Azure 開發實作特快車

紙鈔魚

自我介紹

- 于子超 (紙鈔)
- Microsoft MVP 2017
  - Visual Studio and Development Technologies
- https://www.linkedin.com/in/abc12207/
- @lettucebo (Facebook)

本身經驗

- 2012年開始使用Azure
- 從 Websites 開始使用（後來改名為 Azure Web Apps）
- 公司目前除了開發機以外，都使用Azure服務
- 大型活動網站
  - 2013～2017台灣燈會(2015開始都架在Azure上)
  - 大大小小政府網站

Azure 開發實作特快車

VM / Storage / App Services 快速入門班

CLOUD 簡介

雲端 - 美國國家標準局 NIST 定義

自我服務

- 透過自我服務入口網站 (self-service portal) 自由獲取運算資源

網路存取

- 任何裝置可從任何地點存取運算資源

資源共享

- 雲端業者採用多租戶架構將運算資源提供給眾多用戶

彈性延展

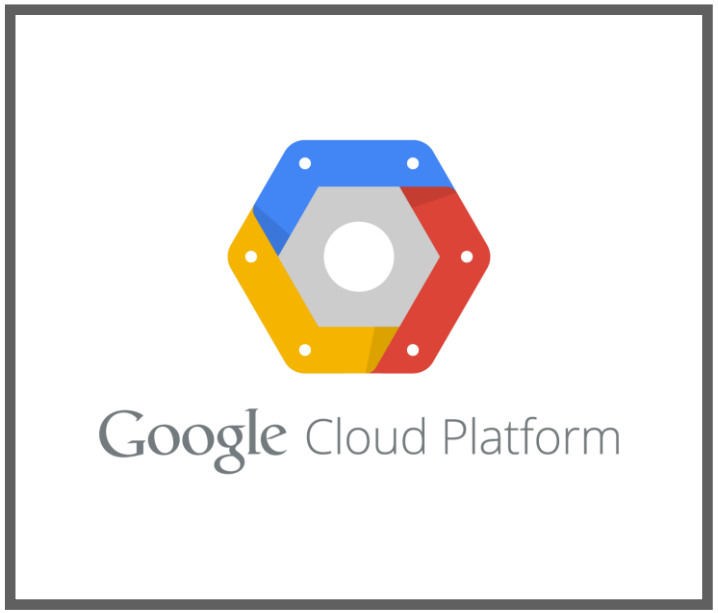
- 用戶可以依據實際需求自由延展擴增運算資源或縮減運算資源

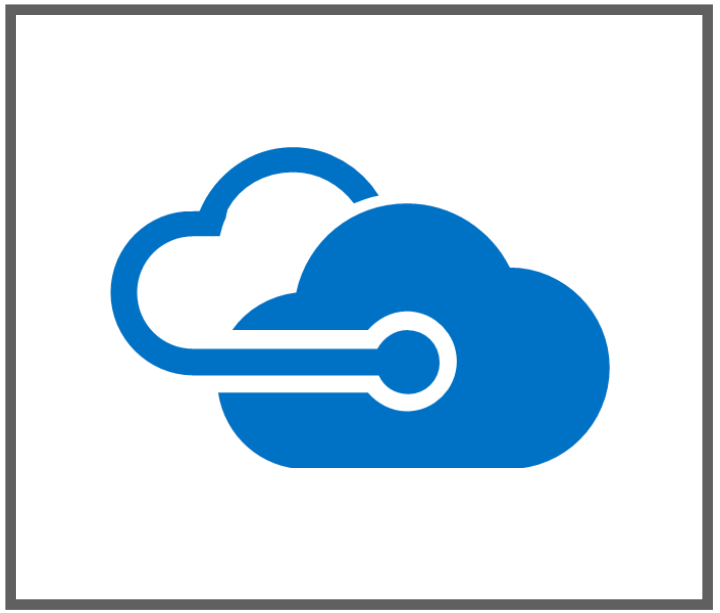
以量計價

- 用戶依照實際用量支付費用或分攤成本

Why Cloud

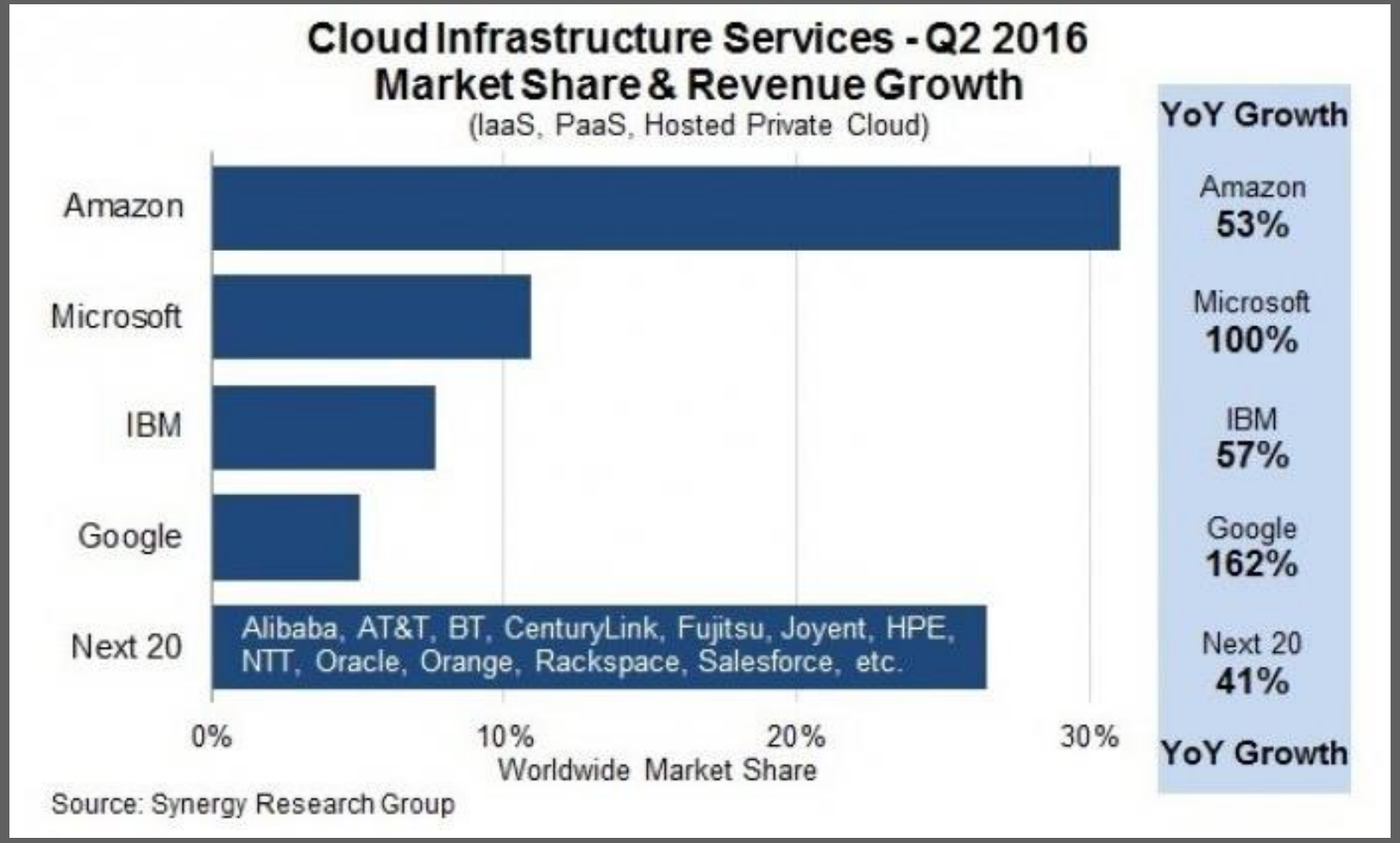
- 站在 Startup, ISV 角度上看
  - 自建機房與營運的成本
    - 設備購買、汰舊
    - 冷氣設備與電費
    - 資料安全怎麼半
  - 專職IT所需要的知識





三大雲端服務提供商

三大雲端服務提供商

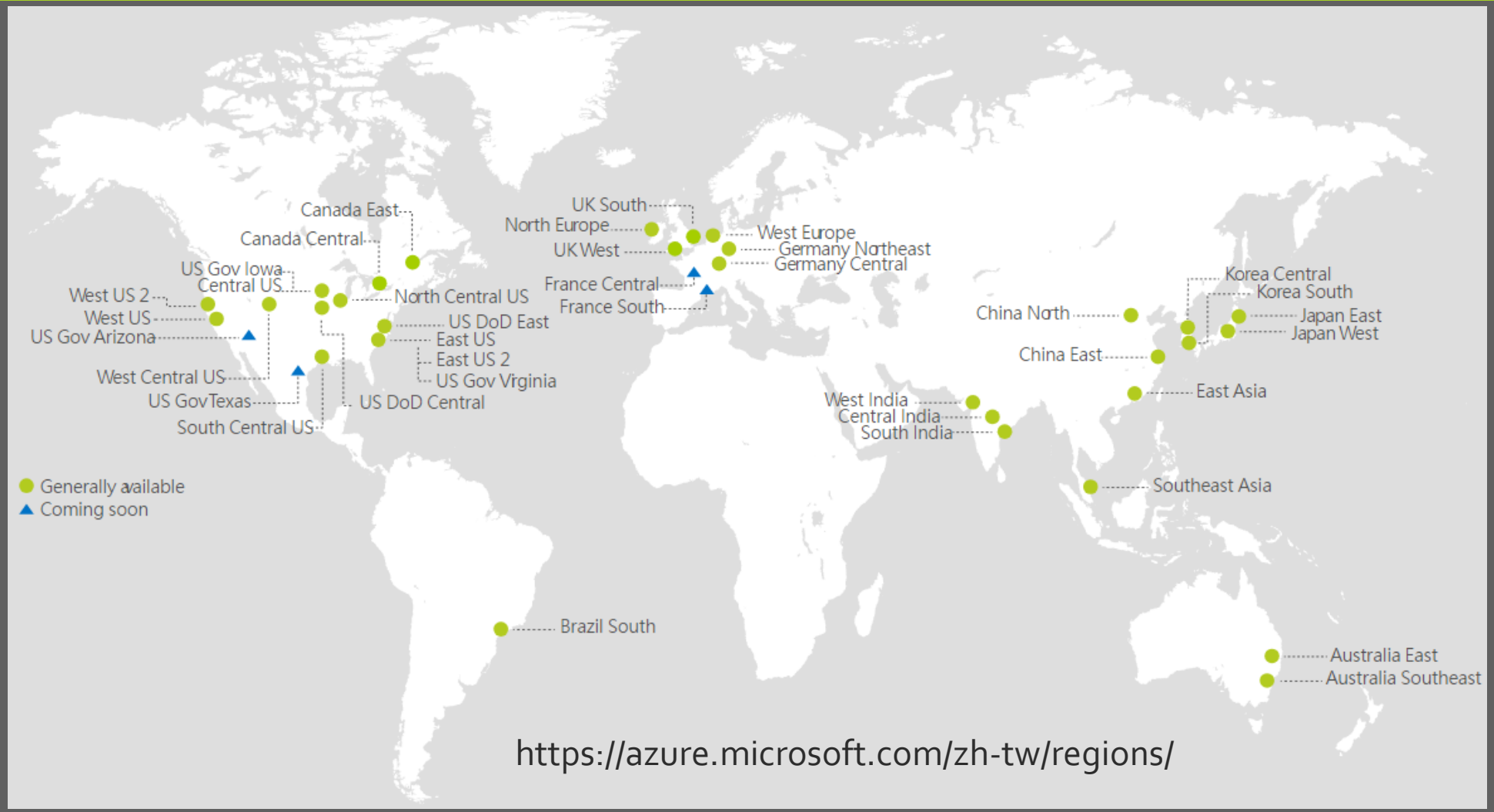

Cloud Infrastructure Services - Q2 2016
Market Share & Revenue Growth
(IaaS, PaaS, Hosted Private Cloud)
Amazon
Microsoft
IBM
Google
Next 20
Alibaba, AT&T, BT, CenturyLink, Fujitsu, Joyent, HPE, NTT, Oracle, Orange, Rackspace, Salesforce, etc.
0%
10%
20%
30%
Worldwide Market Share
YoY Growth
Amazon 53%
Microsoft 100%
IBM 57%
Google 162%
Next 20 41%
YoY Growth
Source: Synergy Research Group

