure Functions core tools can generate one for us.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=13.801857142857143) [So let me show you how to do that.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=18.427) [I'll create a new folder called dockerfuncs,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=21.126) [navigate into it,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=23.360285714285713) [and then I'm going to use func init to create a new Azure Functions app.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=25.308142857142855) [But I'm also going to provide the --docker argument to](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=32.098) [ask it to generate me a Docker file.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=35.680600000000005) [This will prompt me for the WORKER\_RUNTIME I want to use,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=38.683) [and the Docker file will be customized to the choice I make here.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=41.97419999999999) [I'm going to choose dotnet.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=46.498) [And if we look on disk to see what files got created by this command,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=48.508) [we can see that here is our Docker file.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=52.48562500000001) [And this Docker file is a generic Docker file for .NET Azure function apps.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=56.228) [So we could just copy it directly into the function app that we already created,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=61.339) [and it would just work.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=65.925) [If we take a look at the contents of the Docker file,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=67.922) [it's quite simple and uses a two-stage Docker build process.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=70.35624999999999) [First,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=75.685) [it uses a container that's got the .NET Core 2.1 SDK](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=75.97075000000001) [installed to build our application.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=80.48611111111109) [It copies our source code in and performs a dotnet publish command](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=83.63) [just like we did manually in our previous demo.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=87.13385714285714) [And then it uses a base container that's just got the](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=91.752) [Azure Functions runtime installed.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=95.38371428571429) [Then it sets an environment variable that's needed](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=97.346) [by the Azure Functions runtime.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=100.00500000000001) [And then it copies the publish code out of the builder Docker container](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=102.45) [that we created in the first stage of this Docker file.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=106.21666666666664) [Now if you've worked with Docker files before,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=110.238) [hopefully that will be quite straightforward for you.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=112.14016666666666) [But if you haven't, I know it can seem a little bit intimidating.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=115.486) [And there are plenty of great introductory courses here on](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=119.521) [Pluralsight that will help you get started with Docker.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=122.4325714285714) [And I've actually made one called Microsoft Azure](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=126.183) [Developer: Deploying and Managing Containers.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=129.31883333333332) [And that not only gives you an introduction to Docker basics,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=132.623) [but it goes on to show you the various ways that you](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=135.17933333333332) [can host your containers in Azure.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=138.26199999999992) [So do check that out if you'd like to learn more about](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=141.016) [running Docker containers in Azure.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=143.89200000000002) [To build a Docker image from this Docker file is very straightforward.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=146.402) [But I will quickly create a new function first.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=150.798) [And again, we'll just make an HTTP- triggered function,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=154.011) [and we'll call it NewFunc1.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=157.68085714285715) [And I'm able to build a Docker image because I've got Docker](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=160.768) [Desktop installed here on my Windows machine.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=164.44766666666663) [If I run docker version,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=167.917) [you can see that I've got it configured in the Linux mode.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=169.27866666666668) [So we'll actually be building a Linux Docker image.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=173.08) [But because .NET Core and the Azure Functions runtime is cross- platform,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=176.1745714285714) [I could also create a Windows container image.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=180.88457142857143) [I'll build the image with docker build,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=184.19771428571428) [giving it a tag of docker funcs v1 and saying that the](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=187.41375000000002) [Docker file is in the current directory.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=192.2933333333334) [Now when we run this for the first time,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=195.86) [it will take some time as it needs to pull down those base images.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=197.681) [First, it needs to get the SDK image.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=202.387) [So I'll fast-forward a bit.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=205.214) [And once that installer image with the .NET Core SDK has downloaded,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=207.687) [we can see that it's copying in our function app source](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=211.38499999999996) [code and building it with dotnet publish.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=215.019) [And when it's finished doing that, it's going to download the other base image,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=218.885) [the azure-functions dotnet runtime image.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=223.11216666666667) [So, again, let's fast-forward to when that's complete.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=226.633) [And when it's finished downloading it,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=229.38799999999998) [it's going to copy in the publish code from the previous stage.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=231.7615) [So now we've got a Docker image containing our function app.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=237.675) [And that means we can run this on any Docker host whether in](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=240.9935) [Azure or in another cloud or in an on- premise data center or](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=244.949) [even on our own development machine.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=250.30399999999997) [Now there are a couple of important things to be aware of.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=253.346) [Obviously,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=257.00239999999997) [we've seen that Azure function apps integrate with other Azure services,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=257.428) [such as Storage Accounts and Application Insights.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=261.667) [And so if you're not running your Docker container in Azure,](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=265.499) [you'll either need to allow it to connect out to Azure to access](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=268.0871428571428) [those services or simply not use the Azure Functions features](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=272.209) [that depend on those Azure services.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=276.1393333333334) [Another thing to be aware of is there currently isn't an easy](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=278.58200000000005) [way to access the function keys for HTTP-triggered functions](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=282.9174444444445) [running in a Docker container.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=287.1571666666667) [So it would be up to you to make sure that you chose a suitable](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=289.653) [security mechanism to protect your HTTP-triggered functions if](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=293.46428571428567) [you deployed them in containers.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=297.983) [And we will be talking a bit more about ways of securing](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=300.59) [your functions in the next module. But first, let's wrap up what we've learned in this module.](https://app.pluralsight.com/course-player?clipId=27876067-69b6-4f2b-9e0e-f39dda166618&startTime=303.74566666666664)

### [Module Summary](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4)

[In this module,](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=1.412) [we took a look at the various ways of creating Azure function](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=2.1149999999999998) [apps in Azure and deploying our code to them.](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=5.763) [And we saw that there were loads of options available to us.](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=9.663) [We can create function apps with the Azure CLI using](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=12.638714285714288) [the az functionapp create command.](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=16.54675) [And we can also define ARM templates to allow us to](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=19.683) [deploy the associated resources,](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=22.7885) [like storage accounts and Application Insights instances,](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=24.32) [with a single command.](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=28.582) [Then we saw how we can publish our function app code to those function apps.](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=30.726) [We can use the Visual Studio publish command to publish to](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=36.046) [either a new or an existing function app,](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=39.26011111111112) [as well as update application settings all from](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=42.361) [within the development environment.](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=46.0764) [And we saw that if we want to automate publishing the application code,](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=48.558) [we can either use the Azure Functions core tools with func](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=52.387) [azure functionapp publish or the Azure CLI with az](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=56.532199999999996) [functionapp deployment source config-zip.](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=62.20733333333334) [I chose to use the new run from package technique for these demos,](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=65.54) [and that creates an application setting called WEBSITE\_RUN\_FROM\_PACKAGE.](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=69.81385714285712) [And the value of this setting is either a secure SAS URI](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=75.162) [pointing to a zip file in blob storage, or it just holds the number 1,](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=78.21933333333332) [in which case the Azure Functions runtime knows to find the zip file in the](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=83.30771428571428) [D:\home\data\SitePackages folder with the packagename.txt file containing](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=88.138) [the name of the zip file that's currently live.](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=93.48000000000002) [So now we know how to create Azure function apps and deploy our code to them.](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=97.948) [in our final module, I want to give you some pointers for working with Azure functions in production.](https://app.pluralsight.com/course-player?clipId=e6ee0035-2da3-42fd-9f01-6fa1472a36d4&startTime=102.972)

