Chad Green From Zero to Serverless

Scenic City Summit October 4, 2019







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Agenda

- What is Serverless Computing
- Functions as a Service
- Serverless Options
- Azure Functions Overview
- Azure Functions in Action
- Pricing
- Best Practices









What is Serverless Computing

Serverless in Action



What is the right **size** of servers for my business needs? How can I increase **server** utilization? How many **servers** do I need? How can I scale my application?



How often should I patch my servers? How often should I backup my server? Which packages should be on my **server**?



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laaS



How do I deploy new code to my server? Which **Operating System** should I use? Who **monitors** my application?

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- - How many **servers** do I need?
 - How can I scale my application?









What is the right **size** of servers for my business needs? How can I increase **server** utilization?







The platform for next generation applications

On-Premises

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What is Serverless?



Abstraction of Servers







Event-Driven/Instant Scale

Micro-Billing

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Benefits of Serverless





Manage apps not servers



Reduced DevOps

Faster Time to Market

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Challenges of Serverless Architecture

Complexity

Organizational Support





No Runtime Optimization



Function as a Service

Serverless in Action

Serverless is more than just one thing

Backend as a Service (BaaS)

Applications that significantly or fully ightarrowdepend on services (in the cloud) to manage server-side logic and state

Functions as a Services (FaaS)

Application run in stateless compute ulletcontainers that are event-triggered, ephemeral, and fully managed by a 3rd party



Function Scale







Nano Services

FaaS is at the center of serverless



Single responsibility

Functions are single-purposed, reusable pieces of code that process an input and return a result



Short lived

Functions don't stick around when finished executing, freeing up resources for further executions

Functions-as-a-Service programming model use functions to achieve true serverless compute



Stateless

Functions don't hold any persistent state and don't rely on the state of any other processes



Event driven & scalable

Functions respond to predefined events, and are instantly replicated as many times as needed







Serverless Options

Serverless in Action



AWS Lambda

Run code without thinking about servers. Pay only for the compute time you consume.



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AWS Lambda

Google **Cloud Functions**

Event-driven serverless compute platform





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AWS Lambda

Google **Cloud Functions**

IBM Cloud **Functions**

Execute code on demand in a highly scalable serverless environment











AWS Lambda

Google **Cloud Functions**

IBM Cloud **Functions**

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Auth0 WebTask

All you need is code









Google **Cloud Functions**



IBM Cloud **Functions**

Your vision. Your cloud.











Azure Serverless Offerings



Event Grid

Manage all events that can trigger code or logic



Logic Apps Design workflows and orchestrate processes



Database



Storage



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Functions Execute your code based on events you specify







Events + data

Azure Functions

Serverless in Action

Choice of language ullet





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- Choice of language ightarrow
- Pay-per-use pricing model ullet











- Choice of language ullet
- Pay-per-use pricing model ullet
- Bring your own dependencies ullet







- Choice of language ullet
- Pay-per-use pricing model ightarrow
- Bring your own dependencies •
- Integrated security ightarrow





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- Simplified integration ullet
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- Integrated security ightarrow
- Simplified integration ightarrow
- Flexible development ightarrow
- **Open-source**



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Azure Functions

Azure Functions is an event driven, compute-on-demand experience that extends the existing Azure application platform with capabilities to implement code triggered by events occurring in virtually any Azure or 3rd party service as well as on-premises systems. Azure Functions allows developers to take action by connecting to data sources or messaging solutions, thus making it easy to process and react to events. Azure Functions scale based on demand and you pay only for the resources you consume.

This repository acts as a directory for folks looking for the various resources we have for Azure Functions.