Azure 開發實作特快車

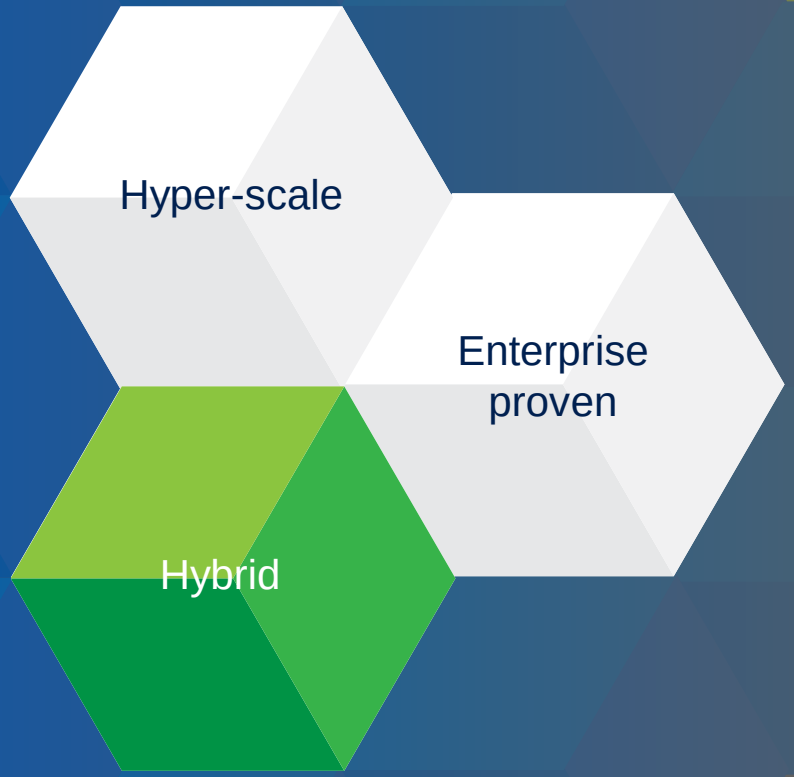
VM / Storage / App Services 快速入門班

AZURE 簡介

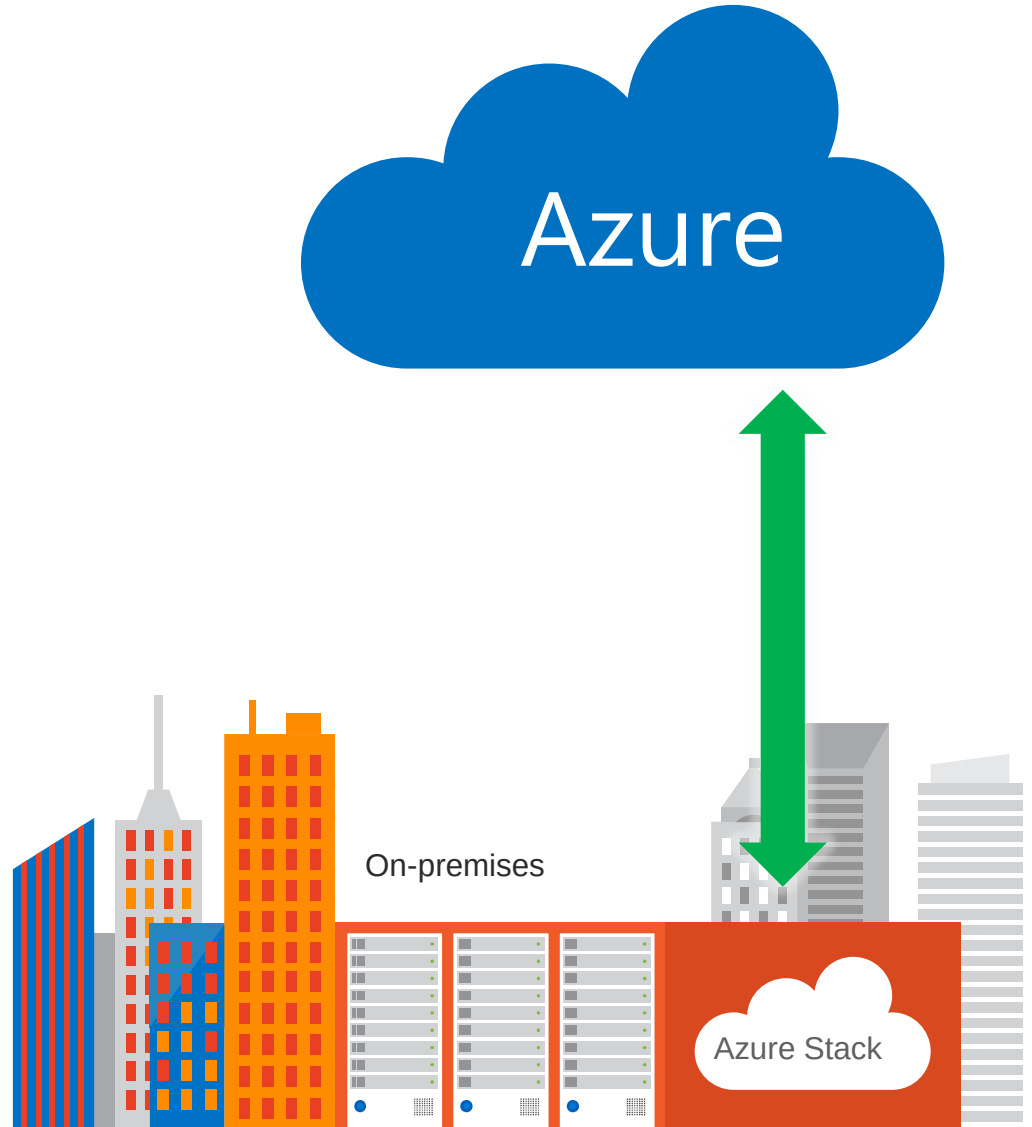
Azure Data Center

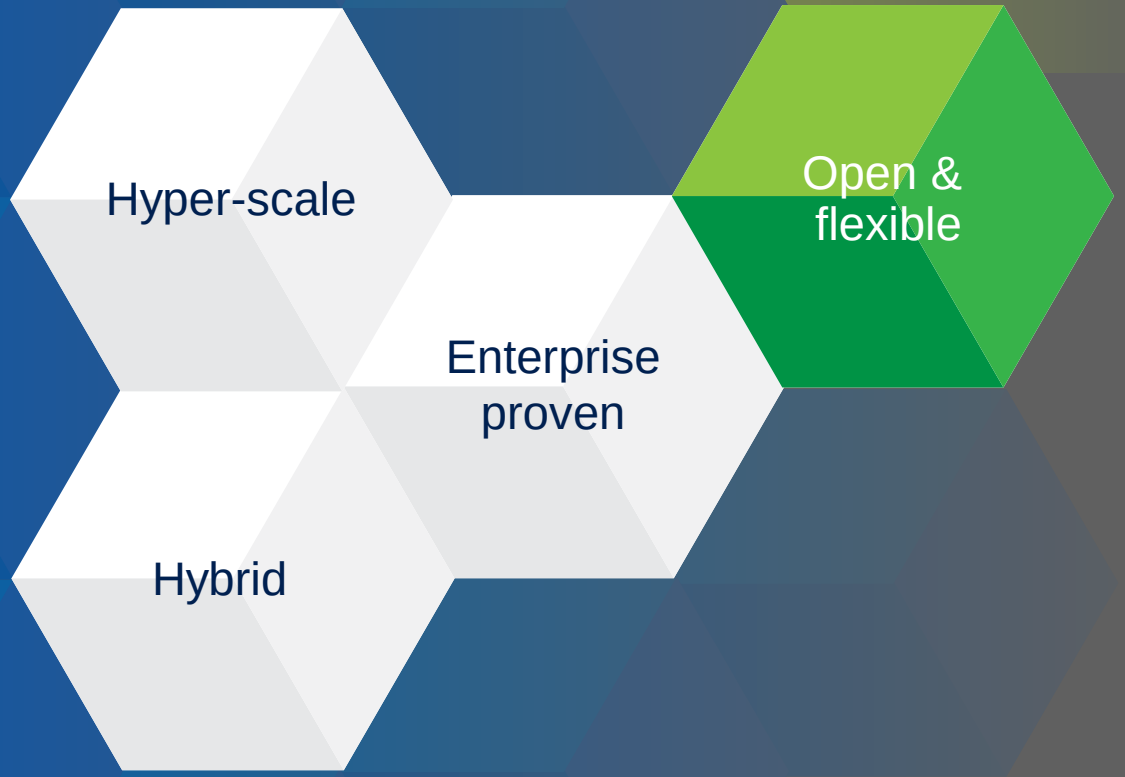


https://azure.microsoft.com/zh-tw/regions/


Hyper-scale
Enterprise proven
Hybrid

Hybrid


Azure
On-premises
Azure Stack



Open + Flexible

Management

puppet labs · CHEF · ANSIBLE · GitHub

Applications

apprenda · WordPress · Joomla! · Drupal · CLOUD FOUNDRY

App Frameworks

nodeJS · python · Java · php · Ruby

Databases & Middleware

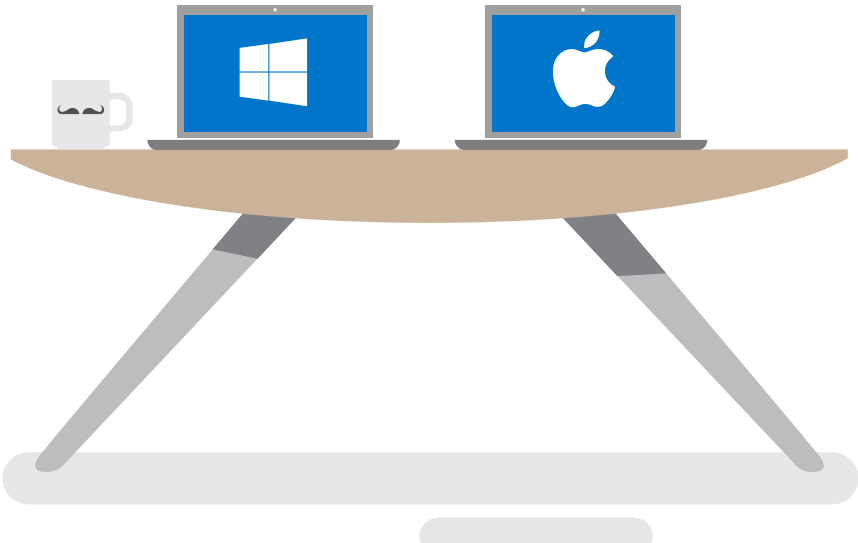
cloudera · mongoDB · Hortonworks · MySQL

Infrastructure

FreeBSD · Linux · docker

Dev + IT productivity

- Visual Studio
- GitHub
- Eclipse
- Chef + Puppet
- Powershell



Developer & IT productivity

Hyper-scale

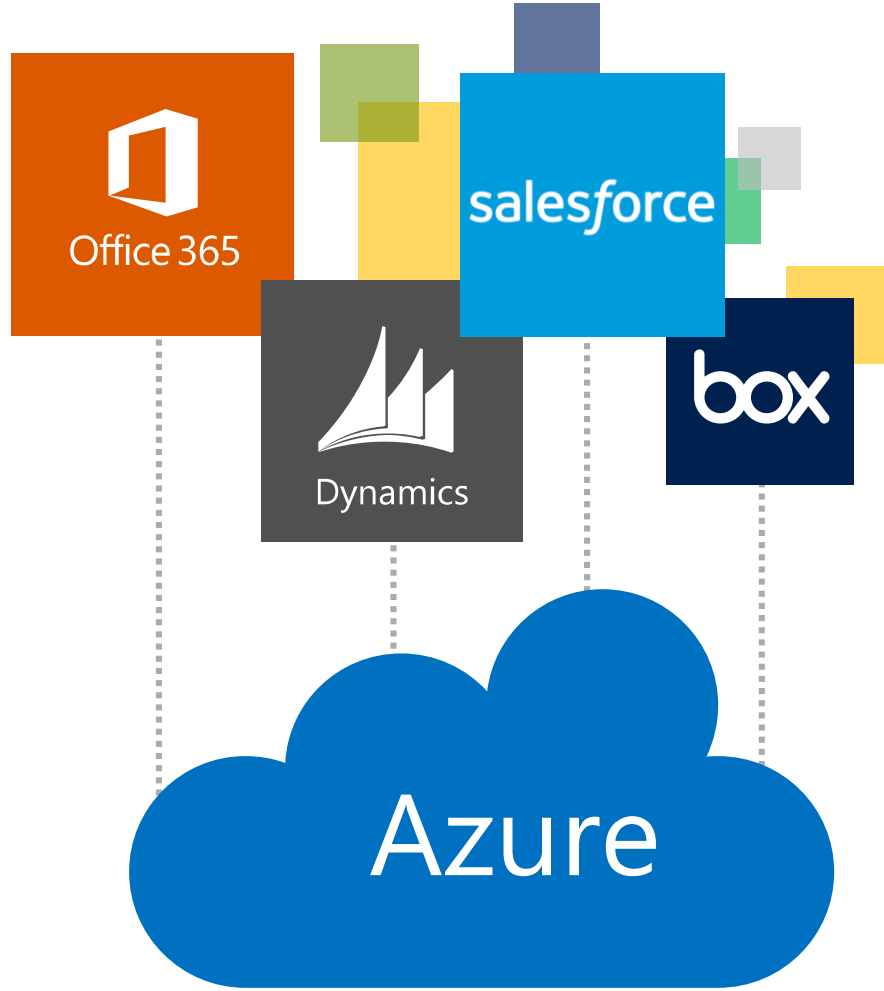
Open & flexible

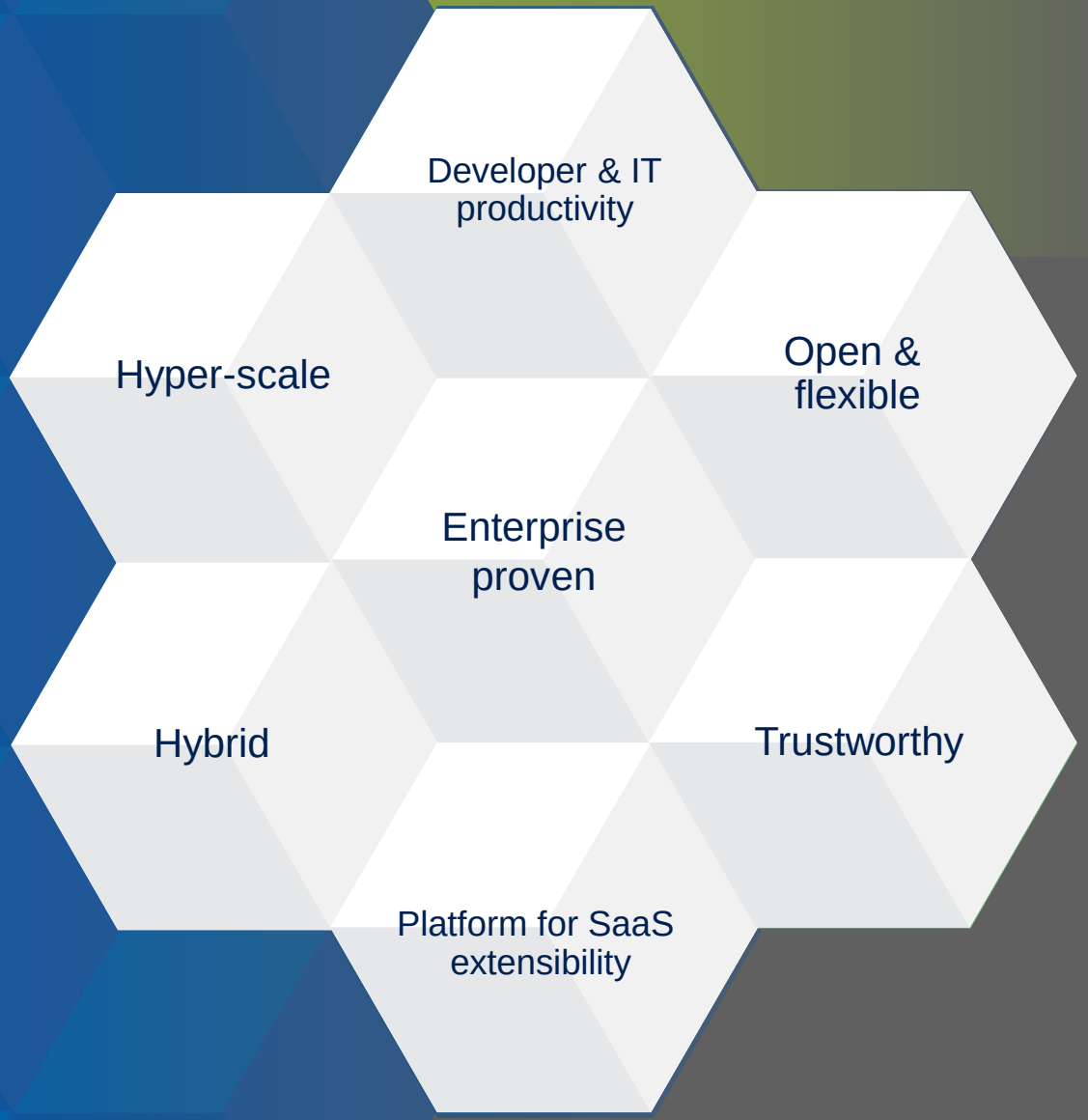
Enterprise proven

Hybrid

Platform for SaaS extensibility

SaaS extensibility





Trustworthy

More compliance certifications than any other cloud

MICROSOFT AZURE 通過各項資安標準

http://azure.microsoft.com/zh-tw/support/trust-center/compliance/

國際標準	描述	認證狀態
EU Standard Contractual Clauses	歐洲聯盟指令符合歐盟對資料隱私規範 Article 29 Working Party	完成
ISO/IEC 27001/27002:2013	ISO 國際資安標準	完成
PCI DSS Level 1	支付卡產業資料安全標準	完成
SSAE 16 (SOC 1 Type 2)	美國會計與稽核規範，取代 SAS 70 Type 2	完成
FISMA / FedRAMP	美國聯邦資訊安全管理法案 Federal Information Security Management Act (FISMA)	完成
ISO/IEC 27018	全球第一個通過之雲端業者，在未經客戶同意的情況下，禁止將客戶資料用於廣告和行銷用途	完成
HIPAA BAA	美國醫療資訊隱私保護規範	完成

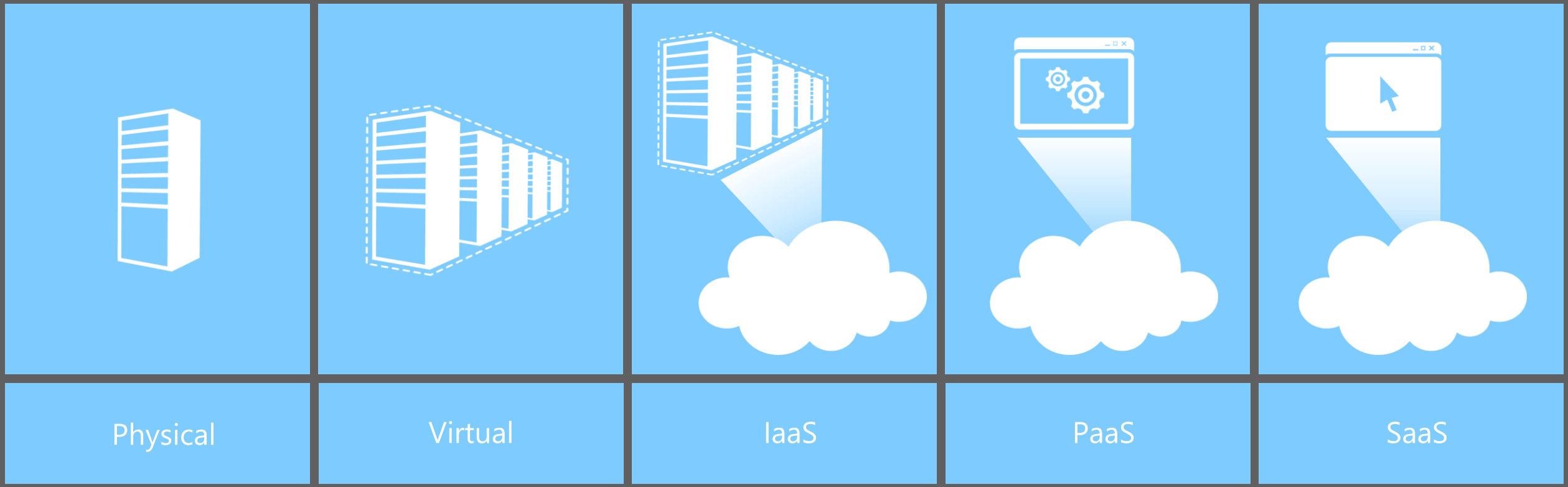
Leading the journey to the Cloud

SAAS SOLUTIONS	Office 365 Microsoft Dynamics Power BI
ENTERPRISE MOBILITY	Microsoft Enterprise Mobility Suite