## [Working in Production](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d)

### [Module Introduction](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d)

[Hi, Mark Heath here,](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=0) [and in this final module of our Azure Functions Fundamentals course,](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=1.9985) [we're going to focus on working in production.](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=7.120555555555556) [So far in this course, we've learned how you can create functions,](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=11.693) [use triggers and bindings, and seen how to deploy our functions to Azure.](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=15.64214285714286) [So in one sense, we're ready to go live to production.](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=21.107857142857142) [But there are still a few questions that I've not](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=25.618) [directly answered so far in this course,](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=28.14) [so in this module, we'll be answering the following questions.](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=30.409399999999998) [First, how can I monitor my functions?](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=35.212) [I'll show you how we can view the invocation history of our functions,](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=38.372) [including their log output, and keep track of how much we're spending.](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=42.361) [Second, how can I secure my functions?](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=47.914) [We'll discuss a few of the options for securing functions](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=50.859) [and learn how to manage function keys.](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=53.713428571428565) [Third, how can I configure CORS for my functions,](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=56.95099999999999) [which I might need if I was calling them from JavaScript in a web page?](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=60.732500000000016) [Fourth, how can I integrate with other Azure services?](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=65.06725) [Azure Functions integrates really nicely with many other Azure services,](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=69.994) [and in this module,](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=73.80462499999999) [we'll see how Azure Functions Proxies enable us to pass](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=75.0805) [incoming HTTP requests onto other destinations,](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=79.7872857142857) [allowing us to host static websites.](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=84.057) [We'll also see how we can access secrets stored in Azure Key Vault and how](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=87.307) [to integrate our function app with Azure API Management,](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=92.05762499999996) [which gives us some additional security options.](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=95.8385) [Fifth, how can I build workflows with my functions?](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=98.88571428571429) [We've already built a very simplistic workflow in this course,](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=103.82) [but we'll see what Durable Functions adds to the picture.](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=106.71899999999998) [And finally, just in case I didn't address your specific question,](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=111.15) [I'll point you at some recommended resources for](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=114.6192857142857) [learning more about Azure Functions.](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=117.7418) [So we've got a lot to get through. Let's start off by looking at how we can monitor our functions.](https://app.pluralsight.com/course-player?clipId=e5a21300-25c4-4eea-b3e1-4b87bf75a97d&startTime=121.035)

### [How Can I Monitor My Functions?](https://app.pluralsight.com/course-player?clipId=512b20fe-1155-4be3-ac37-2b389546edec)

[The first question I want to address is how can I monitor my Azure functions?](https://app.pluralsight.com/course-player?clipId=512b20fe-1155-4be3-ac37-2b389546edec&startTime=1.542) [How can I find out how many times they ran,](https://app.pluralsight.com/course-player?clipId=512b20fe-1155-4be3-ac37-2b389546edec&startTime=6.719) [when they ran, and how long they took?](https://app.pluralsight.com/course-player?clipId=512b20fe-1155-4be3-ac37-2b389546edec&startTime=8.835) [And how can I look back at the log output for individual function invocations?](https://app.pluralsight.com/course-player?clipId=512b20fe-1155-4be3-ac37-2b389546edec&startTime=12.224) [And how can I track how much I'm spending?](https://app.pluralsight.com/course-player?clipId=512b20fe-1155-4be3-ac37-2b389546edec&startTime=17.166) [The recommended way to monitor your Azure functions and view](https://app.pluralsight.com/course-player?clipId=512b20fe-1155-4be3-ac37-2b389546edec&startTime=20.837) [their invocation history is to integrate your Azure function](https://app.pluralsight.com/course-player?clipId=512b20fe-1155-4be3-ac37-2b389546edec&startTime=24.184) [app with Application Insights.](https://app.pluralsight.com/course-player?clipId=512b20fe-1155-4be3-ac37-2b389546edec&startTime=27.68171428571428) [We've already seen how to create an Application Insights](https://app.pluralsight.com/course-player?clipId=512b20fe-1155-4be3-ac37-2b389546edec&startTime=30.523) [instance and link it up to our function app,](https://app.pluralsight.com/course-player?clipId=512b20fe-1155-4be3-ac37-2b389546edec&startTime=33.009) [so in a moment,](https://app.pluralsight.com/course-player?clipId=512b20fe-1155-4be3-ac37-2b389546edec&startTime=36.170333333333346) [we'll see what kind of information is available to us in Application Insights.](https://app.pluralsight.com/course-player?clipId=512b20fe-1155-4be3-ac37-2b389546edec&startTime=37.413) [Also, the Azure portal provides us access to lots of metrics,](https://app.pluralsight.com/course-player?clipId=512b20fe-1155-4be3-ac37-2b389546edec&startTime=43.121) [as well as alerts and billing dashboards that can help us](https://app.pluralsight.com/course-player?clipId=512b20fe-1155-4be3-ac37-2b389546edec&startTime=46.95088888888888) [keep track of how much we're spending. So in our next two demos, we're going to explore some of these features.](https://app.pluralsight.com/course-player?clipId=512b20fe-1155-4be3-ac37-2b389546edec&startTime=50.58728571428572)

### [Demo: Monitoring Functions](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8)

[In this demo,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=1.661) [we'll see how to view our Azure function invocation](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=2.363) [history with Application Insights.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=5.4319999999999995) [Here we are in the Azure portal,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=8.397) [and we're looking at one of the function apps we deployed in the last module.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=10.853) [As you can see, here are the three functions in our order processing pipeline.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=15.759) [If we expand one of these, we can see that there's a Monitor tab.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=20.949) [If we select this tab,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=25.746) [it loads a view showing us the details of the invocations of this function,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=27.068777777777782) [and you can see here that there's been four calls to this function,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=32.05266666666667) [which I simply ran recently while I was testing.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=36.592) [We can see the date and time that the function executed,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=40.393) [whether it was successful or not,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=43.203399999999995) [and the duration of the function call in milliseconds.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=45.865750000000006) [And we can see that most of these executed very quickly,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=50.725) [but the first one was a little bit slower,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=53.07849999999999) [and that's because of what's called a cold start.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=55.678000000000004) [If I've not used method Azure Functions app for a while,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=59.362) [sometimes the first call can be a little bit slower,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=62.25137500000001) [and that's because behind the scenes a new server needs to be](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=65.43387500000001) [quickly started up to run the function.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=69.186) [Now for many serverless applications, cold starts aren't a problem,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=72.517) [but they are something you need to be aware of,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=76.17349999999998) [particularly if you're implementing a back-end API](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=78.837) [that a website is going to call.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=81.24444444444445) [Let's look next at the GenerateLicenseFile,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=83.836) [function, and as we'd expect, there are four calls here as well,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=86.359) [each triggered by queue messages.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=91.222) [The first three of these were a little bit slower,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=93.994) [although, again, that might just be a cold start issue,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=95.63671428571429) [as it seems to have sped up by the fourth invocation.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=98.70255555555558) [And if we look at the EmailLicenseFile function invocations,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=102.653) [again, we see a similar pattern.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=105.67866666666667) [It sped up after the first couple of starts.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=107.87371428571427) [If I select one of these invocations, it shows me the log output.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=112.239) [We can see that we get some messages from the Azure Functions runtime,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=117.2) [telling us when we started executing the function and completed it,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=120.921) [as well as messages showing us the log output from our function code.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=124.17485714285714) [If I return to the invocation list,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=128.11942857142859) [you'll notice here that there's a link to run this](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=130.61866666666666) [query in Application Insights.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=133.797) [If I click this,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=136.864) [it jumps me over to the Application Insights query explorer site and preloads](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=137.68320000000003) [the query that returns the details of those invocations that we were just](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=143.05985714285714) [looking at in the functions part of the portal.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=147.562) [I can expand one of these invocations to see more details about it.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=150.24624999999997) [The query language used by Application Insights,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=156.215) [which is sometimes called Kusto, is a very powerful language,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=158.4085) [and it does take a bit of getting used to,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=162.31912499999996) [so it's really helpful that these sample queries are generated for you,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=164.668) [and you can use them as the basis for customizing them to meet your exact needs.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=168.15850000000006) [Back in the functions part of the portal, I can do the same for the log output.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=174.424) [If I select an invocation and click on the Run in](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=179.031) [Application Insights link again, we see another query.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=182.03799999999998) [This time it's a fairly complex one, but the key parameter is the operation Id,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=185.758) [which is specific to this particular function invocation.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=190.982) [And again, we can expand this table here to see the full details of the message.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=195.178) [So as you can see,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=200.373) [if you choose to enable Application Insights for your Azure function app,](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=201.6835) [you get access to some quite powerful querying capabilities, allowing you to explore in detail how your Azure functions are performing.](https://app.pluralsight.com/course-player?clipId=adbd3556-0bc3-4213-a125-7dc22bc7aab8&startTime=205.4965)