Triggers and Bindings

Туре	1.x	2.x	Trigger	Input	Output
Blob Storage	 Image: A start of the start of	✓	\checkmark	\checkmark	\checkmark
Cosmos DB	~	\checkmark	\checkmark	\checkmark	\checkmark
Event Grid	\checkmark	\checkmark	\checkmark		
Event Hubs	\checkmark	\checkmark	✓		<u> </u>
HTTP & Webhooks	 ✓ 	\checkmark	<u> </u>		<u> </u>
IoT Hub	✓	\checkmark	✓		<u> </u>
Microsoft Graph		\checkmark		\checkmark	\checkmark
A microsoft Graph		~		✓	✓
OneDrive files					
Microsoft Graph		\checkmark			\checkmark
Outlook email					
Microsoft Graph		\checkmark	\checkmark	✓	\checkmark
events Microsoft Croph				•	
Auth tokens		\checkmark			
Mobile Apps	✓	✓		✓	✓
Notification Hubs	 	 Image: A set of the set of the			\checkmark
Queue Storage	~	 	✓		\checkmark
SendGrid	~	 Image: A set of the set of the			✓
Service Bus	~	 	✓		✓
SignalR		 Image: A start of the start of		✓	\checkmark
Table Storage	~	 		\checkmark	\checkmark
Timer	\checkmark	\checkmark	\checkmark		
Twilio	~	~	\checkmark		\checkmark

Develop How You Want









Azure Portal

- else
- Visual Studio 2017
- Visual Studio Code
 - ightarrow
- Azure Functions Core Tools (CLI)
 - choice

• Quickly get started without having to install anything

• First class C# development experience

• First class Node.js development experience Edit any function project generated via CLI Build any kind of function and edit in IDE of your



Runtime Versions

Runtime 1.x

• .NET Framework 4.6



Runtime 2.x

- .NET Core 2.0
- Cross Platform ullet
- Language Extensions •
 - Java
- **Binding Extensions** •
 - Microsoft Graph
 - Durable Functions

Runtime Version Languages

Language	1.x	2.x
C#	GA (.NET Framework 4.7)	GA (.NET Core 2.2)
JavaScript	GA (Node 6)	GA (Node 8 & 10)
F#	GA(.NET Framework 4.7)	GA (.NET Core 2.2)
Java	N/A	Preview (Java 8)
Python	Experimental	Preview (Python 3.6.x)
TypeScript	Experimental	GA (Supported through transpiling to JavaS
PHP	Experimental	N/A
Batch (.cmd, .bat)	Experimental	N/A
Bash	Experimental	N/A
PowerShell	Experimental	Preview (PowerShell Core 6)



Consumption Plan

- Pay for what you use without the need to reserve compute resources.
- Function Apps are assigned to compute processing instances that are scaled dynamically by the platform.
- Functions can have multiple parallel executions minimizing the total time needed to process requests.
- Cost is driven by the number of executions and by accounting \bullet for memory size used and total execution time across all functions in a Function App as measured in gigabyte-seconds.

Selection guidance

Good option if your functions run at elastic scale with lacksquarepotentially intermittent executions.

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- Subscription

Storage Account functiondcdf32e7a2e1

Pin to dashboard

Create

Automation op



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App Service Plan

- Function Apps run on dedicated VMs, just like \bullet today
- Dedicated VMs are allocated to your apps and \bullet available whether code is being actively executed

Selection guidance

- Good option if you have existing, under-utilized \bullet already running other code
- Good option if you expect to run functions conti \bullet almost continuously

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Premium Plan

	Consumption Plan	- <i>New-</i> Premium Plan (Preview)
Instance Size	Fixed at one core and 1.5Gb of memory	Configurable up to 4 cores and 14Gb of memory
Scaling	Event driven scaling	Event driven scaling
Scale Controls	None	Set min and max instances
Private Networking	None	VNET integration
Warmup Time (Cold Start)	Your app must be loaded after it is inactive	No delay after your app is inactive and scale instantly to pre-warmed instances
Cost	Consumption	Consumption and at least 1 pre-warmed instance per plan

Ways to Run Functions

Consumption Serverless



Pay only for what you use! Metering is per execution and per Gb second.

App Service Plan Free, Basic, Standard, Premium



All the advantages of Functions with the SLA and 'always on' feature of an App Service Plan

App Service Environment Network Isolation



Your own dedicated cloud environment with network isolation for apps, higher scale, and the ability to connect securely to local vNets.

Azure Stack On Premises



Leverage cloud innovations in onpremises infrastructure. Azure Stack brings the power of Azure to your data centers.

Azure Functions Runtime Functions on your Server



Run your Azure Functions on our local server (without the rest of Azure)

Azure IoT Edge On Devices



Run on IoT Devices by deploying custom modules.