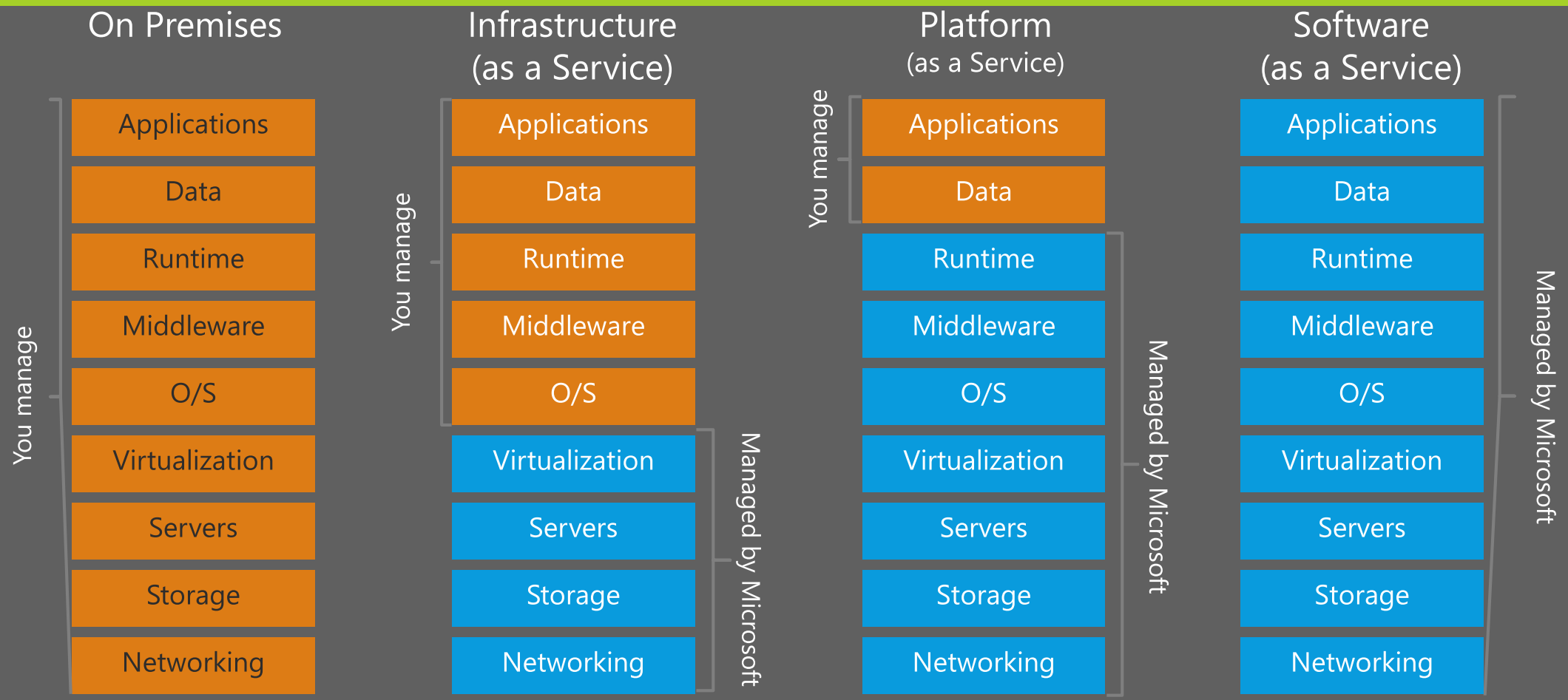
Microsoft Azure

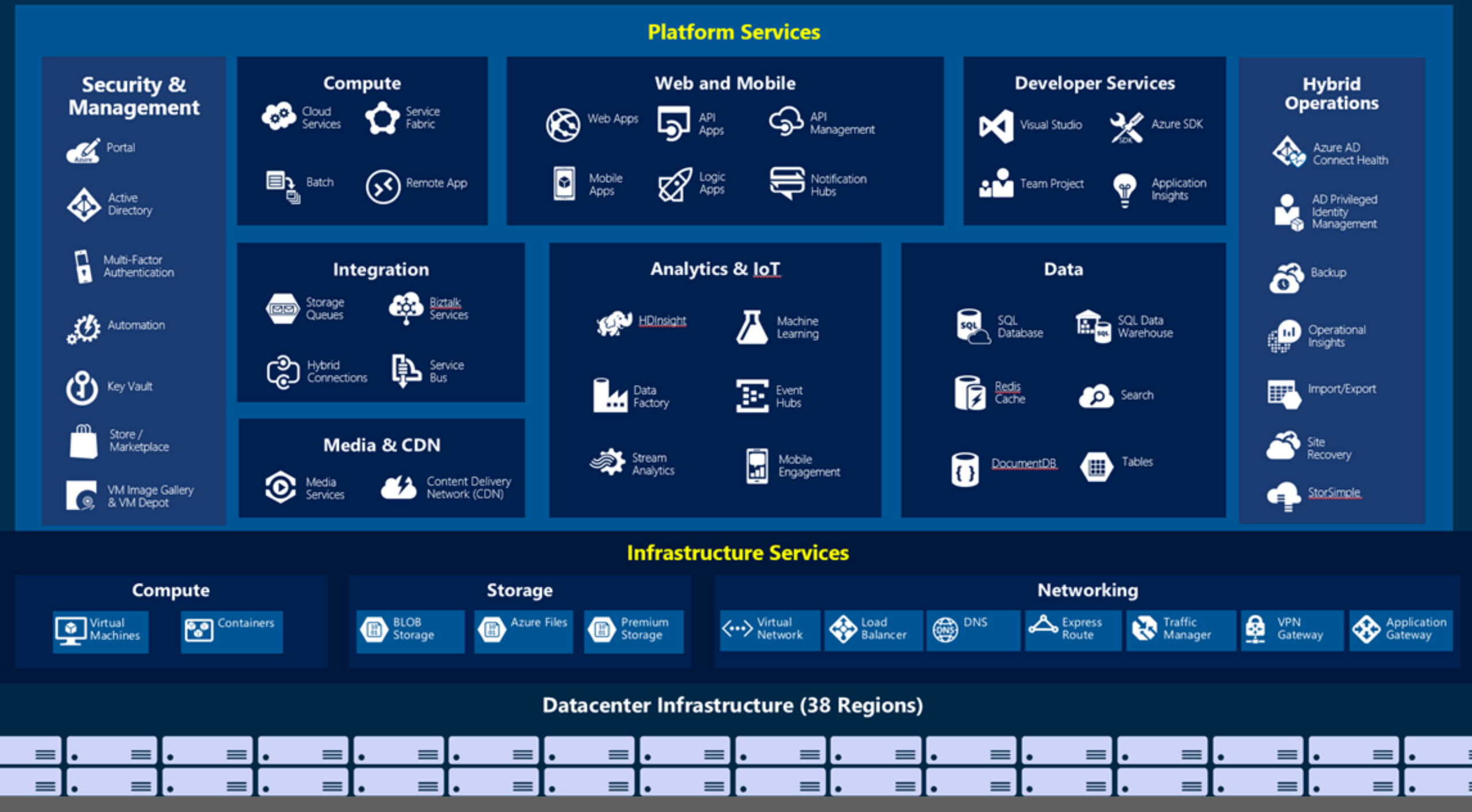
DEVELOPER + APP PLATFORM	Visual Studio Family + Azure App Service
DATA + ANALYTICS	Cortana Analytics Suite
INTERNET OF THINGS	Azure IoT Suite
CLOUD INFRASTRUCTURE	Azure + Azure Stack + Operations Management Suite

Times Change



Cloud Models



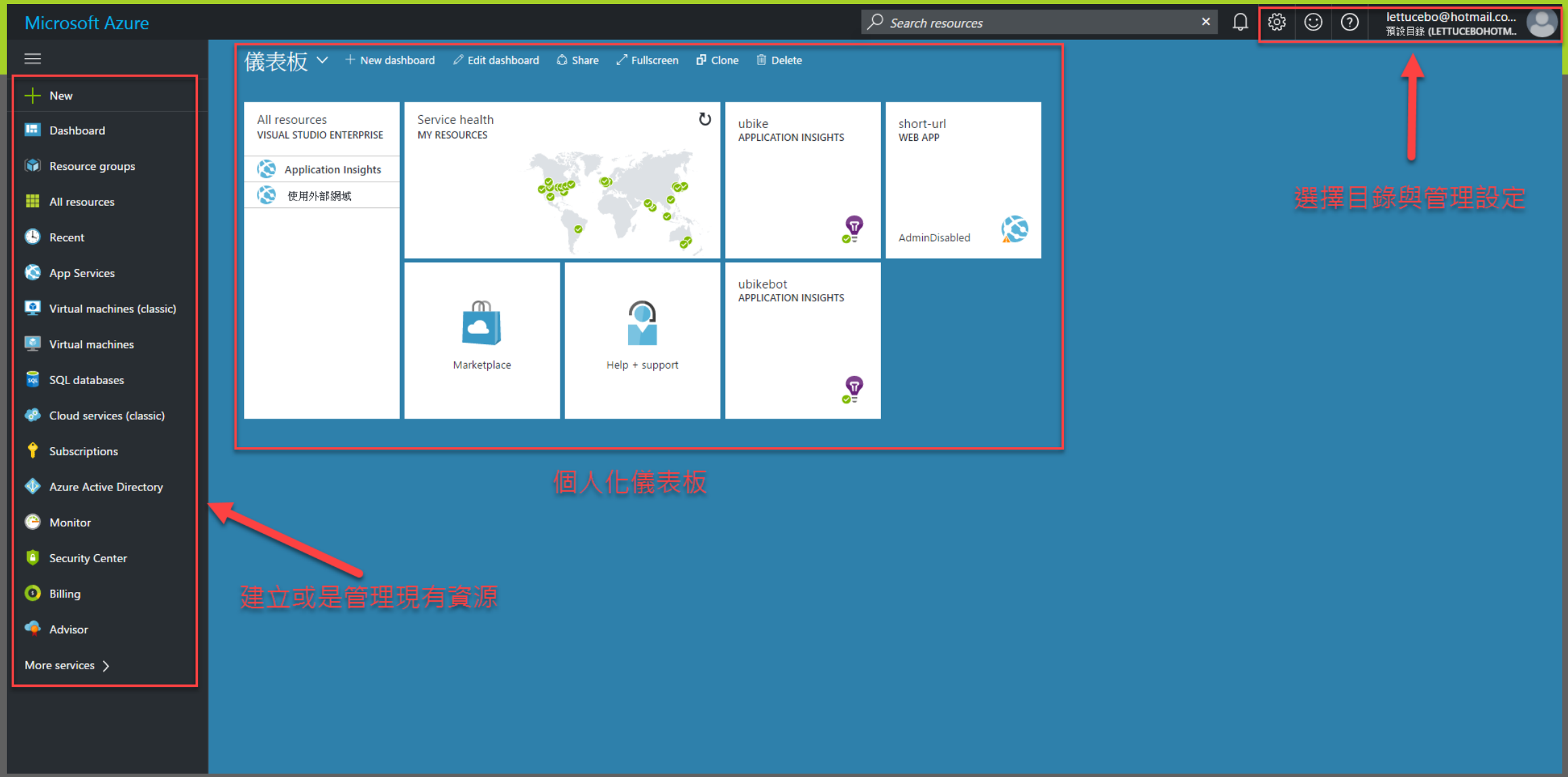

Platform Services
Security & Management
Portal
Active Directory
Multi-Factor Authentication
Automation
Key Vault
Store / Marketplace
VM Image Gallery & VM Depot
Compute
Cloud Services
Service Fabric
Batch
Remote App
Web and Mobile
Web Apps
API Apps
API Management
Mobile Apps
Logic Apps
Notification Hubs
Developer Services
Visual Studio
Azure SDK
Team Project
Application Insights
Hybrid Operations
Azure AD Connect Health
AD Privileged Identity Management
Backup
Operational Insights
Import/Export
Site Recovery
StorSimple
Integration
Storage Queues
Biztalk Services
Hybrid Connections
Service Bus
Analytics & IoT
HDInsight
Machine Learning
Data Factory
Event Hubs
Stream Analytics
Mobile Engagement
Data
SQL Database
SQL Data Warehouse
Redis Cache
Search
DocumentDB
Tables
Media & CDN
Media Services
Content Delivery Network (CDN)
Infrastructure Services
Compute
Virtual Machines
Containers
Storage
BLOB Storage
Azure Files
Premium Storage
Networking
Virtual Network
Load Balancer
DNS
Express Route
Traffic Manager
VPN Gateway
Application Gateway
Datacenter Infrastructure (38 Regions)

Azure 開發實作特快車

VM / Storage / App Services 快速入門班

介面、訂閱與帳務

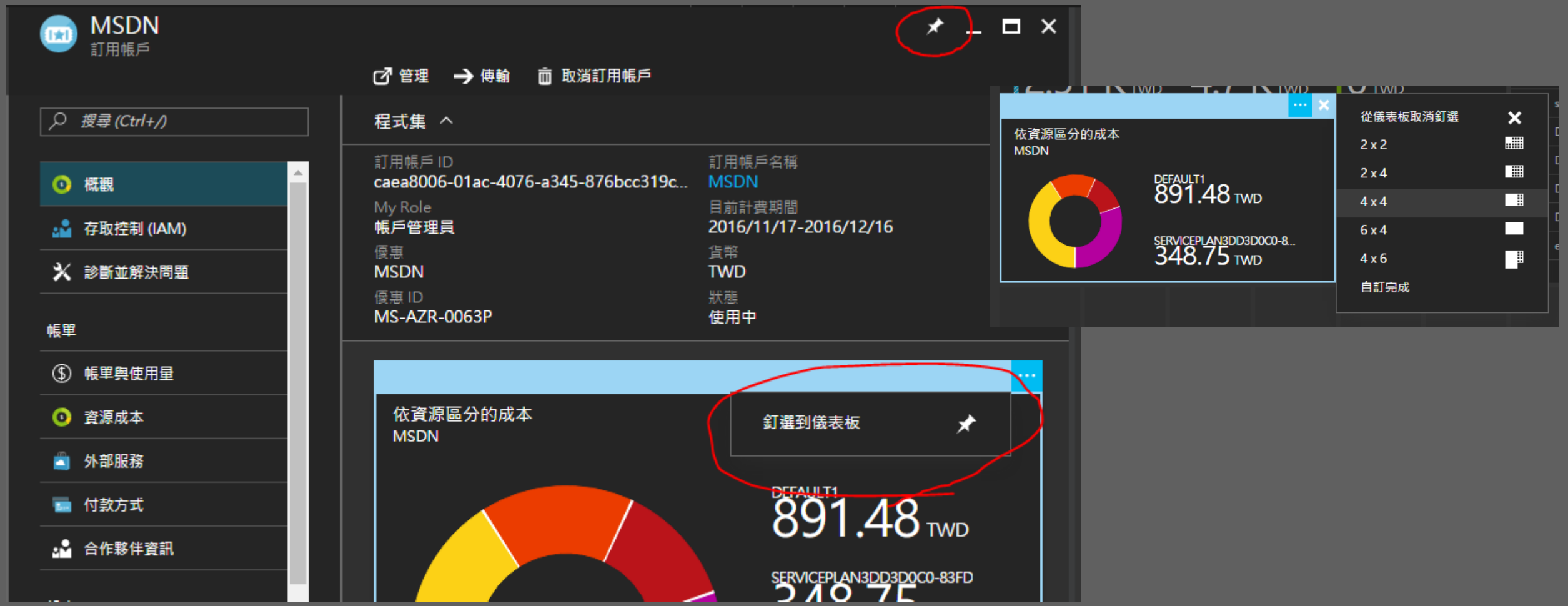
Azure 管理後台 (Portal)



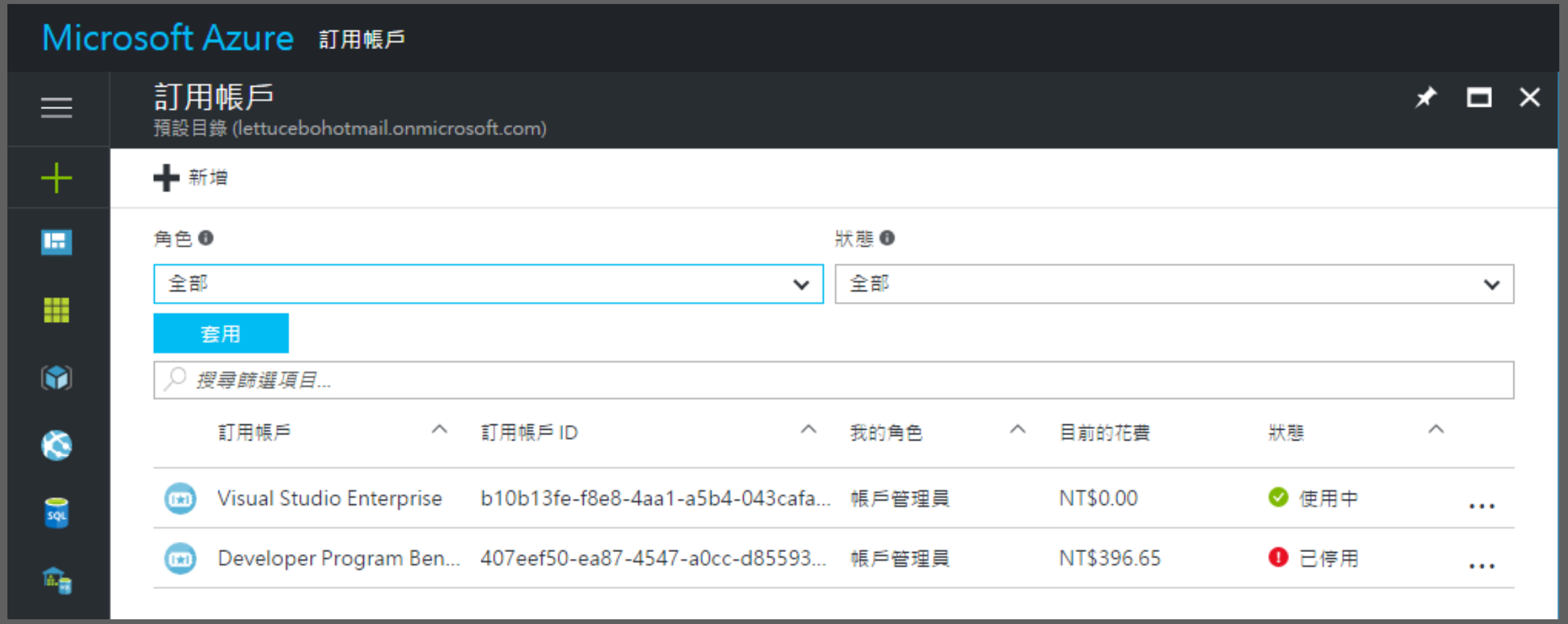
Azure Portal

- 篩選訂閱
- 主題設定
- 語言與區域

自訂介面


MSDN
訂用帳戶
管理
傳輸
取消訂用帳戶
搜尋 (Ctrl+/)
概觀
存取控制 (IAM)
診斷並解決問題
帳單
帳單與使用量
資源成本
外部服務
付款方式
合作夥伴資訊
程式集
訂用帳戶 ID
caea8006-01ac-4076-a345-876bcc319c...
訂用帳戶名稱
MSDN
My Role
帳戶管理員
目前計費期間
2016/11/17-2016/12/16
優惠
MSDN
貨幣
TWD
優惠 ID
MS-AZR-0063P
狀態
使用中
依資源區分的成本
MSDN
釘選到儀表板
DEFAULT1
891.48 TWD
SERVICEPLAN3DD3D0C0-83FD
依資源區分的成本
MSDN
DEFAULT1
891.48 TWD
SERVICEPLAN3DD3D0C0-8...
348.75 TWD
從儀表板取消釘選
2 x 2
2 x 4
4 x 4
6 x 4
4 x 6
自訂完成