### [Demo: Monitoring Cost](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0)

[In this demo,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=1.568) [I'll show you some of the ways that we can monitor and control the cost](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=2.114666666666667) [of our Azure function apps using the Azure portal.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=6.059875) [Now although we've said that the serverless pricing model can dramatically](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=10.534) [reduce your costs compared to a more traditional architecture,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=13.573999999999998) [you probably still do want to keep a close eye on how much you're spending.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=16.905285714285714) [So let's take a look at some of the capabilities](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=22.673) [available to us in the Azure portal.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=24.577125) [Here we're looking at the same function app we saw in our previous demo.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=27.987) [I'll navigate into Platform features for my function app,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=32.549) [and I'll select Metrics.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=36.54271428571428) [And you may well already be familiar with Azure](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=38.945) [Metrics from other Azure resources, as this isn't specific to Azure Functions.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=41.6895) [Pretty much every type of Azure resource provides metrics](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=46.976) [that we can graph and create alerts from.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=50.16085714285714) [In this view, I can easily create a graph,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=52.934000000000005) [so let's pick what metrics we want to view.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=56.104666666666674) [I'll select the resource group and the function app that I'm interested in,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=59.892) [and there are loads of metrics available in here,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=68.156) [but two that are particularly interesting for function](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=70.49216666666668) [apps are the Function Execution Count,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=73.346) [which tells us how many times our function has been executed,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=76.124) [and the Function Execution Units, which are measured in gigabyte seconds,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=80.28533333333334) [and this is interesting because these are the units that are used for the](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=86.363) [pricing calculation when you're using the Consumption plan.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=89.74862500000003) [Another thing we can do with any of these metrics is set up alerts.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=92.73971428571427) [This is really useful if you're concerned that you might accidently run](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=98.017) [up a large bill or if you just wanted some advanced warning that your](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=101.01425000000002) [function app was working harder than normal.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=105.30014285714286) [If you are concerned at the possibility of running up a very large bill,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=107.93242857142856) [there's another useful feature, which is the ability to set a daily usage quota.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=112.27666666666666) [We can configure that in the Function app settings view for our function app.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=118.16) [You provide a daily usage quota in gigabyte seconds,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=123.564) [so here I'll set a maximum of 20000 GB-s per day.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=127.171125) [And when I set this,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=132.1541111111111) [it explains to me that when the daily usage quota is exceeded,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=134.943) [this function app is going to be stopped until the next day at midnight UTC.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=138.64471428571426) [So this is a useful setting if you're creating](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=143.4) [experimental or prototype function apps,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=147.26160000000002) [but for a production function app,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=149.368) [I'd probably prefer to use alerts to let me know that](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=152.01) [there was a higher-than-normal usage,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=154.94133333333332) [rather than allowing it to automatically disable my function app.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=156.49033333333333) [Finally, if you want to know exactly how much you're spending,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=161.347) [then searching for subscriptions in the Azure portal](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=164.5845) [takes us to a view where we can see our current](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=167.59385714285713) [expenditure for a specific subscription.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=170.553) [Here I've navigated into the subscription I'm using for this function app,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=174.353) [and as you can see, on this particular subscription,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=178.30533333333335) [I'm hardly spending anything at all.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=181.682) [In fact,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=183.886) [most of what I'm spending comes from Azure disks and container registries.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=184.3665) [If I click on one of the items in this pie chart legend,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=189.279) [it takes us into another view that gives us a breakdown](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=192.27100000000002) [of exactly what we've spent so far.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=195.85525) [And as you can see,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=197.8761111111111) [my costs for these test function apps I'm creating are extremely low,](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=199.325) [just costing me a couple of pennies a month.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=203.41571428571424) [So this is a great place to come if you want to see the breakdown of exactly what's in your Azure bill.](https://app.pluralsight.com/course-player?clipId=8d3b90e3-2f71-4c9d-86ea-5dc103b164a0&startTime=207.351)