Pricing

Serverless in Action



Pricing – General Information

- No upfront cost
- No termination fees
- Pay only for what you use



Consumption Plan Pricing

Meter	Price	Free Grant
Execution Time	\$0.000016 per Gb-s	400,000 GB-s
Executions	\$0.20 per million executions	1 million executions

- lacksquare
- Executions Each time a function is executed ightarrow

Pricing Example

- **Execution Time**
 - 3 million executions x 1 second per execution = 3 million seconds ullet
 - Resource consumption of 512-Mb \rightarrow 1.5 million GB-s ightarrow
 - 1.5 million GB-s minus grant of 400,000 Gb-s = 1.1 million Gb-s ullet
 - Execution Total = \$17.60 ullet
- Executions

 - 2 million transactions at 20 cents per million = \$0.40
- Grand Total: \$18.00

Gigabyte-second (GB-s) – Combination of memory size and execution time

• 3 million executions minus grant of 1 million executions = 2 million executions







Azure Functions in Action

Serverless in Action



Demo: Create an Azure Function from the Portal



Demo: Create an Azure Function from Visual Studio

Visual Studio Installer

Products

Installed



Welcome!

We invite you to go online to hone your skills and find additional tools to support your development workflow.

C Learn

Whether you're new to development or an experienced developer, we have you covered with our tutorials, videos, and sample code.



Marketplace

Use Visual Studio extensions to add support for new technologies, integrate with other products and services, and fine-tune your experience.

Need some help?

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Get help from Microsoft at Visual Studio Support.



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⁺	Desktop development with C++ Build Windows desktop applications using the Microsoft C++ toolset, ATL, or MFC.			
Web & C	loud (7)			
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2	Python development Editing, debugging, interactive development and source control for Python.		(js)	Node.js developm Build scalable netw asynchronous ever
Location				

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nt

and projects for developing cloud apps,

, and building Containers including...

nent

work applications using Node.js, an nt-driven JavaScript runtime.

Summary

- > Visual Studio core editor
- > Universal Windows Platform development *
- > .NET desktop development
- > ASP.NET and web development
- > Azure development
- > Data storage and processing
- > .NET Core cross-platform development
- ✓ Individual components
 - Visual Studio C++ core features
 - PowerShell Tools for Visual Studio 2017
 - ReadyRoll for VS2017
 - SQL Prompt Core
 - ✓ TypeScript 2.3 SDK
 - Arduino IDE for Visual Studio
 - PowerShell Pro Tools for Visual Studio 2017
 - Windows Template Studio
 - ✓ VS Live Share Preview

Total install size:





Demo: Monitoring a Rapidly Scaling Function

Most Powerful Sith Lord



Darth Vader



Darth Bane



Darth Sidious



Darth Vitiate



Exar Kun



Darth Revan



Darth Traya

@ChadGreen





Darth Maul

Darth Millennial

Darth Revan

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Most Powerful Sith Lord



Darth Jar Jar



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Most Powerful Sith Lord







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Best Practices

Serverless in Action



Function Timeouts

- Default timeout of 5 minutes
- Maximum timeout of 10 minutes
- For longer running functions use the App Service Plan and/or Durable Functions

The absolute minimum best practices

- Functions should do one thing
- Functions should be idempotent
- Functions should finish as quickly as possible

Avoid long running functions



 Avoid long running functions Cross function communication



- Avoid long running functions
- Cross function communication
- Write functions to be stateless

More capabilities coming in near future

Durable Functions



- Avoid long running functions
- Cross function communication
- Write functions to be stateless
- Write defensive functions

Testing Your Functions

- Recommended Way ightarrow
 - Abstract logic away from the Function and test that abstraction •
- But I really need (want) to test the actual Function ightarrow
 - Within test project, you will need to create a class that implements the ulletILogger which will be passed into the Functions



Do not mix test and production code in the same function app

- Do not mix test and production code in the same function app
- Use async code but avoid blocking calls



- Do not mix test and production code in the same function app
- Use async code but avoid blocking calls
- Receive messages in batch whenever possible

- Do not mix test and production code in the same function app
- Use async code but avoid blocking calls
- Receive messages in batch whenever possible
- Configure host behaviors to better handle concurrency

How to get started

- item
- Integration is a great place, often it's a new layer on top of old layers

Start small, replace 1 API or background processing

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