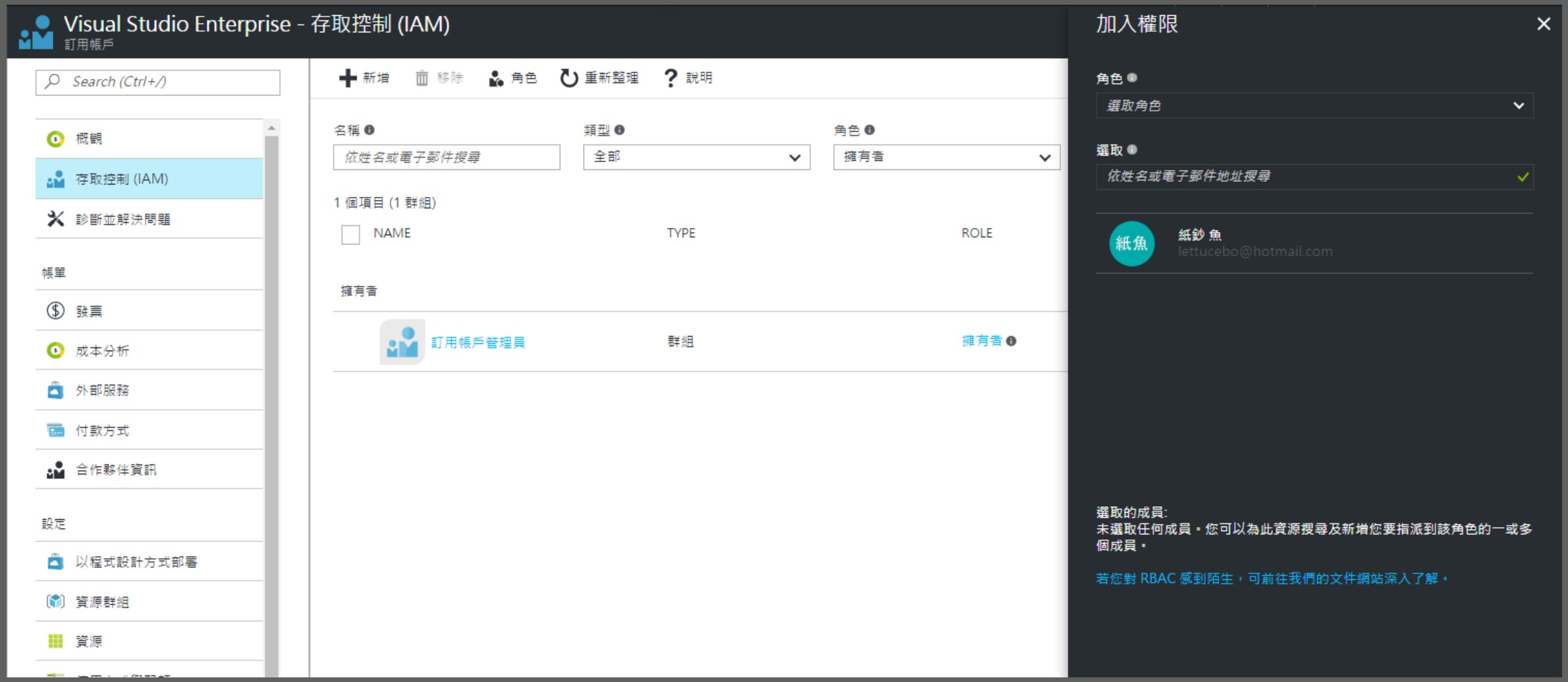
訂用帳戶


Microsoft Azure 訂用帳戶
訂用帳戶
預設目錄 (lettucebohotmail.onmicrosoft.com)
新增
角色
全部
狀態
全部
套用
搜尋篩選項目...
訂用帳戶
訂用帳戶 ID
我的角色
目前的花費
狀態
Visual Studio Enterprise
b10b13fe-f8e8-4aa1-a5b4-043cafa...
帳戶管理員
NT$0.00
使用中
Developer Program Ben...
407eef50-ea87-4547-a0cc-d85593...
帳戶管理員
NT$396.65
已停用

訂用帳戶種類

- 隨付即用 (Pay-as-you-Go) 的免費試用或正式帳戶
- 各種微軟計畫（如：MSDN 訂閱用戶、Imagine Access 等）的 Azure 優惠訂閱
- 用於活動或教學的 Azure Pass 訂閱
- Azure In Open 訂閱
- Enterprise Agreement (EA) 訂閱
- Dev Essential (每月免費 NT$775.69)
- ...

設定別人可以管理此訂閱



練習

- 設定管理後台的佈景主題
- 釘選自訂自己關注的資訊面板
- 建立一個以上的儀表板
- 設定共同管理員

Azure 開發實作特快車

VM / Storage / App Services 快速入門班

VIRTUAL MACHINE

建立VM流程

選擇要使用什麼方式部署

管理入口網站

指令化
(Windows, Linux and Mac)

REST API

選擇作業系統範本與虛擬機器大小

Windows Server

Linux

Extra Small

Small

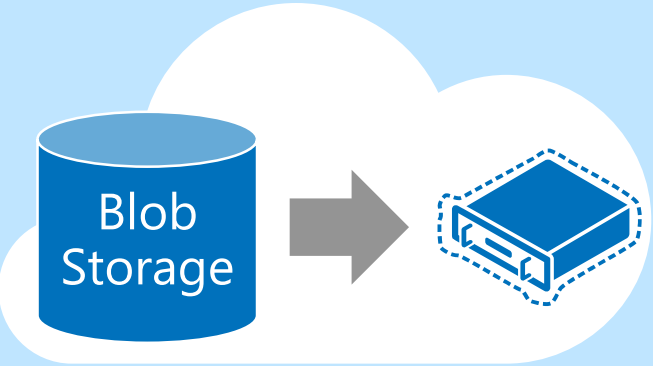
Medium

Large

X-Large

將作業系統範本寫入儲存區中

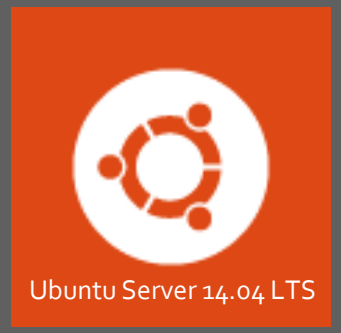
由新磁碟啟動 VM



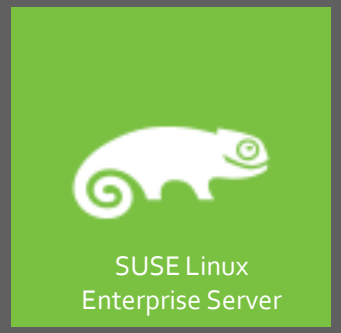
Cloud

VM Gallery


Windows Server 2012 R2


Ubuntu Server 14.04 LTS

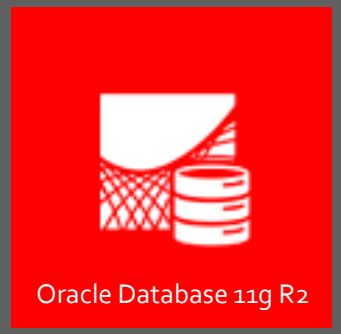

CentOS 6.5


SUSE Linux
Enterprise Server

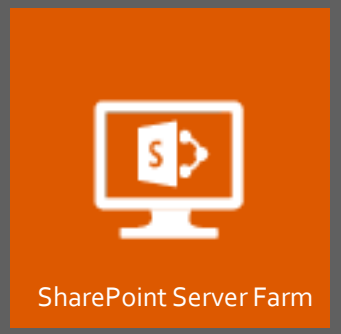

openSUSE
openSUSE 13.1


Oracle Linux 6.4.0.0.0


SQL
SQL Server 2014 Standard


Oracle Database 11g R2


BizTalk
BizTalk Server 2013


SharePoint Server Farm


Microsoft Dynamics
GP 2013


Zulu 8


SAP
SAP HANA
Developer Edition


Puppet Enterprise 3.2.3


Barracuda Web Application


Oracle WebLogic
Server 12.1.2


Visual Studio Ultimate 2013


Windows 8.1 Enterprise

VM 等級

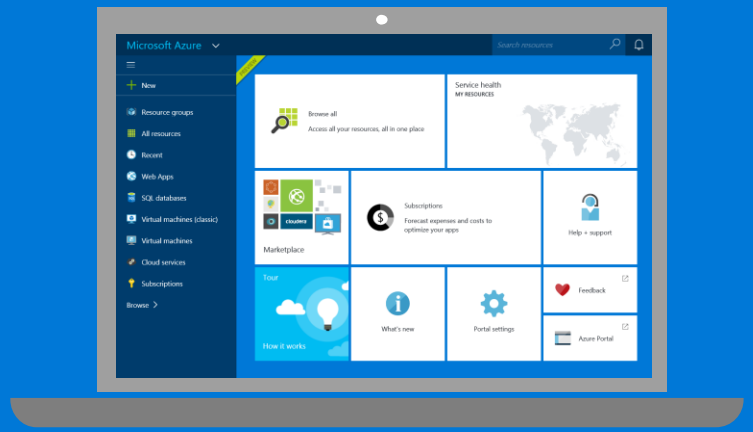
General Purpose	Compute Optimized	Memory Optimized	GPU	High Performance Compute
A0 – A5 Basic	F1, F2, F4, F8, F16	D11 – D14	NV6, NV12, NV24	A8 – A11
A0 – A7 Standard		D11v2 – D15v2	NC6, NC12, NC24, NC24r	H8, H8m, H16, H16m, H16r, H16mr
D1 – D4		G1 – G5		
D1v2 – D5v2				

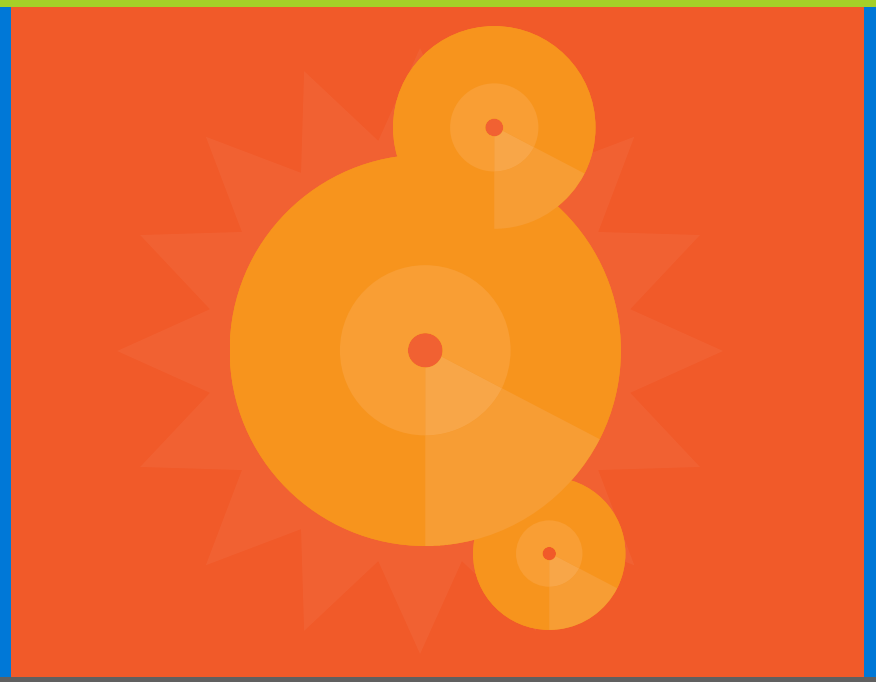
VM 等級

https://docs.microsoft.com/zh-tw/azure/virtual-machines/virtual-machines-windows-sizes

類型	大小	說明
一般用途	DSv2、Dv2、DS、D、Av2、A0-7	CPU 與記憶體的比例平均。 適用於測試和開發、小型至中型資料庫，以及低至中流量 Web 伺服器。
計算最佳化	Fs、F	CPU 與記憶體的比例高。 適用於中流量 Web 伺服器、網路設備、批次處理，以及應用程式伺服器。
記憶體最佳化	GS、G、DSv2、DS	記憶體與核心的比例高。 適用於關聯式資料庫伺服器、中型至大型快取，以及記憶體內部分析。
儲存體最佳化	Ls	高磁碟輸送量及 IO。 適用於巨量資料、SQL 及 NoSQL 資料庫。
GPU	NV、NC	以大量圖形轉譯和視訊編輯為目標的特製化虛擬機器。 有單一或多個 GPU 可供使用。
高效能計算	H、A8-11	速度最快、功能最強的 CPU 虛擬機器，搭載選配的高輸送量網路介面 (RDMA)。

Great Infrastructure Enhancements





End to End Management

Integrated management portal
Application Templates
Lifecycle Management
Role Based Access Control
Billing API

Premium Storage

Up to 64 TB of storage per VM
>80,000 IOPS per VM
Less than 1ms read latency

Largest VMs in Public Cloud

Optimized for data workloads
Up to 32 CPU cores, 450 GB RAM, 6.5 TB local SSD
Latest generation Intel processor

New **N** family of virtual machines

Latest NVIDIA GPU
Superfast RDMA network
High-end remote visualization

Azure 開發實作特快車

VM / Storage / App Services 快速入門班

DEMO

建立 VM

Microsoft Azure 服務水準合約

雲端服務、虛擬機器及虛擬網路

- 對於雲端服務 (Cloud Services)，我們保證當您在不同錯誤網域和升級網域部署兩個以上的角色 (Role) 執行個體時，您的網際網路對向角色將在至少 99.95% 的時間內具有外部連線能力。
- 對於有兩個以上執行個體部署至相同可用性設定組的所有網際網路對向虛擬機器 (Virtual Machines)，我們保證將在至少 99.95% 的時間內具有外部連線能力。
- 對於虛擬網路 (Virtual Network)，我們保證虛擬網路閘道有 99.9% 的可用性。

99.95% 高可用度代表什麼意思?

Availability %	每年允許停機時間	每月允許停機時間	每週允許停機時間
90% (一個 9)	36.5 days	72 hours	16.8 hours
99% (兩個 9)	3.65 days	7.20 hours	1.68 hours
99.9% (三個 9)	8.76 hours	43.2 minutes	10 minutes
99.95%	4.38 hours	22 minutes	5 minutes
99.99% (四個 9)	53 minutes	4.3 minutes	1 minutes
99.999% (五個 9)	5 minutes	26 seconds	6 seconds

價格 – 估價須知

- 虛擬機器大小是影響價格的主因 (ex: SQL Server 2016 Enterprise in Extra Large VM)
- 由 Microsoft Azure Management Portal 關閉虛擬機器即停止計價
- 了解各項服務計價單位 (ex: 虛擬機器以分鐘計價)

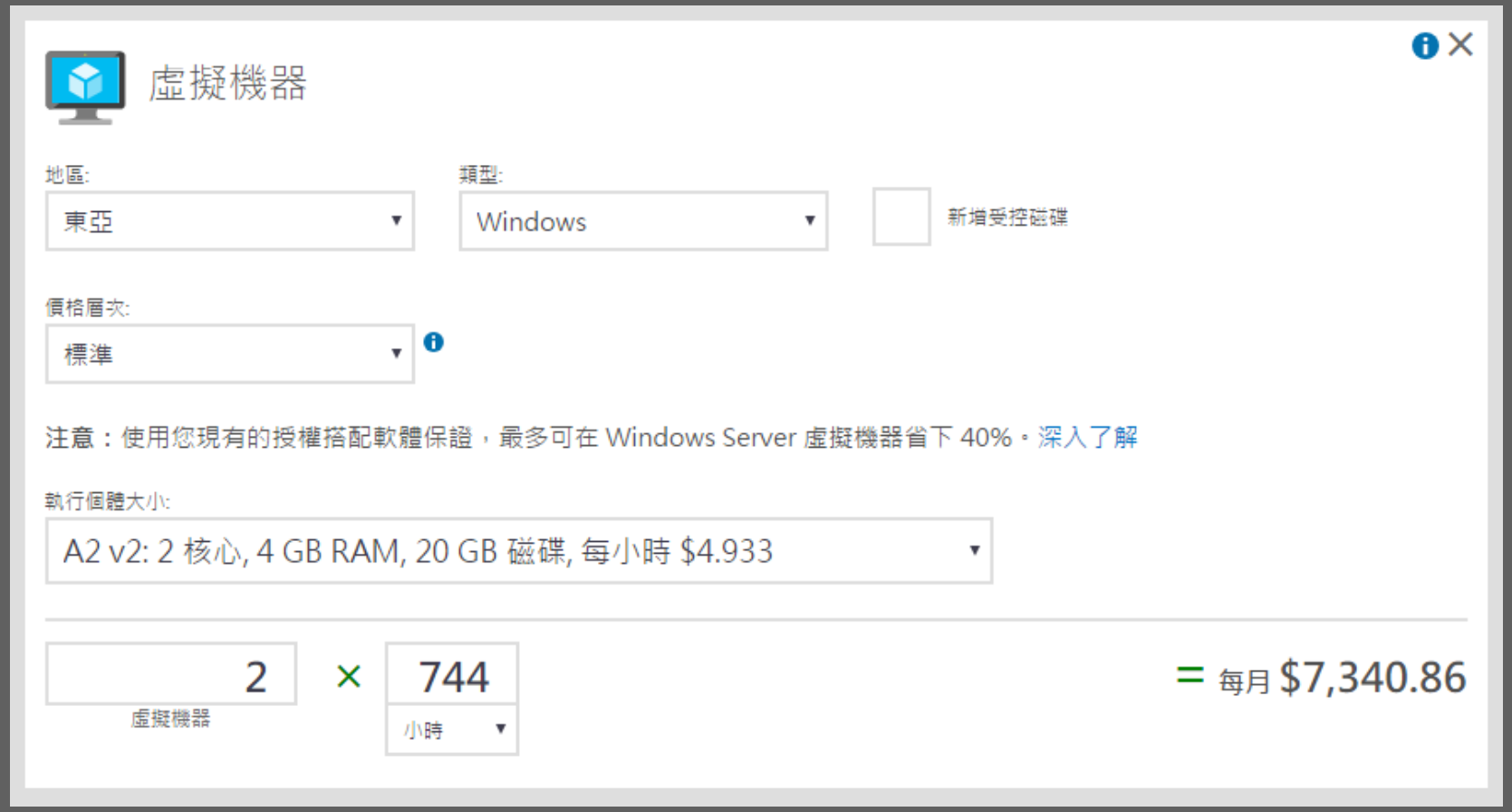
Microsoft Azure Virtual Machines 成本估算

- 我們公司要把應用系統放到 Microsoft Azure Virtual Machine
- 請問一個月要花多少錢?