### [How Can I Secure My Functions?](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931)

[One very important question when you deploy your functions to production](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=1.597) [is how can you make sure that they're properly secured?](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=5.4110000000000005) [And for most trigger types,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=9.387) [your functions are already inherently secure by virtue of](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=10.539) [the fact that only authorized users can perform the action](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=13.983000000000002) [that triggers the function.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=17.997) [For example, if I've got a queue-triggered function,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=20.136) [then that can only be triggered by someone who's already got](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=22.45114285714286) [permission to post a message to that queue.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=26.439428571428564) [But for HTTP-triggered functions,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=29.139) [how can you prevent someone who knows the URL of](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=32.059) [your function from just calling it?](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=34.702) [Well, there are several options available to us.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=37.111) [The most obvious one, which is built right into Azure Functions,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=40.521) [is the concept of function keys.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=43.48885714285715) [For each HTTP-triggered Azure function, you can choose an authorization level,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=46.448) [and the three main options to choose between are anonymous,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=51.41766666666666) [function, and admin.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=55.731) [Anonymous means that the Azure Functions runtime will allow all calls](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=58.487) [to your function without any credentials required,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=61.622) [so you'd only use this if you really were happy for anyone to call](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=65.108) [your function or maybe if you're going to implement your own custom](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=68.27775) [validation logic in the function code itself.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=71.66933333333333) [The function authorization level means that the caller must supply a secret](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=75.16) [code that's specific to that particular Azure function.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=80.20633333333333) [It can be provided either as the code query string parameter](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=84.515) [or with the x-functions-key HTTP header.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=88.30659999999999) [And the admin authorization level means that the caller must supply a](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=93.543) [secret code that's specific to the function app as a whole,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=97.96974999999996) [and this is useful if you've created several HTTP-triggered functions](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=100.88787500000001) [that together make up an API and you don't want your caller to have to](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=105.58800000000001) [provide separate codes for each endpoint.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=110.38028571428569) [The Azure Functions portal provides a user interface that allows](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=113.572) [you to generate new function and admin keys,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=117.01357142857141) [as well as cycle or revoke them.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=119.89950000000002) [And this means that it's possible to give each client of](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=122.39037499999999) [your API their own personalized key.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=125.78375000000003) [Now,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=128.944) [function keys are fine for server-to-server calls where the](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=129.35616666666667) [caller can be trusted to keep a secret, but that's not always possible.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=133.3216666666667) [Fortunately,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=138.565) [there are some alternative ways you can secure your HTTP-triggered functions.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=138.962) [For example, you can also enable an Azure App Service feature called Easy Auth,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=144.959) [which requires a valid OAuth token before accepting a call.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=151.198) [This feature applies to your entire function app,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=155.21642857142854) [and it can be configured to use Azure Active Directory,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=158.19350000000003) [Google, Facebook, or several other identity providers.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=161.977) [If you're interested in seeing a demo of how to](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=165.976) [configure Easy Auth with Azure Functions,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=168.84071428571428) [then do check out another course I've created here on Pluralsight.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=170.41742857142856) [It's in the Microsoft Azure Developer: Create Serverless Functions course.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=175.187) [And the demo can be found here.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=180.984) [However,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=183.843) [Easy Auth isn't always an ideal choice because it](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=184.25442857142858) [globally applies to all functions,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=187.6427142857143) [and also because it redirects you to a login page](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=189.28233333333333) [whenever you make an unauthorized call,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=192.46455555555553) [which is only really useful when your consumers are](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=194.21333333333334) [accessing your functions from a web browser.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=197.77516666666665) [Other security options include simply validating the HTTP headers yourself,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=200.865) [and this gives you complete freedom to perform your](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=206.029) [own custom bearer token validation.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=208.89857142857144) [But of course, the usual security considerations apply here.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=211.66) [Generally, it's very risky to implement your own security code,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=215.794) [so you should only do this if you're really sure you know what you're doing.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=219.29500000000002) [One other option worth considering is to put an Azure API](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=223.35433333333333) [Management service in front of your function app,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=227.504) [and this gives you access to additional security features that](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=230.45450000000002) [API Management offers to authorize callers.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=234.34580000000005) [And then API Management, once it's authorized the callers,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=237.575) [can pass on the calls to your function app simply using the function keys,](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=241.27) [which never need to be revealed to the clients.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=245.75) [So there are plenty of security choices available to you. Let's see in our next demo how we can configure function keys.](https://app.pluralsight.com/course-player?clipId=eb2e8eb2-f553-49a1-b361-87a896b7f931&startTime=248.85)

### [Demo: Working with Function Keys](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9)

[In this demo,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=1.733) [we'll see how to use function keys and manage them in the Azure portal.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=2.510666666666667) [Here we are in the Azure portal,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=8.368) [and we're looking again at the Pluralsightfuncsarm function](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=9.999) [app that we deployed in our previous module.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=12.495000000000001) [I'll navigate into the OnPaymentReceived function,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=17.174) [which, if you remember, was an HTTP-triggered function.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=19.9318) [Now, if I go to the Manage tab for this function,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=25.503) [once this page is loaded,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=28.3095) [we can see the function keys that are currently defined for this function.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=30.802) [There's currently just one function key,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=35.49) [called default, and there are two host keys,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=37.543) [called \_master and default.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=40.8028) [And the host keys are the keys that can be used to call](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=44.206) [any function in this function app.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=47.233666666666664) [If I want to, in this view I can click to show the value of a particular secret,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=49.629) [as well as hide it again.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=55.054) [And there's also a convenient way for us to copy it to the clipboard.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=57.346) [Let me navigate back to the main view for the OnPaymentReceived function,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=61.594) [and once it's loaded, I'm going to click this Get function URL link,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=66.079) [which shows me the URL I need to call to trigger this function,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=70.51187500000003) [including the function key.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=74.8156) [You'll see in this drop-down that I can choose which code I want to use.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=77.478) [I can choose any of the function keys or host keys](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=81.843) [that we saw in the Manage tab.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=84.74) [Let's copy this whole URL to the clipboard,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=87.631) [and we'll use it to trigger our Azure function from PowerShell.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=90.458) [I'll paste in a command line that we've seen before in this course.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=95.981) [It's using the PowerShell invoke web request command,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=99.726) [and we're calling the URL that we copied from the portal,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=102.648) [complete with the secret code,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=106.66) [and passing some order details in the request body.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=109.031) [And this is executed successfully and accepted our order.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=111.92366666666666) [But let's prove to ourselves that the function security really does work.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=117.362) [What happens if we try the same thing, submitting another order,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=121.595) [but this time without providing the secret code in the URL?](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=124.79750000000001) [This time, we get a 401 Unauthorized,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=130.103) [which is of course exactly what we expected and wanted.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=134.279) [Let me also show you another way of providing this secret code.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=137.46325) [You don't have to pass it as a query string parameter.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=142.747) [If you want to, you can pass the code as a HTTP header.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=145.873) [Here you can see that I'm providing the code with the x-functions-key header,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=149.17725) [and if we submit this request, we can see that again it's successful.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=155.343) [Let's jump back into the portal and look at the Manage tab](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=161.244) [for our OnPaymentReceived function again.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=165.22299999999996) [If I click this Renew link,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=167.37457142857144) [it will regenerate the secret key and invalidate the original value.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=169.82187499999998) [It prompts me to confirm,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=175.479) [and apologies that this prompt is appearing off-screen here.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=177.563) [I unfortunately can't drag it down, but I'll just click OK.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=180.607) [So now we've created a new key, which we can see here starts with 6x.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=185.304) [Let's jump back to PowerShell, and we'll try to call our function again,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=191.386) [but we're going to use the old key, which started with NE.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=195.256) [And as we can see, we get 401 Unauthorized,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=199.671) [which is exactly what we expect because this original](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=203.292) [function key has now been invalidated.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=206.47549999999998) [Of course, we don't have to use the default key.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=209.399) [Back in the Manage tab in the portal, I can create additional keys.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=212.911) [For example,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=218.295) [I could create a separate key for each client that I](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=218.85225) [wanted to grant access to call my function.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=221.84462500000004) [So I could create a new key called Client1,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=225.239) [and we can either provide our own value or let it generate a value for us,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=228.456) [which I'll do here.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=233.693) [And again, from this view, I can show the key,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=235.316) [I can renew it,](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=237.80381818181817) [or revoke it if I no longer want Client1 to have access to my API.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=239.0270909090909) [So as we've seen in this demo, it's really straightforward to manage and use Azure function keys.](https://app.pluralsight.com/course-player?clipId=499fbbd9-0a4a-4650-b33f-37c6f28b3ce9&startTime=245.113)