Microsoft Azure Virtual Machines 成本估算

- 需要知道目前伺服器規格
  - CPU 核心數與記憶體
- 需要決定選用微軟哪一個資料中心
  - Azure Speed Test
- 需要知道目前使用的作業系統
- 需要知道目前存放資料磁碟實際用量
- 需要知道目前對於儲存設備的規格 (IOPS, Throughput)
- 需要知道目前每月資料傳出量

Microsoft Azure Virtual Machines 成本估算



兩台 VM 透過單一 Availability Set 互為備援微軟才方提供 99.95% 不停機服務水準SLA

Microsoft Azure Virtual Machines 成本估算

- Azure Storage 等級會影響成本
- Azure Storage (基本 Basic)
  - 500 IOPS for Azure VM Standard , 300 IOPS for Azure VM Basic
  - 60 MiB / Sec Throughput
- Azure Storage (進階 Premium)

	P10	P20	P30
磁碟大小	128 GB	512 GB	1,024 GB
每月價格	NT$611.56	NT$2,271.84	NT$4,193.99
每一磁碟的 IOPs	500	2,300	5,000
每一磁碟的輸送量	100 MB / 秒	150 MB / 秒	200 MB / 秒

Microsoft Azure Virtual Machines 成本估算

https://docs.microsoft.com/zh-tw/azure/storage/storage-about-disks-and-vhds-windows

	Azure 進階磁碟	Azure 標準磁碟
磁碟類型	固態硬碟 (SSD)	硬碟 (HDD)
概觀	以 SSD 為基礎，針對執行時需要大量 I/O 之工作負載的 VM 或裝載任務關鍵性生產環境的 VM，提供高效能、低延遲的磁碟支援	以 HDD 為基礎、符合成本效益的磁碟支援，適用於開發 / 測試 VM 案例
案例	生產環境和重視效能的工作負載	開發 / 測試、非關鍵性 不常存取
磁碟大小	P10：128 GB P20：512 GB P30：1024 GB	非受控磁碟：1 GB – 1 TB 受控磁碟： S4：32 GB S6：64 GB S10：128 GB S20：512 GB S30：1024 GB
每一磁碟的輸送量上限	200 MB / 秒	60 MB / 秒
每一磁碟的 IOPS 上限	5000 IOPS	500 IOPS

Microsoft Azure Virtual Machines 成本估算

- 估算硬碟
  租賃一個月費用

Microsoft Azure Virtual Machines 成本估算

- 估算頻寬一個月費用

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動手做

建立 VM

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VM設定與硬碟管理

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建立服務與開通

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動手做

建立服務與開通

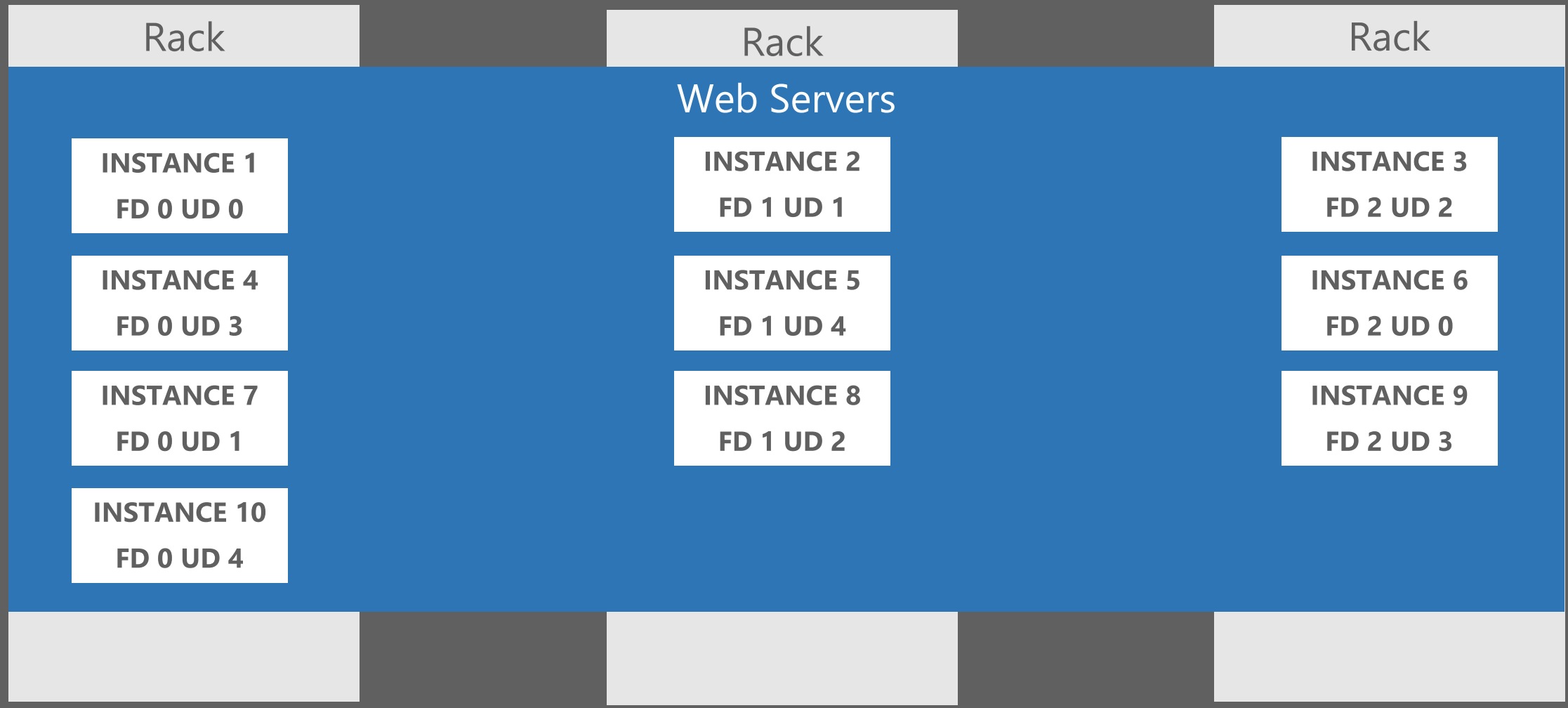
VM 小撇步

- 如何省錢
  - 用不到時自動關機
  - 時間到自動開機

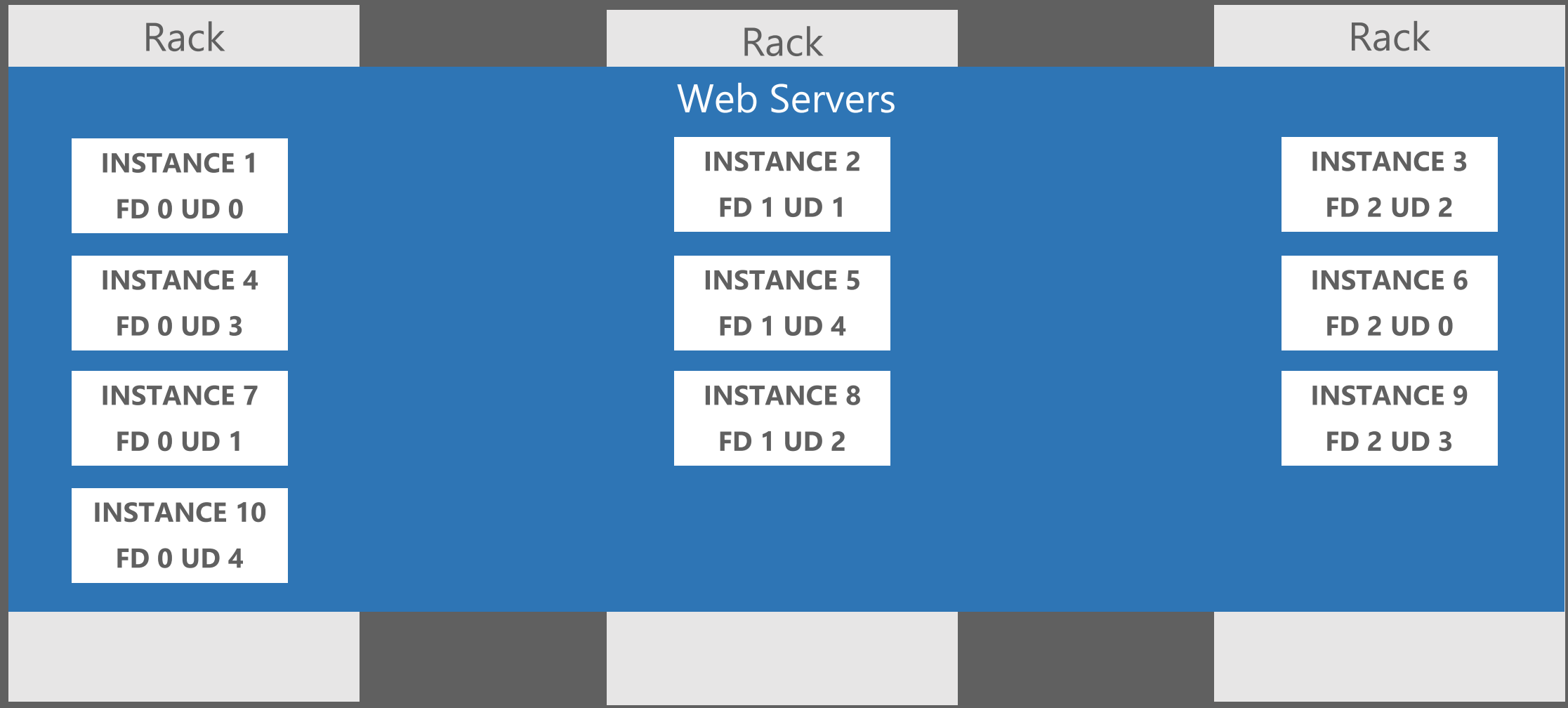
- 正確關機

  - Azure 省錢大作戰 - 排程讓 Azure 把虛擬機關機及調教 VM 大小
    - https://dotblogs.com.tw/swater111/2014/04/09/144671

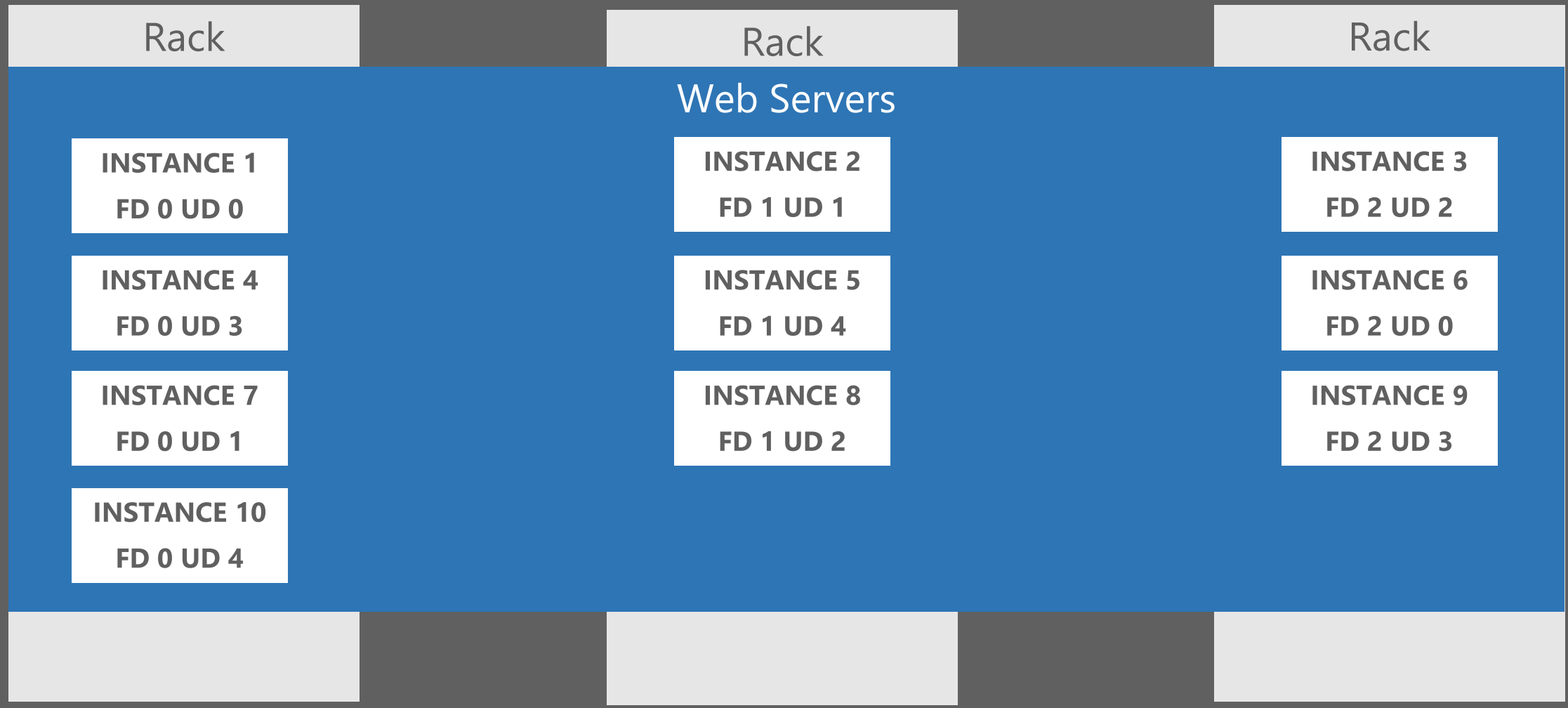
Availability Sets



Availability Sets – Rack Failure



Availability Sets - Maintenance



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HA架構

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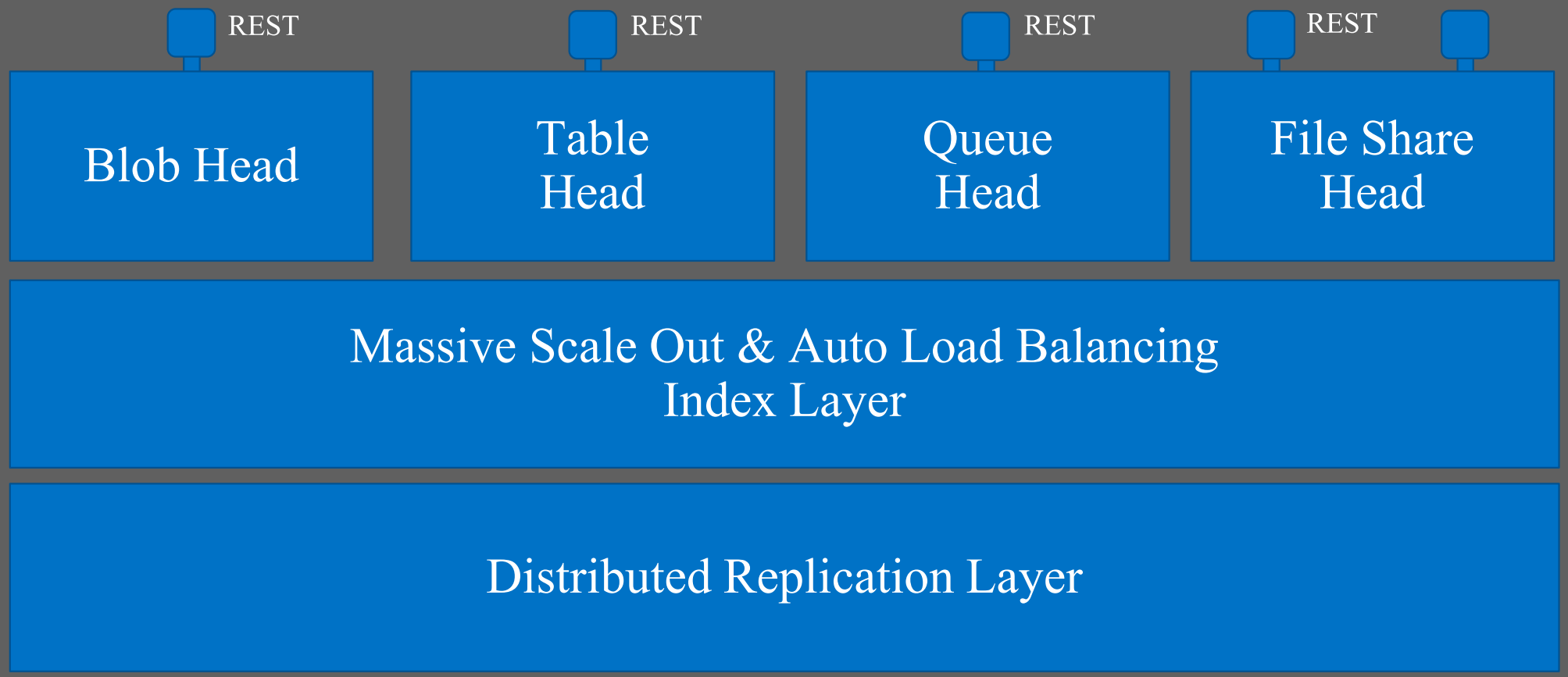
STORAGE

儲存體類型

Blob	Files	Queues	Table	StorSimple
• Blob 儲存體	• 檔案儲存體	• 佇列儲存體	• 表格儲存體	• 混合式雲端儲存體

Azure Storage Architecture



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BLOB

Two Types of Blobs Under the Hood

Block Blob

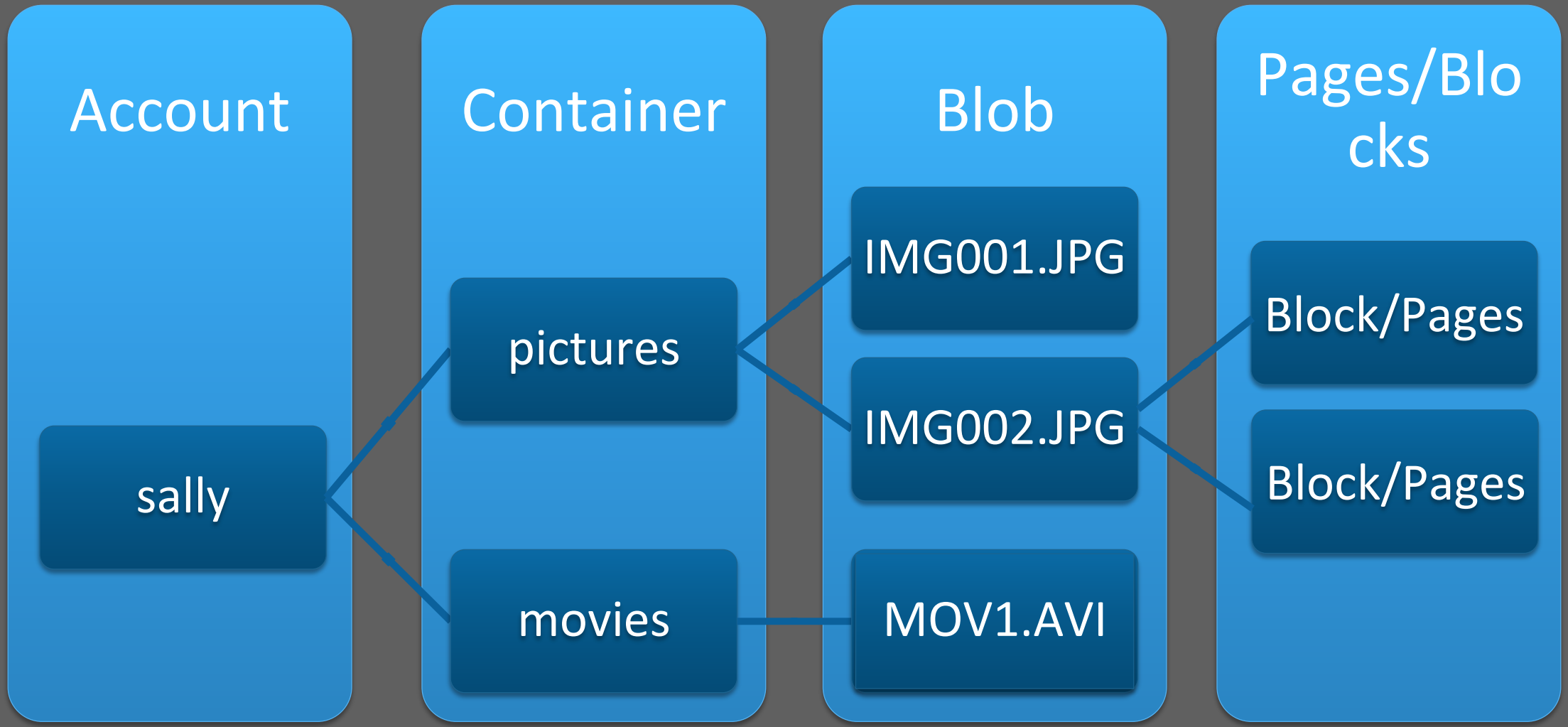
- Targeted at streaming workloads
- Each blob consists of a sequence of blocks
- Each block is identified by a Block ID
- Size limit 4.77TB per blob
- Optimistic Concurrency via Etags

Page Blob

- Targeted at random read/write workloads
- Each blob consists of an array of pages
- Each page is identified by its offset from the start of the blob
- Size limit 1TB per blob
- Optimistic or Pessimistic (locking) concurrency via leases

Blob Storage

https://{account}.blob.core.windows.net/{container}/{blobName}



Blob儲存體價格


儲存體
地區:
美國西部
類型:
區塊 blob
價格層次:
標準 - 一般用途型儲存體帳戶
資料備援:
LRS
容量
1024
GB
= 每月 $762.53
儲存體交易
1
交易單位 (100,000 筆交易)
× $0.1117
每單位
= 每月 $0.11
小計
每月 $762.64

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建立Blob儲存體

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動手做

建立Blob儲存體

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用程式處理Blob Storage

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用程式處理Blob Storage

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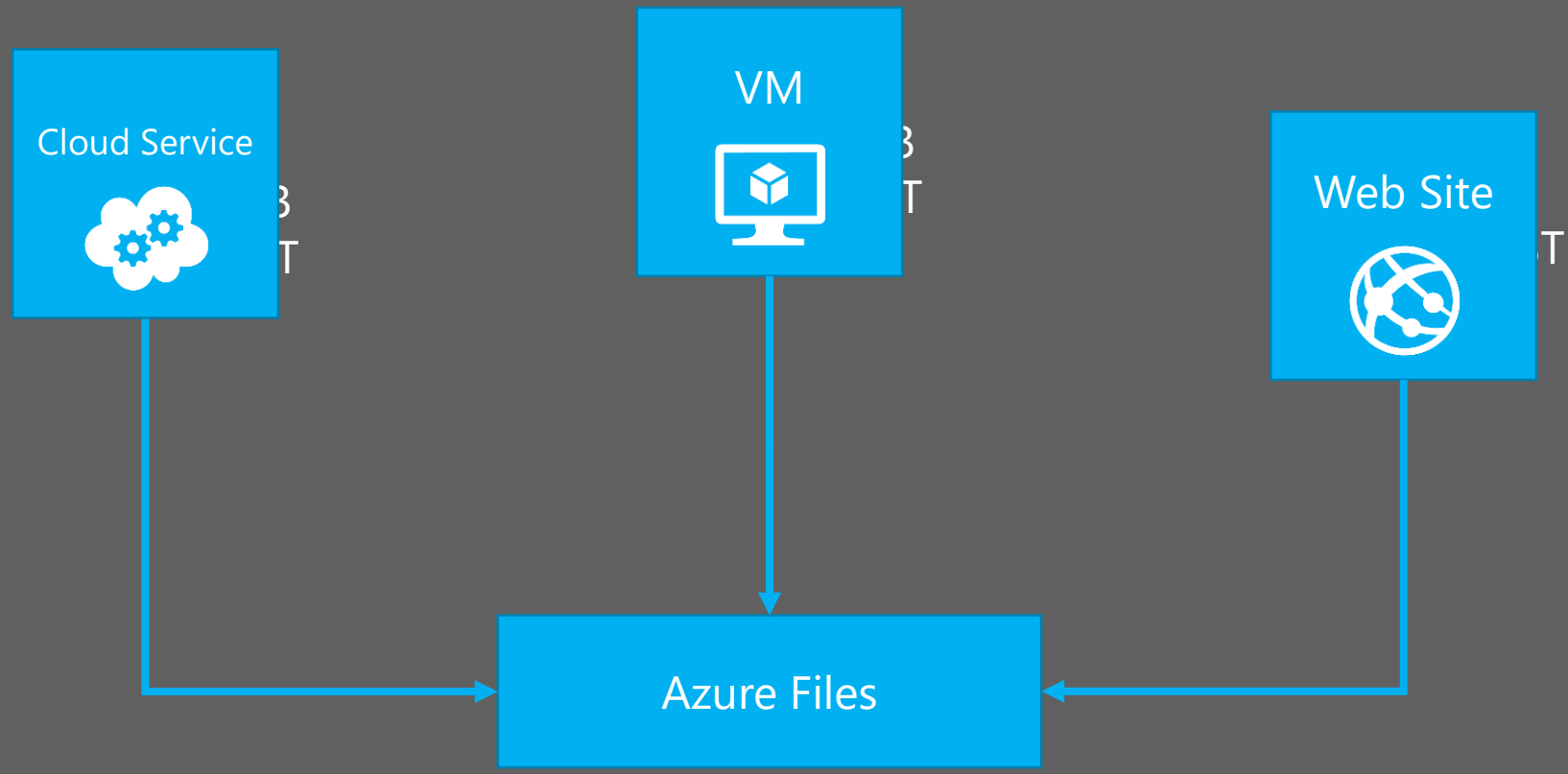
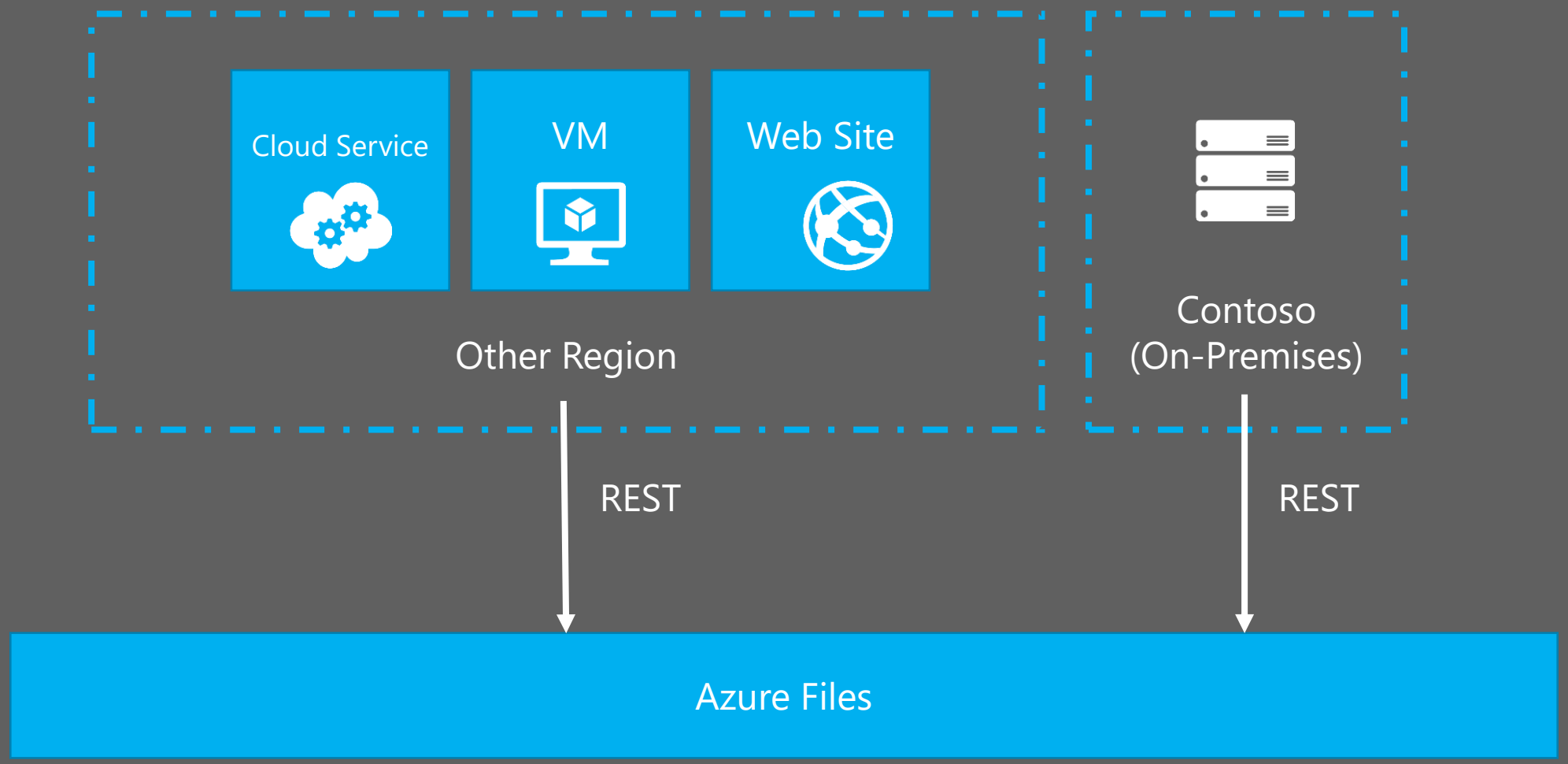
FILES

Azure files



Azure files


Cloud Service
VM
Web Site
Other Region
Contoso
(On-Premises)
REST
REST
Azure Files

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QUEUE

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用程式處理 Queue

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動手做

用程式處理 Queue

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TABLE

Table Storage

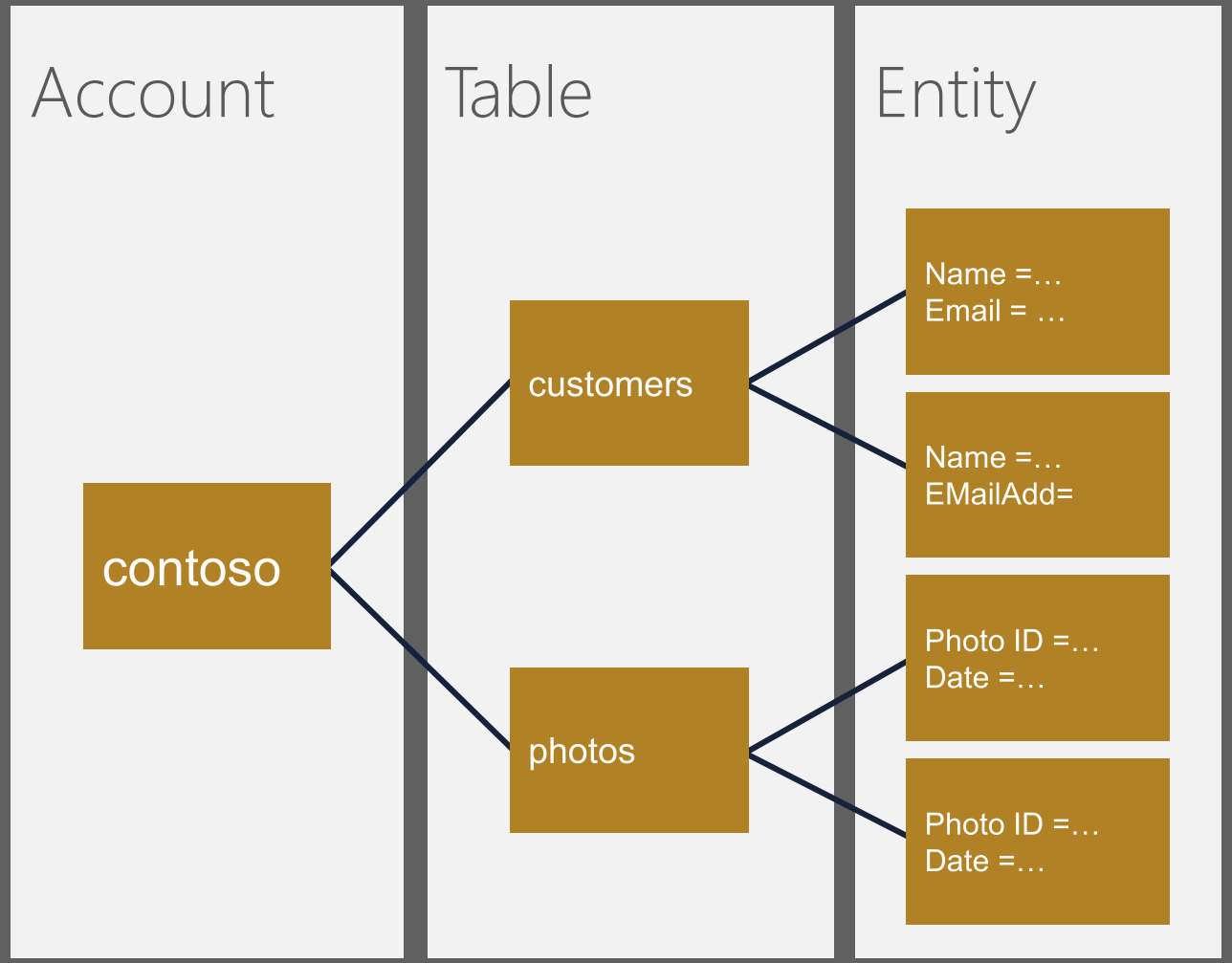

Table Storage

- Mandatory Properties for every entity
  - PartitionKey & RowKey (only indexed properties)
  - Uniquely identifies an entity
  - Defines the sort order
  - Timestamp
  - Optimistic Concurrency
  - Exposed as an HTTP Etag
- No fixed schema for other properties
  - Each property is stored as a <name, typed value> pair
  - No schema stored for a table
  - Properties can be the standard .NET types
  - String, binary, bool, DateTime, GUID, int, int64, and double
- Entity can have up to 255 properties
  - Up to 1MB per entity

Table Storage

PARTITIONKEY (CATEGORY)	ROWKEY (TITLE)	TIMESTAMP	MODELYEAR
Bikes	Super Duper Cycle	…	2009
Bikes	Quick Cycle 200 Deluxe	…	2007
…	…	…	…
Canoes	Whitewater	…	2009
Canoes	Flatwater	…	2006
Rafts	14ft Super Tourer	…	1999
…	…	…	…
Skis	Fabrikam Back Trackers	…	2009
…	…	…	…
Tents	Super Palace	…	2008

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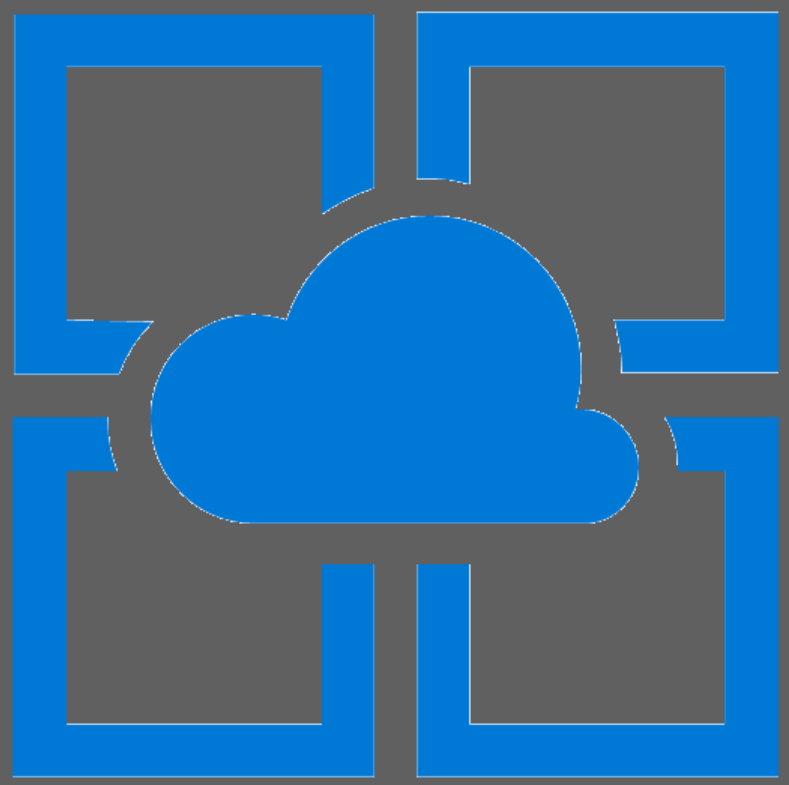
AZURE WEB APP

Azure Web App



Web Apps
Web apps that scale with your business

Mobile Apps
Build mobile apps for any device

Logic Apps
Automate business processes across SaaS and on-premises

API Apps
Build and consume APIs in the cloud

Azure Web Apps

- Support a variety of languages and platforms
  - .NET, Java, Node.js, PHP, Python, and more
- Support scaling (manual or auto) and load balancing
- Support slots for staged deployments and A/B testing
- Support continuous integration

Familiar and Fast

Leverage existing skills, plus languages, frameworks, and tools you're familiar with