### [How Do I Configure CORS?](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40)

[One issue you might run into if you use Azure Functions to](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=1.316) [implement an API is that you might need to configure the](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=4.71975) [settings for cross-origin resource sharing,](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=8.403285714285714) [also known as CORS.](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=11.383) [This allows JavaScript hosted on one domain to make calls from within](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=13.287000000000003) [a web browser to APIs hosted on another domain.](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=17.84825) [It's very easy to configure CORS for a function app in the Azure portal.](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=21.925) [Let's see how we can do that.](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=26.997) [Here I'm looking at my function app in the Azure portal again,](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=29.068) [and I'm going to navigate to Platform features.](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=31.94714285714286) [Now, I'll scroll down here and select the CORS option.](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=36.807) [This allows me to specify which domain names are allowed](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=39.93514285714286) [to make calls into my function app.](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=43.87157142857143) [You can see that there are already three configured,](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=47.342) [and these are used by the Azure portal, so I recommend you don't remove these.](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=49.14975) [But in this view, it's quite straightforward to add additional domain names.](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=55.486) [For example,](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=59.897) [if I wanted to host a web page on my personal website at markheath.net,](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=60.3246) [I could enter that domain like this, and click Save here.](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=65.938) [It will just take a few moments to update those settings,](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=70.344) [and now any JavaScript I host on the markheath.net domain will be allowed to make calls into this function app.](https://app.pluralsight.com/course-player?clipId=86d5bb8c-d708-44f0-923b-0ae9b6c5dd40&startTime=72.85557142857144)

### [What Other Services Can I Integrate With?](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8)

[We've already seen how bindings allow our Azure functions to easily](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=1.209) [integrate with Azure Blob Storage and queues and table storage,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=5.170333333333333) [but there are many other Azure services you can combine your Azure function](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=9.279285714285715) [apps with to add on all kinds of additional capabilities.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=13.953666666666667) [Let me just highlight a few particularly interesting possibilities.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=18.8) [First, there's Azure Functions Proxies.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=23.375) [These allow you to redirect any incoming HTTP requests to](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=26.816) [your function app to another endpoint,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=30.897714285714283) [and you can optionally modify the requests and responses as they pass through.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=33.724333333333334) [You could use this to pass certain requests onto other function](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=38.83875) [apps or to pass requests through to blob storage,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=43.99483333333335) [where you might have some static HTML, CSS,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=46.412) [and JavaScript files hosted.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=49.465333333333334) [And that's a great option if you want to create a single-page web application](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=52.032) [with a function app serving everything from the same domain.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=55.407999999999994) [Second,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=59.35971428571428) [you can place an Azure API Management service in front of your function app.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=59.839571428571425) [This acts as an API gateway that accepts incoming API calls and](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=66.0435) [then routes them onto your back-end function APIs.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=70.814) [It also provides additional security options.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=74.55900000000001) [It's able to verify not just API keys, but JWT tokens or certificates.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=77.927) [It can add a caching layer or enforce usage quotas or rate limiting,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=85.293) [and the API Management service is a particularly good fit](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=89.85300000000002) [for integrating with function apps,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=94.01033333333334) [as it now offers a serverless pricing model itself.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=96.097) [Third,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=100.321) [we've seen already that we can use application settings to store](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=100.608125) [secrets like we did with the SendGrid API key,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=104.632) [but you may prefer to store your secrets in Azure Key Vault.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=108.359) [And you can enable your function app to access secrets from Key Vault](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=111.77062500000002) [by assigning a managed identity to the function app,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=116.47228571428572) [which creates an Azure Active Directory service principal](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=120.22914285714286) [that you can grant key vault access to.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=123.41133333333332) [And I'll be showing how we can set this up in a demo later on in this model.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=127.303) [Fourth, in the last module,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=132.258) [we looked at several ways to deploy our Azure function apps,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=133.47050000000004) [including some tools that allow us to automate deployment.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=136.982125) [If you'd like to set up continuous delivery,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=141.835) [where after your build server has built the function app code it](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=143.59385714285713) [publishes it to a staging environment in the cloud,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=148.02400000000006) [then a great option is to use Azure DevOps Pipelines.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=151.161) [This comes with a number of built-in actions that](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=155.387) [simplify publishing function apps, and it can also deploy ARM templates.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=157.6698) [So this can greatly reduce the amount of work required to](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=162.968) [automate the deployments of your function apps.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=165.94499999999996) [Fifth, if you need to integrate with lots of different Azure services,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=169.354) [then it's worth taking a look at Event Grid.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=173.647) [Event Grid is a service that's able to subscribe to events raised by other](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=176.754) [Azure resources and pass them on to your function app.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=181.01371428571426) [Almost every resource type in Azure publishes events to Event Grid,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=185.304) [and so if you want to trigger functions from things like](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=188.91487499999997) [resource group deployments completing,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=192.4476) [then Event Grid is an excellent way to achieve that.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=194.446) [Now,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=197.32675) [we don't have time in this course to go into great](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=197.725625) [detail on all these integration options,](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=201.26399999999992) [but we will take a quick look at a few of them in action. So first up, let's see how Azure Functions Proxies work.](https://app.pluralsight.com/course-player?clipId=315bd680-cf34-459a-bef7-dd81a60fb4e8&startTime=203.08042857142854)