Enterprise Grade

ISO-, SOC2-, and PCO-compliant with enterprise-level SLAs

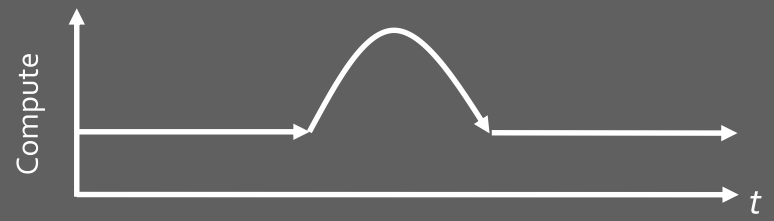
Global Scale

Scale up and down as needed, manually or automatically

Scaling - Cloud Computing Patterns

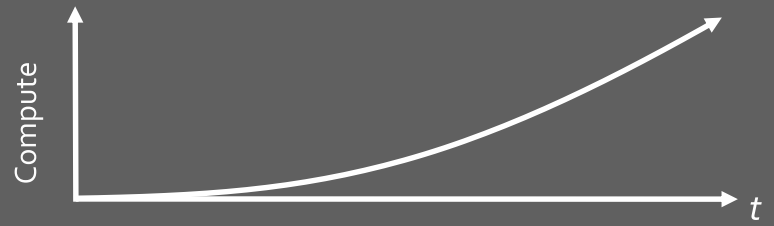
On and Off

On & off workloads (e.g. batch job)
Over provisioned capacity is wasted
Time to market can be cumbersome



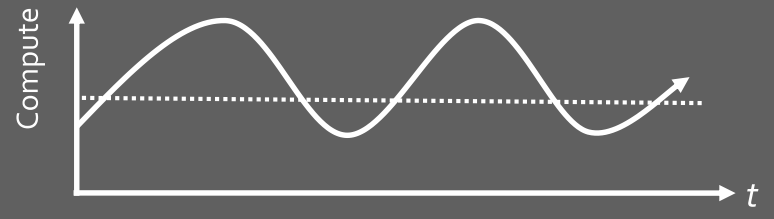
Unpredictable Bursts

Unexpected/unplanned peak in demand
Sudden spike impacts performance
Can't over provision for extreme cases



Growing Fast

Successful services needs to grow/scale
Keeping up w/ growth is big IT challenge
Cannot provision hardware fast enough



Predictable Bursts

Services with micro seasonality trends
Peaks due to periodic increased demand
IT complexity and wasted capacity

Scaling Up vs. Scaling Out

Scale Up

Vary the VM size

1 Core w/ 1.75 GB RAM
2 Cores w/ 3.5 GB RAM
4 Cores w/ 7 GB RAM

Scale Out

Vary the VM count

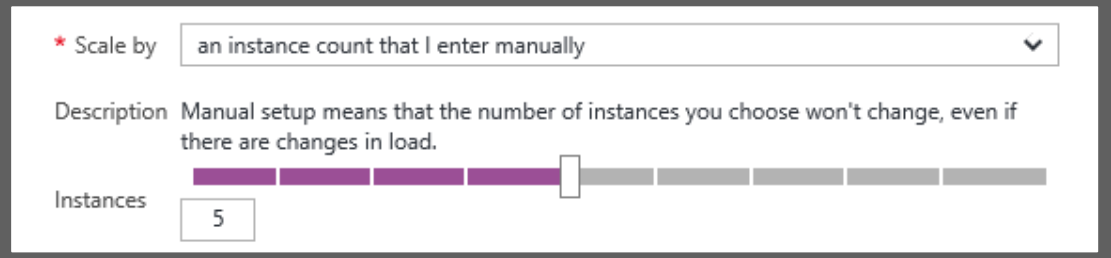
Max 3 instances*
Max 10 instances
*Max 20/50** instances*

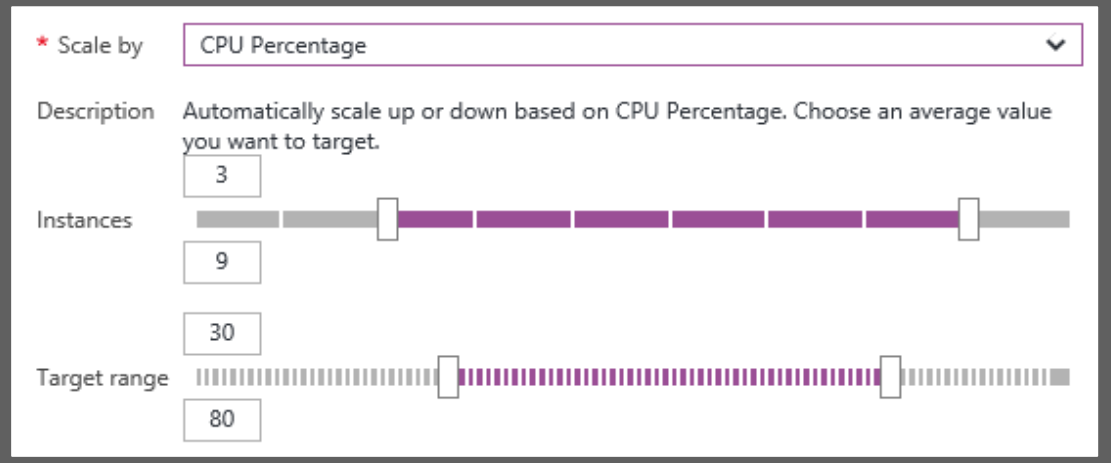
Manual Scaling vs. Auto-Scaling

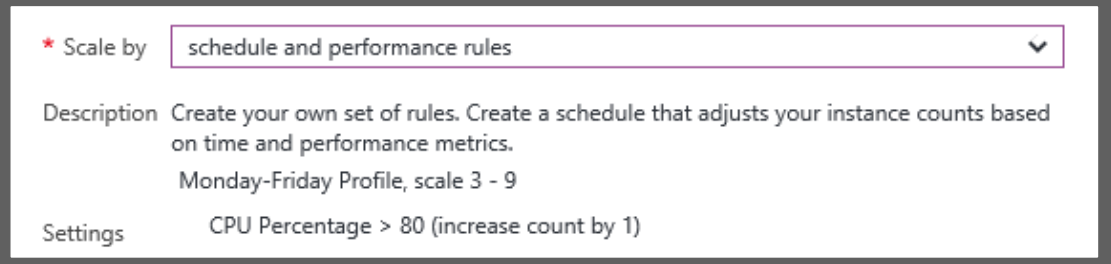
Manual – Scale via portal or scripts

Auto – CPU Percentage

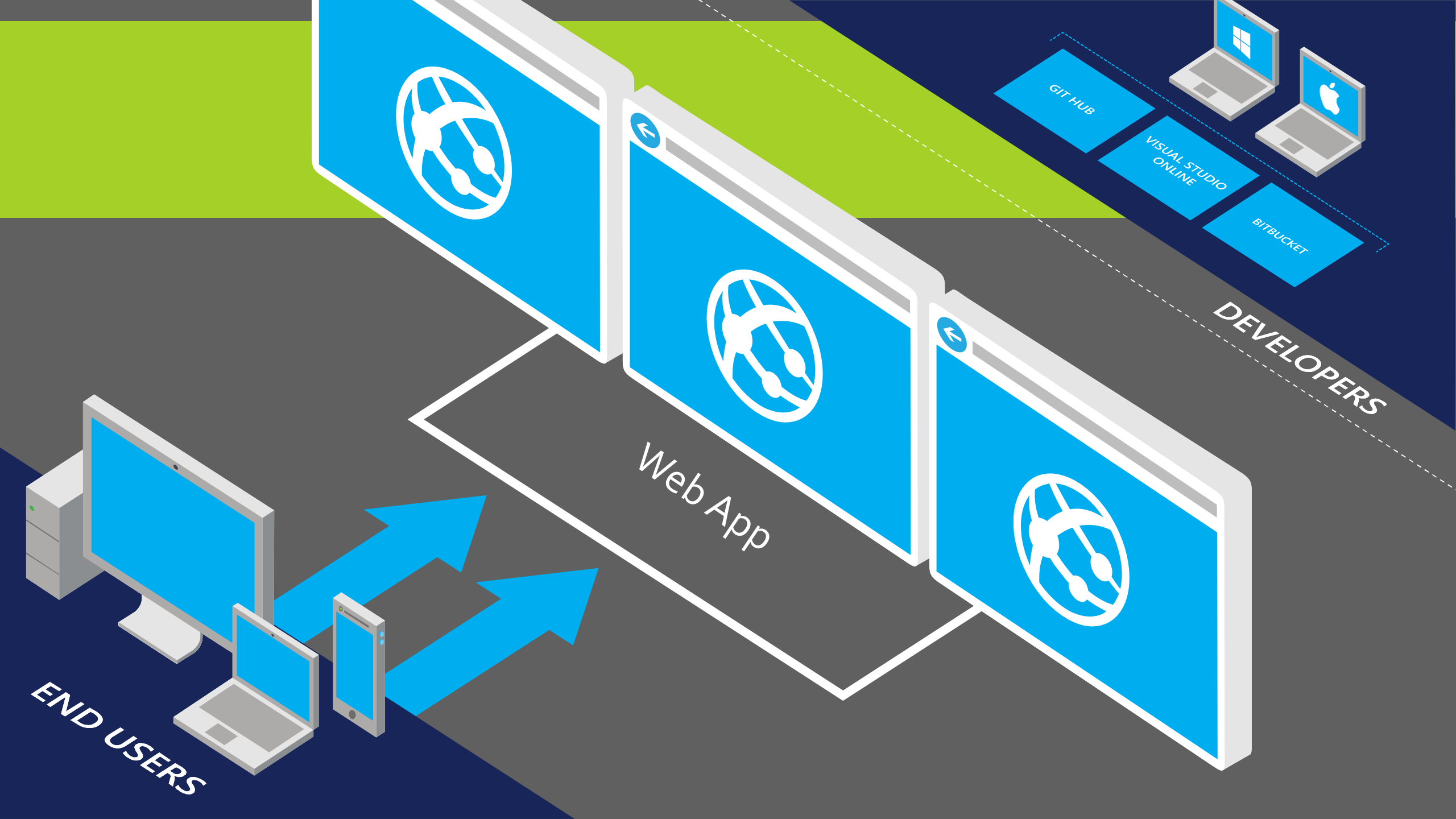
Auto – Schedule & Performance Rules








GIT HUB
VISUAL STUDIO ONLINE
BITBUCKET
DEVELOPERS
Web App
END USERS


GIT HUB
VISUAL STUDIO ONLINE
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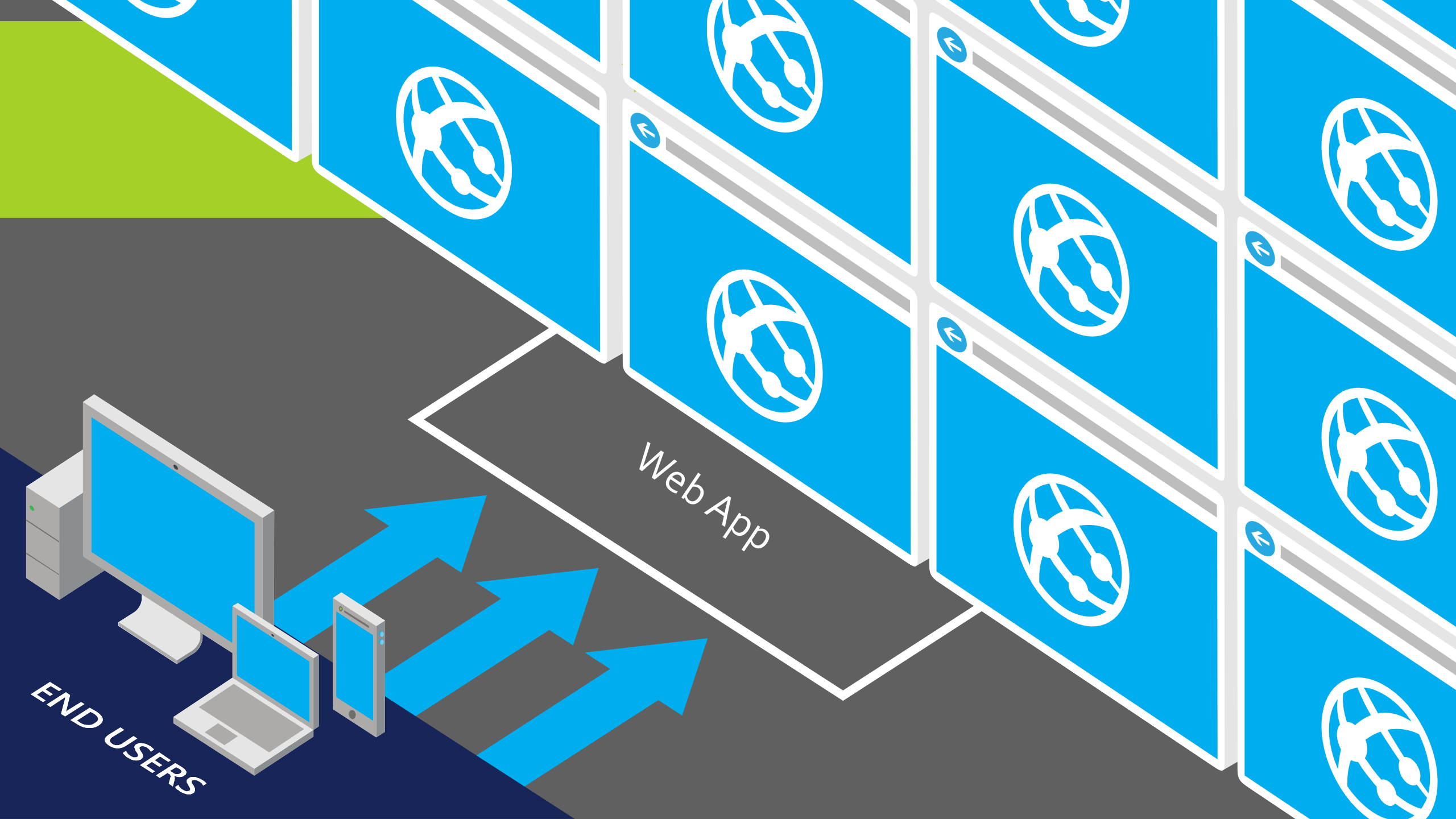
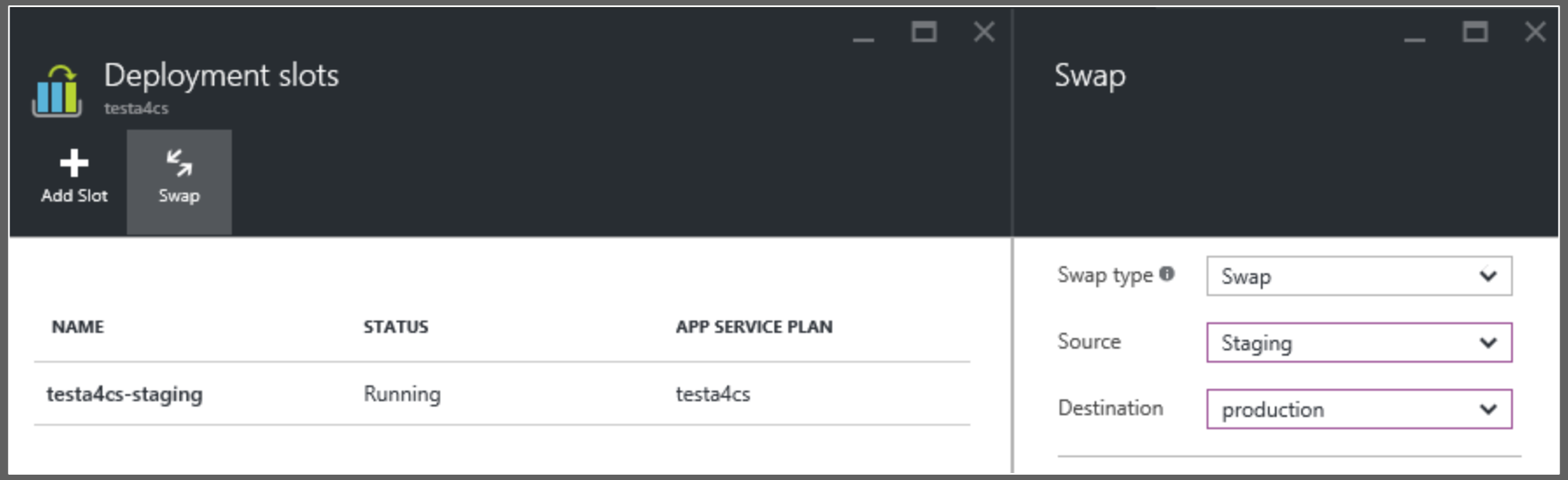

Web App
END USERS

Deployment Slots

- Use a Deploy-Confirm-Promote workflow
  - Promote via “swap” through Azure portal
- http://sitename-slotname.azurewebsites.net



Continuous Integration

- Web apps can be deployed manually via FTP or WebDeploy
- Automate deployment using 3rd party source-control providers
- Can also use a local Git repository from Azure Portal