### [Demo: Azure Functions Proxies](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d)

[In this demo,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=1.709) [we'll see how we can configure Azure Functions Proxies to proxy](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=2.447) [incoming traffic to our function app through to some static web](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=6.951) [resources hosted in Blob Storage.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=11.447571428571433) [Azure Functions Proxies are configured in a proxies.json file,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=13.8595) [and one of the easiest ways to create that proxies file is to use](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=18.93) [the Azure portal to configure the proxies manually and then take a](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=22.98033333333334) [look at the JSON that gets created.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=27.788222222222224) [I've got a function app here called Pluralsightfuncs1234](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=30.568) [that we created earlier on in this course.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=32.7565) [If I navigate to the Proxies view,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=37.496) [it shows me that currently we have no proxies defined in this function app.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=40.024) [I'll click this plus icon, which allows me to define a new proxy.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=44.753) [This one I'll call proxyHomePage,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=49.59) [and it will have a route template of simply a forward slash,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=52.78) [meaning that requests to the route domain are going to be handled by this proxy.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=56.136571428571436) [I'll only proxy GET requests through.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=61.250750000000004) [And now in the backend URL,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=64.739) [I'll specify where I want the requests to be proxied through to.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=67.049) [In this case,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=71.72) [it's to an index.html file that I've already uploaded to blob storage.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=72.81725000000002) [You can see here that I can override the incoming HTTP](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=78.187) [request before proxying it onto the back end.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=81.40966666666667) [I can override the HTTP method, add a query string parameter,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=85.37744444444444) [or add a HTTP header.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=90.315) [And there's also options to override what gets returned as well.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=92.89) [But for this demo, I don't need to do any of that.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=96.861) [So let's go ahead and create this proxy,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=99.42244444444445) [and when that's completed, I'll create another one.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=102.3228) [This time, I'm going to call it proxyImages,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=106.365) [and the route template is going to be /images/,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=108.28866666666667) [\*restOfPath.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=115.53040000000001) [And that means that any incoming requests matching the route](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=116.7) [starting with images is going to match this proxy.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=119.46485714285716) [I'll only proxy GET requests again,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=123.124) [and I'm going to proxy these requests through to](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=125.979) [some files stored in blob storage.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=128.875) [Notice here that I'm taking the restOfPath parameter from the](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=131.521) [route template and using it in the backed URL,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=135.30971428571425) [and this matches whatever was in the incoming request URL.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=138.824625) [So if a request comes in for /images/ elephant.jpeg,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=143.332) [then the restOfPath parameter would contain elephant.jpeg.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=146.5276) [And so now we've created these two proxies,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=153.132) [let's see if they're working by visiting the URL for our function app,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=156.215) [which is Pluralsightfuncs1234.azurewebsites .net.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=160.173) [And this is going to match the proxy homepage route.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=165.442) [So when it loads up, it loads the HTML page that I have in blob storage,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=168.49314285714286) [and it's used the other proxy to access the three images](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=173.246) [that I've got stored in blob storage.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=176.73785714285714) [And this particular web page is a just a very simple site](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=179.789) [that I use in Durable Functions demos.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=182.11175) [And the nice thing about a setup like this is it's really easy for us to](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=184.2482857142857) [write some JavaScript in this web page that calls through into some](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=189.11249999999998) [HTTP-triggered functions in our function app.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=192.375) [That way, because we're doing everything through the same domain,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=196.121) [we don't even need to set up any CORS roles.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=198.94950000000003) [Let's see what the underlying configuration looks like.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=202.676) [If I click Advanced editor here, it takes us to this App Service Editor,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=206.20585714285713) [which is a new preview feature that shows us the](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=211.80025) [files that make up our function app.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=215.35999999999999) [And here we can see what the proxies.json file that's](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=217.41733333333332) [been generated for us looks like.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=221.04) [There's a proxies object that has an entry per proxy,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=223.93928571428572) [and the information we entered in the portal is visible here in](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=228.56) [these matchCondition and backendUri settings.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=231.902) [So once you've seen this syntax once,](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=235.91) [it's very easy for you to use this as the basis for creating your own](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=238.426) [proxies.json files directly without needing to use the portal. Let's see next how we can access secrets that are stored in key vault.](https://app.pluralsight.com/course-player?clipId=dff27087-9697-4fa1-870b-49c686c0e77d&startTime=242.74550000000002)

### [Demo: Accessing Secrets in Key Vault](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf)

[In this demo,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=1.759) [I'll show you how we can access secrets stored in Azure](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=2.3209999999999997) [Key Vault from an Azure function app.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=5.653571428571427) [We'll use it to protect a secret key that currently we're](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=8.853) [storing directly in an application setting.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=11.971333333333334) [And we'll be creating a system-assigned managed identity for our](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=15.143) [function app to allow it to access the key vault.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=18.77585714285715) [Here I'm showing you an Azure Key Vault that I've already created,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=22.476) [and I've added a secret to it called SendGridApiKey.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=26.7045) [Since anyone who's got this key can send emails as](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=31.819) [though they were coming from me,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=34.42399999999999) [I'd really like to protect this secret securely in Azure Key Vault.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=36.341) [In Azure Key Vault, secrets have identifiers,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=40.438) [and I'm going to need the identifier for this secret later.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=43.41557142857142) [I can get it by navigating into the secret,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=47.678) [selecting the current version, and copying the secret identifier here.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=50.871) [Next,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=56.532) [I want to grant my function app access to read the keys from this Key Vault,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=56.843125) [and I can do that in two steps.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=61.89611111111111) [First, I'm going to give my function app a system-assigned managed identity.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=65.169) [I can do that by going to Platform features for my](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=70.853) [function app and then selecting Identity.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=75.12700000000001) [And all I need to do is turn this on,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=79.348) [and my function app will be given an identity in Azure Active](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=81.934) [Directory that we can then grant access to our key vault.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=85.27199999999998) [So I'll turn this on and save it,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=90.245) [and it tells me that it's going to create an](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=93.244) [identity called Pluralsightfuncs1234.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=96.371) [So I'll allow it to carry on, and when it's done,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=99.593) [we need to grant this new identity read access to my Azure Key Vault.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=102.425875) [So back in my key vault, let's navigate to Access policies.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=108.112) [I need to add a new access policy.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=112.13475000000001) [First, I'll select the service principal that we just created,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=115.65766666666667) [so I'll search for Pluralsightfuncs1234 and select that.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=120.977) [The only thing my function app needs to be able to do is get a secret,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=125.35857142857142) [so following the principle of least privilege,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=131.331) [I'll only grant it permission to get secrets.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=133.43957142857144) [And now let me complete creating this access policy.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=136.58499999999998) [So now we've got two access policies for this key vault,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=141.763) [and I can always come back here and revoke the access for my](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=145.10099999999997) [function app in the future if I want to.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=148.80412500000003) [The final step is to set up the function app to be able to](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=151.869) [reference the secret from key vault,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=155.34733333333327) [rather than having the secret value stored directly as an application setting.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=157.18228571428574) [So what we need to do in our application setting](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=163.477) [value is to use a special syntax.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=165.86075) [The syntax we need to use is @ Microsoft.KeyVault,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=169.163) [and then SecretUri=,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=172.8426) [and then we provide the identifier of our secret that we copied from key vault.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=175.722) [And this syntax is known as Key Vault References,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=181.157) [and it's currently still a preview feature of Azure](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=184.2055) [Functions at the time I'm recording this.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=187.46457142857142) [So let's do this.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=190.685) [In my function app, I'll visit the Application settings page,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=192.19149999999996) [and I'll add a new setting.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=196.337) [Its name will be SendGridApiKey, but the value,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=198.295) [instead of being the actual API key,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=202.2535) [will use the special syntax that references our key vault secret.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=204.56775) [And now I'll save the application settings,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=209.96) [and with that done,](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=212.714) [now whenever my function app code accesses the SendGridApiKey application setting, it will see the value from the key vault.](https://app.pluralsight.com/course-player?clipId=0ab3531c-cac7-40ef-a6d2-9a97a105e3cf&startTime=213.87857142857143)

### [Demo: Integrate with API Management](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99)

[In this demo,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=1.243) [I want to show how easy it is to put an Azure API Management](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=1.9354545454545455) [service in front of an Azure function app.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=6.280250000000002) [First, let's click here in the Azure portal to create a new resource,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=9.087) [and I'll search for API Management.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=14.259999999999996) [We'll create a new API Management service,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=17.072875) [and I need to provide some configuration.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=20.78714285714286) [I'll give it the name Pluralsightfuncs1234 and put it in the](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=23.787571428571432) [Pluralsightfuncs1234 resource group as well.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=29.279) [I am required to provide an organization name,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=33.753) [and that's used by a developer portal which API Management](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=36.204625) [exposes to help developers who want to use our API.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=40.251) [And we're also asked to provide an administrator email address.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=45.056) [We need to choose a pricing tier, and until fairly recently,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=49.135) [the options were Developer, Basic, Standard,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=52.74557142857143) [and Premium,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=55.67159999999999) [with each one adding additional capacity and features but going up in cost.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=56.966) [But there's also a new tier called Consumption,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=62.391) [which offers a serverless pay-for-what-you-use pricing model,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=64.5582) [and that makes it a great fit for combining with Azure](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=69.837) [Functions in a serverless architecture, so let's pick that option.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=72.71700000000001) [We'll create our API Management service,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=78.086) [and this will take a little while,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=80.756) [but when the notification comes through that deployment is complete,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=82.677) [we can navigate to it in the portal.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=86.911) [Let's go into the APIs section, and we need to add a new API.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=89.869) [A single API Management service can be placed in](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=96.33411111111108) [front of multiple function apps, but we're just going to connect to one.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=99.51787500000003) [In the add new API view, I can select Function App,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=103.81066666666668) [and this simplifies the process of adding an Azure function app.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=109.006) [So let's search for our Pluralsightfuncs1234 function app.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=113.683) [When we find it,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=119.021) [it will automatically detect all the HTTP-triggered](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=120.03757142857141) [functions in our function app, and there's just one in this example.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=122.96066666666665) [But if there were multiple HTTP-triggered functions,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=127.10085714285715) [we could pick and choose which ones we wanted to expose through API Management.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=129.3826666666667) [Next,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=136.593) [we can configure various settings for this API like the](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=136.94571428571427) [display name and the API URL suffix,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=140.69622222222222) [which controls the URLs that will be routed through](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=143.69500000000002) [to these function app endpoints.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=147.45014285714282) [And the defaults it's suggested here are absolutely fine for our purposes,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=149.33433333333335) [so let's create this now and wait for it to complete.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=153.707625) [And API Management offers us loads of flexibility](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=158.38071428571425) [to customize access to our API.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=161.7134285714286) [For example, we can add inbound policies to all incoming requests,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=164.09777777777782) [and here you can see some of the options.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=169.874) [We can filter by IP address, we can rate limit the API,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=172.248) [we can add additional headers on before passing the](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=176.6071428571429) [request on to our function app, or we could set up response caching.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=180.004625) [So there's a lot of power here to customize exactly how your API works,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=183.6562857142857) [even before the request hits your Azure function app.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=188.68271428571427) [And API Management also offers some great security features.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=192.638) [For example, we can configure OAuth 2.0 for this API Management service,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=197.379) [or OpenID Connect, or client-side certificates.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=201.982) [Now in this course,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=206.457) [unfortunately we don't have time to explore all the features of API Management,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=207.77071428571423) [but I did want to show you just how easy it is to connect your](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=211.61333333333334) [Azure function app to an API Management service,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=215.6516666666666) [and if you'd like to learn more about Azure API Management,](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=219.207) [then here on Pluralsight there are some more courses that will introduce you to more of its capabilities.](https://app.pluralsight.com/course-player?clipId=be1eb352-9b08-4d6a-b968-bcf60e511f99&startTime=222.25400000000002)

### [How Can I Build Reliable Workflows with Azure Functions?](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28)

[For the demos in this course,](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=0.474) [we've been building a very simple function pipeline.](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=2.893) [It starts with a HTTP-triggered function which writes a message into a queue,](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=6.166) [and that triggers another function that creates a blob in Azure Blob Storage,](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=11.133) [and that triggers another function that sends out an email.](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=15.546) [And we saw it was very easy to chain functions together](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=18.5056) [like this to form a basic workflow.](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=22.322571428571436) [However, when you start creating more complex workflows,](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=25.21) [you will start running into some limitations with this approach.](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=28.246333333333336) [For example,](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=33.001) [it's hard to know what workflows are currently in progress](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=33.586999999999996) [and how far through them you've got.](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=37.0077142857143) [There's also no single place where you can write error](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=40.109) [handling for the workflow as a whole.](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=42.770888888888884) [You'd have to put error handlers in each function individually.](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=45.266) [There's also no easy way to retry steps in the workflow in case you](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=49.184) [encounter transient errors or if you wanted to implement some more](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=53.31049999999999) [advanced patterns like waiting for external events with timeouts or](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=57.52600000000001) [performing some of your tasks in parallel and resuming the workflow when](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=62.069) [all of those parallel steps have completed.](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=65.91242857142859) [Those types of things are quite hard to achieve just](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=69.216) [by chaining functions together.](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=71.89533333333333) [Fortunately,](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=74.388) [there's an extension to Azure Functions called Durable](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=74.792) [Functions that addresses all of these concerns,](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=78.41520000000001) [by allowing you to define workflows, also called orchestrations,](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=82.256) [that consist of multiple steps, each performed by a single Azure function.](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=85.87499999999999) [With Durable Functions, you define what's called an orchestrator function,](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=91.45660000000001) [which specifies what all the steps in your workflow are,](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=95.58) [and then activity functions implement each one of those steps.](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=100.099) [Now Durable Functions is too large a topic for us to cover in this module,](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=104.81342857142857) [but I have created a whole course about it here on Pluralsight](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=109.519) [called Azure Durable Functions Fundamentals,](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=113.05249999999998) [so do feel free to check that out if you want a detailed look into how](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=115.121) [Durable Functions work and what you can do with them.](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=120.15842857142857) [But I do want to quickly show you what our order processing pipeline would](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=123.925) [look like if we implemented it with Durable Functions. So let's see that next.](https://app.pluralsight.com/course-player?clipId=ebce034c-0f43-49d8-9c38-8c5476848d28&startTime=127.53300000000002)

### [Demo: Durable Functions](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96)

[In this demo,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=1.806) [I'm going to show you what the order function pipeline we created in this](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=2.3940000000000006) [course would look like if we used Durable Functions.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=6.2822499999999994) [It will still write the order to table storage,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=9.001142857142858) [create a license file in blob storage, and send an email to the customer.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=12.478000000000003) [But now each of those steps will be implemented as activity functions.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=16.689999999999998) [And although we don't have time to go into the details of](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=22.076) [exactly how Durable Functions work,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=24.7195) [I hope this will give you a feel for what a durable workflow looks like in code.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=26.320555555555558) [Here we are in Visual Studio,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=32.002) [and I've already converted the workflow to use Durable Functions.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=34.564) [So let's quickly look at each of the five new functions I've created.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=38.992) [The first is the webhook that receives the payment](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=43.393) [notification from our external system, and I've called this OnPaymentReceived2,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=46.3422) [just so that it doesn't clash with our existing](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=50.57933333333333) [OnPaymentReceived function that we created earlier.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=54.73979999999999) [And this is just a normal Azure function with a HttpTrigger.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=57.874) [But it's also got a binding to a DurableOrchestrationClient,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=61.185249999999996) [and we can use that to start a new durable workflow.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=66.452) [And we do that here with the durableClient StartNewAsync method call.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=70.606) [We pass it the name of our orchestrator function,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=75.866) [which is called NewOrderWorkflow,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=77.9128) [and we can pass some information into our orchestrator.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=81) [In this case, I'm passing in the incoming order object.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=83.649) [And StartNewAsync returns an orchestration identifier which we can use to](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=87.29433333333333) [track the progress of this orchestration if we want to.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=92.67285714285714) [The orchestrator function in our example is very simple.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=96.20771428571429) [It has an OrchestrationTrigger,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=100.04) [which is bound to a DurableOrchestrationContext object,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=102.068) [and the first thing it does is it gets hold of that input data that](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=105.752) [our starter function passed to our orchestration,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=108.98685714285718) [which was simply an order object.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=112.103) [Then we just call each of the three activities in turn by awaiting](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=114.943) [CallActivityAsync on the DurableOrchestrationContext.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=119.867) [The first activity saves the order to the database,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=125.292) [the next one creates a license file in blob storage,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=127.57985714285714) [and the last one emails the license file to the customer.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=131.54250000000005) [Each activity can have input data,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=135.606) [and we're just passing the order object to each activity in this example.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=138.241) [They can also return output data,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=142.998) [which could be used to make decisions about what](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=145.065) [should happen next in the workflow.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=147.22528571428572) [And although this workflow is extremely simple,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=149.435) [Durable Functions allows us to evolve it to be more complex.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=151.57816666666665) [Maybe we could run some of these steps in parallel,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=156.15) [or we might want to put a top-level exception handler across the whole workflow.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=157.922) [And here's one of our activity functions.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=162.72042857142856) [This one saves the order to table storage.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=165.40800000000002) [It's got an ActivityTrigger that binds to an order object,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=169.484) [which will be populated with the activities input data.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=172.7197142857143) [And it also has a Table storage output binding.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=176.939) [That bit is exactly the same as we saw earlier on in this course.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=180.399) [And Durable Functions can use any of the standard Azure Functions](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=184.369) [bindings just like regular Azure Functions can.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=187.489) [If we look at the CreateLicenseFileActivity function,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=191.166) [again,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=193.734) [that takes the majority of the code from our queue-triggered](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=194.11800000000002) [function that we created earlier on in this course and simply moves](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=197.913) [it into an Activity- triggered function.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=201.53142857142856) [It's using the IBinder technique that we learned about earlier to](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=203.67999999999998) [give us control of the blob storage file name.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=207.815) [And the EmailLicenseFileActivity function again uses the same](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=211.456) [bindings that we've seen before in this course.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=215.32642857142855) [So,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=218.815) [converting existing Azure function pipelines to benefit from the added value](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=219.2454) [of Durable Functions is very straightforward to implement.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=223.837) [Let's quickly see this in action.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=227.889) [I'm going to start up my function app, and once it's started up,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=230.289) [you can see that now there's on OnPaymentReceived2 function.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=234.13033333333334) [And when we call this,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=238.997) [it's going to create a new Durable Functions orchestration.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=239.9525555555555) [So, let's call this from PowerShell,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=244.42) [just like we've done several times before in this course,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=246.598) [and the only difference is that now I've updated the](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=249.35300000000004) [URL to point to OnPaymentReceived2.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=252.27299999999997) [And this seems to have worked,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=254.2565) [so if we take a look at the functions runtime output,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=257.74122222222223) [we can see that not only is it executing our orchestration function,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=260.47857142857146) [which was called NewOrderWorkflow,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=264.99025) [but we can see it's already finished and called the](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=266.6791666666667) [EmailLicenseFileActivity function.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=271.384) [And if you've got very keen eyesight,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=274.257) [you might notice that we're actually sending two emails now because](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=275.851) [my original blob-triggered function has also picked up on the blob](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=279.2538571428571) [that was generated by my durable workflow,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=283.383125) [so I'd probably want to delete my original pipeline](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=285.80871428571425) [after migrating to Durable Functions.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=289.2223333333334) [And we can check in Storage Explorer that the new](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=292.771) [order is present in the orders table, and here we can see it,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=295.6645) [order 909.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=300.51799999999986) [And let's also check that the blob did get written to](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=301.438) [blob storage in the licenses container, and here we can see it,](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=304.0562857142857) [909.lic.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=310.6092500000002) [So I do highly recommend Durable Functions if you find that you're starting to chain together multiple Azure functions to create workflows.](https://app.pluralsight.com/course-player?clipId=19d8ff15-c2db-4219-9d04-d39ef5172a96&startTime=311.346)

### [How Can I Learn More?](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71)

[In this module, we focused on running Azure Functions in production.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=1.723) [We learned about several ways to monitor our functions,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=6.382) [including using Application Insights to view the](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=9.216199999999999) [invocation history and log output,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=12.466428571428573) [as well as using metrics in the Azure portal to help us](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=14.351666666666668) [keep track of costs and overall usage.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=18.212999999999997) [We discussed various ways to secure our functions and saw how we can manage](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=21.325999999999993) [function keys for HTTP-triggered functions in the Azure portal,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=26.774) [as well as how to configure CORS.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=30.552374999999994) [We saw that Azure Functions integrates really well with several other](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=34.164) [Azure services and saw demos of using proxies to send incoming traffic](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=38.0515) [on to other destinations like blob storage,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=42.910999999999994) [as well as how to access secrets stored in Azure Key Vault by](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=45.446) [configuring a Managed Identity for our function app.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=50.04871428571428) [We also saw how easy it is to put Azure API Management](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=53.47599999999999) [service in front of our function app,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=57.626) [which could be used to add additional security or other](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=59.872125000000004) [features such as caching or rate limiting.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=63.695) [Finally,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=67.018) [we took a very brief look at how Durable Functions add some powerful](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=67.26833333333333) [workflow orchestration capabilities to Azure Functions.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=71.253) [And this is great for implementing complex and long-running business processes.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=75.1122857142857) [In this course,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=80.37499999999999) [I've tried to give you a big picture of the main features](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=82.184) [and capabilities of Azure Functions.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=85.2972857142857) [But of course, there's still plenty more to learn.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=88.118) [So let me wrap up by recommending a few resources for going into more depth.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=90.426) [First of all,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=97.222) [the official Azure Functions Documentation is very](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=98.00242857142855) [comprehensive and well written,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=100.6402) [so I do recommend you spend some time exploring it,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=102.4165) [particularly if you want to use some of the binding and trigger types](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=106.12642857142858) [that we didn't have time to cover in this course.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=109.57944444444445) [Secondly,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=114.041) [here on Pluralsight there are several additional courses that you](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=114.37316666666666) [can watch to learn more about Azure Functions.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=117.70233333333331) [For example, in my Microsoft Azure Developer: Create Serverless Functions course,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=121.903) [I show how you can use Azure Functions to build out a REST API.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=126.303375) [And in my Azure Durable Functions Fundamentals course,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=131.897) [I go into a lot more detail on the inner workings of Durable Functions and](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=134.35325000000003) [the advanced workflow patterns you can implement with them.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=139.1744) [And you might also want to check out this course from Jason Roberts,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=143.711) [which looks at how we can test Azure Functions.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=146.65357142857144) [Finally, here on GitHub,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=150.987) [I've created a large list of recommended Azure Functions resources,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=152.21157142857138) [and this includes loads of articles about](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=156.15966666666665) [real-world use cases of Azure Functions,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=158.83533333333335) [as well as many sample applications.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=161.66125) [I hope you've enjoyed this course and that it's inspired you to try out](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=164.845) [building serverless applications with Azure Functions.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=168.50214285714281) [I'd love to hear about what you create with Azure Functions,](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=172.461) [so do feel free to get in touch with your questions or comments. Thanks for watching.](https://app.pluralsight.com/course-player?clipId=8c08dce7-a232-4f34-b493-19c63d7ffb71&startTime=174.52655555555557)