Git


Visual Studio Team Services

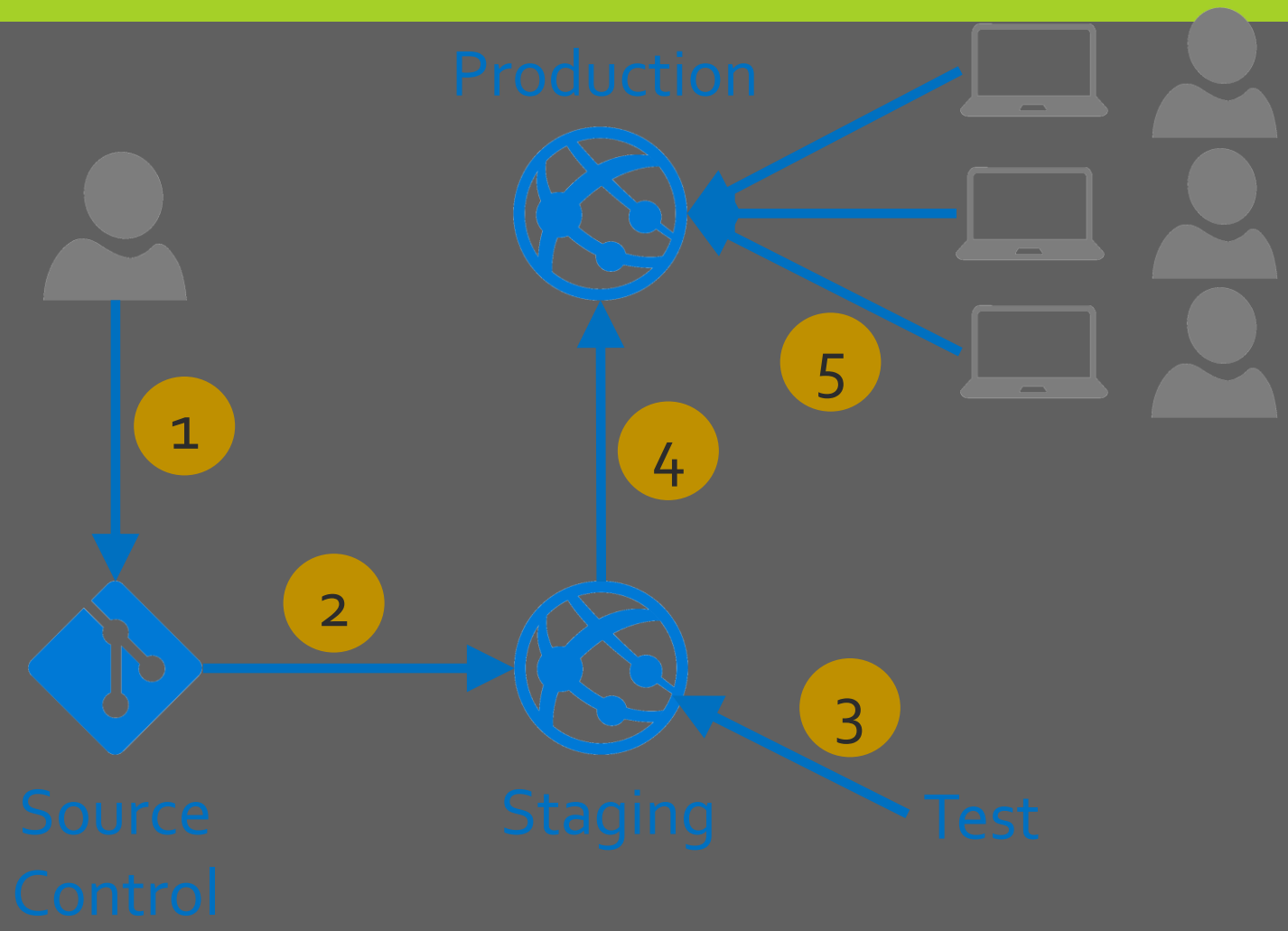

CodePlex


GitHub


BitBucket


DropBox

Continuous Integration + Deployment Slots



1. Developer commits code
2. Automated process builds/compiles and deploys to staging slot
3. Automated and other tests validate content in staging slot
4. Staging content promoted to production
5. Users see updated site

App Service Plans

- Billing and provisioning for App Service resources

	Free	Shared	Basic	Standard	Premium
# of Apps	10	100	Unlimited	Unlimited	Unlimited
Shared Disk Space	1 GB	1 GB	10 GB	50 GB	500 GB
Maximum Instances	1	1	3	10	50
Autoscale	No	No	No	Yes	Yes
Staging Environments				5	20
Custom Domains	No	Yes	Yes	Yes	Yes
SLA			99.95%		

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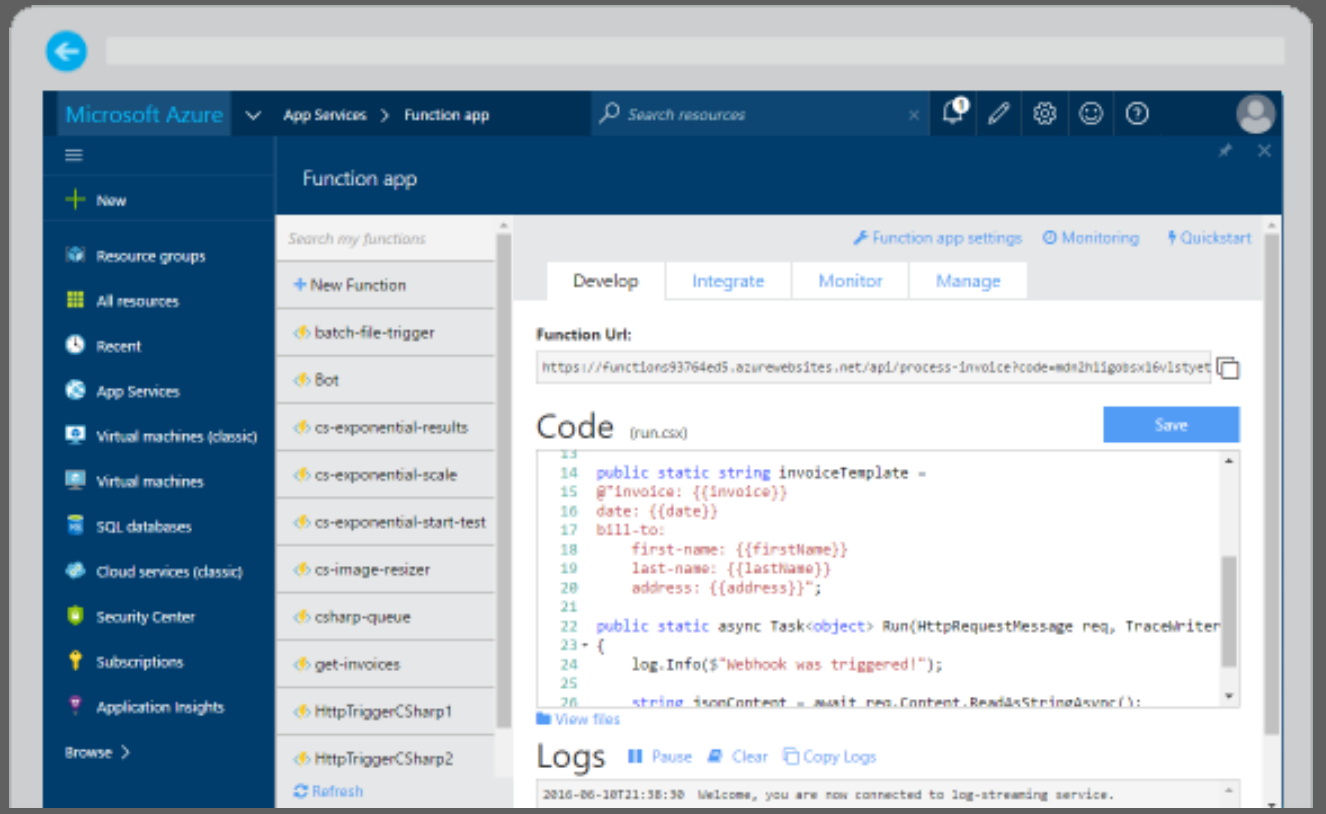
AZURE FUNCTION

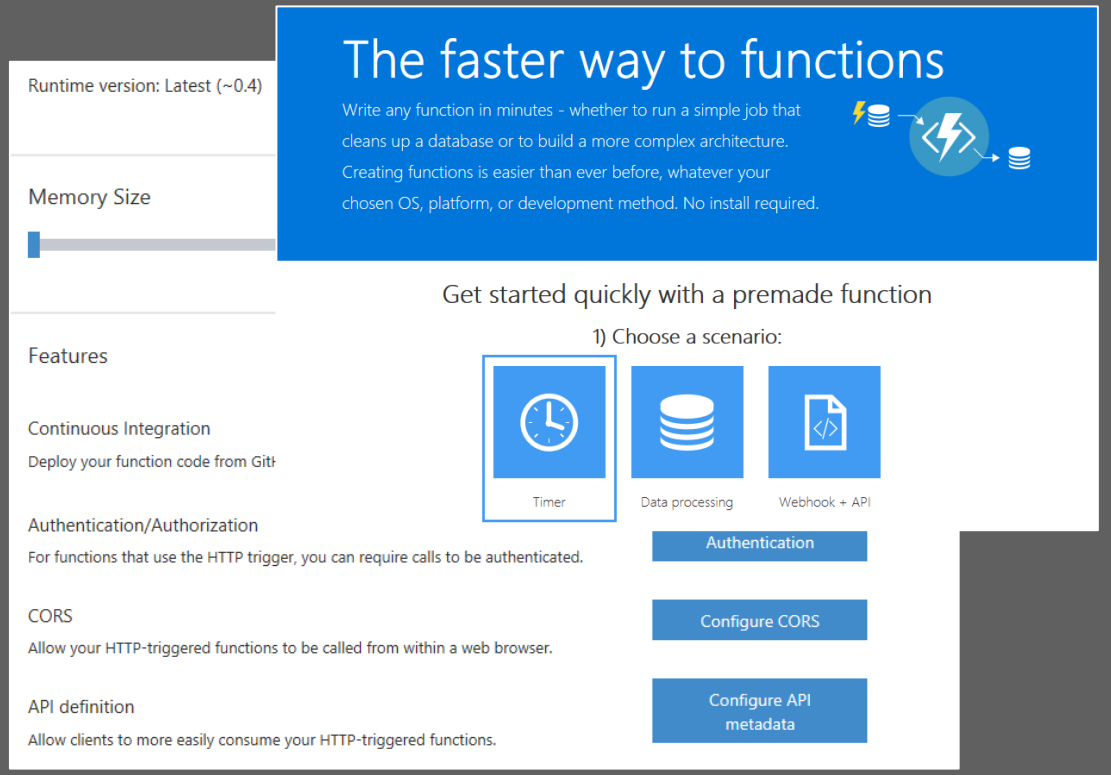
Azure Functions

Create a “serverless” event-driven experience that extends the existing Azure App Service platform by building “nanoservices” that can scale based on demand



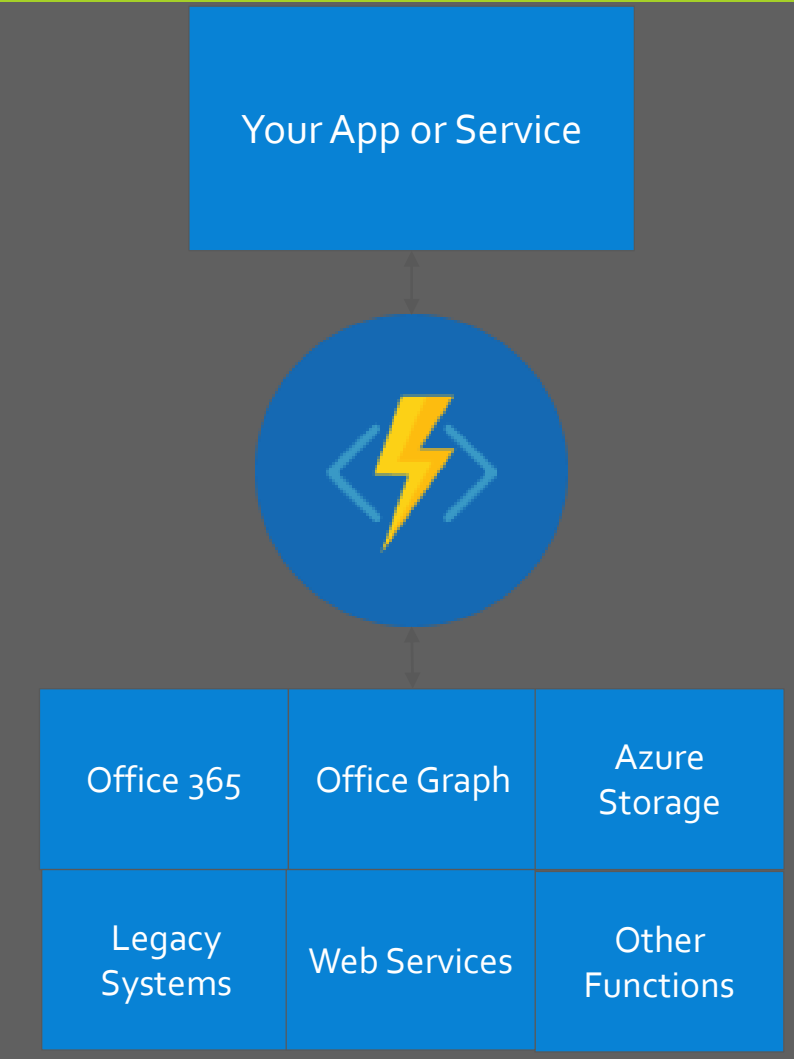
Supported Languages and Tools

Create functions in JavaScript, C#, Python, and PHP, as well as scripting options such as Bash, Batch, and PowerShell, that can be triggered by virtually any event in Azure, 3rd party services, or on premise systems



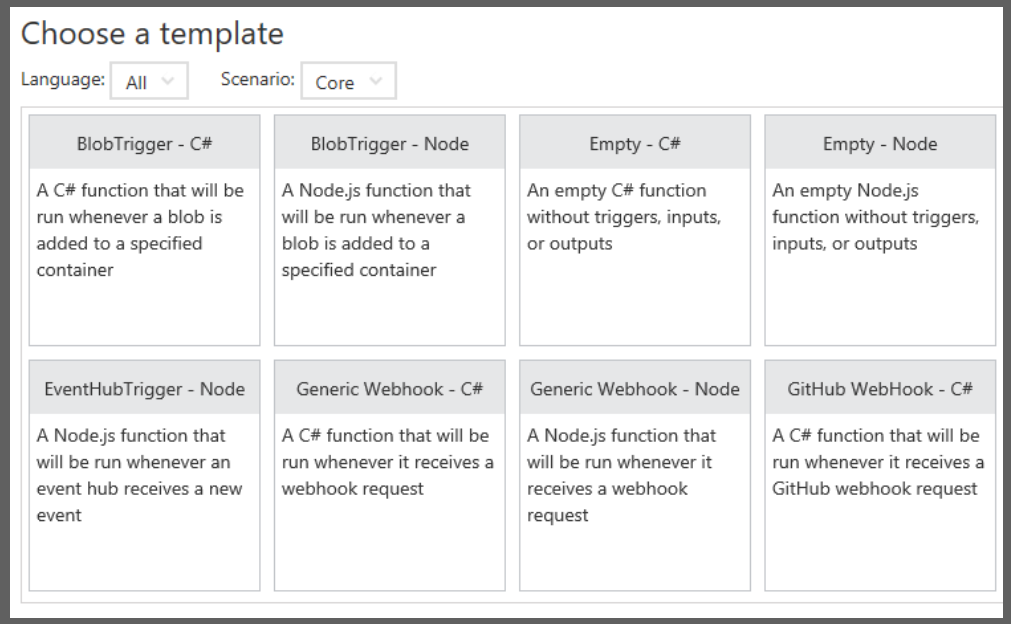
Common Scenarios

- Timer-based processing
- Azure service event processing
- SaaS event processing
- Serverless web application architectures
- Serverless mobile backends
- Real-time stream processing
- Real-time bot messaging



Function App Templates

Function App templates are categorized into general areas of Timer, Data Processing, and Webhook & API



- BlobTrigger
- EventHubTrigger
- Generic webhook
- GitHub webhook
- HTTPTrigger
- QueueTrigger
- ServiceBusQueueTrigger
- ServiceBusTopicTrigger
- TimerTrigger
- Blank & Experimental

Timer Function Apps

- Run at explicitly specified intervals, like every day at 2:00 am using CRON expressions, like “0 */5 * * * *“ (every 5 minutes)
- Can send information to other systems, but typically don’t “return” information, only write to logs
- Great for redundant cleanup and data management
- Great for checking state of services
- Can be combined with other functions

Data Processing Function Apps

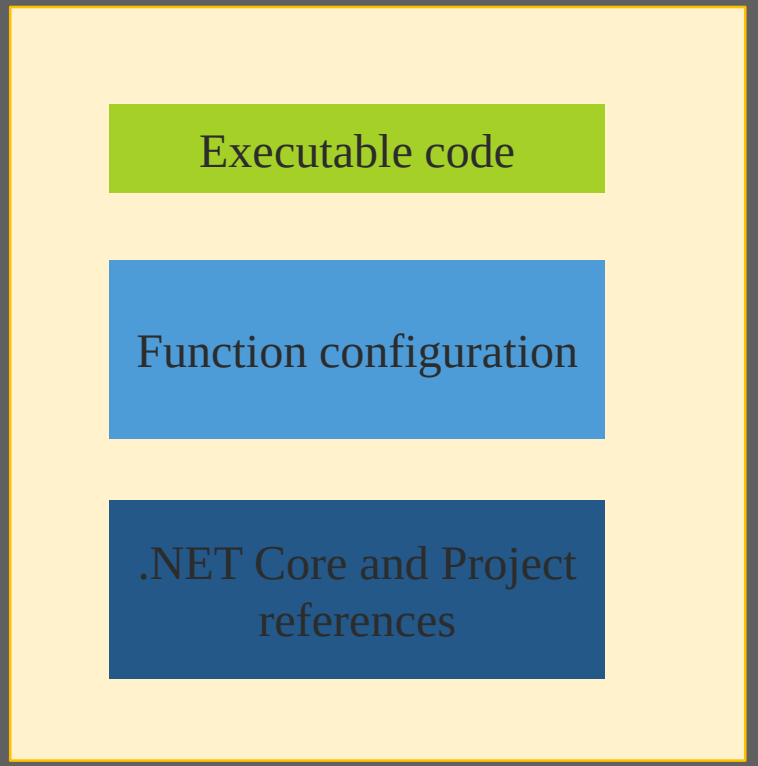
- Run when triggered by a data event, such as an item being added to a queue or container
- Typically have in and out parameters
- Great for responding to CRUD events
- Great for performing CRUD events
- Great for moving content
- Access data across services

Webhook & API Function Apps

- Triggered by events in other services, like GitHub, Team Foundation Services, Office 365, OneDrive, Microsoft PowerApps
- Takes in a request and sends back a response
- Often mimic Web API and legacy web services flows
- Typically need CORS settings managed
- Best for exposing functionality to other apps and services
- Great for building Logic Apps

Anatomy of a Function

- A “Run” file that containing the function code
- A “Function” file containing all service and trigger bindings and parameters
- A “Project” file containing project assembly and NuGet package references
- App Service settings, such as connection strings and API keys



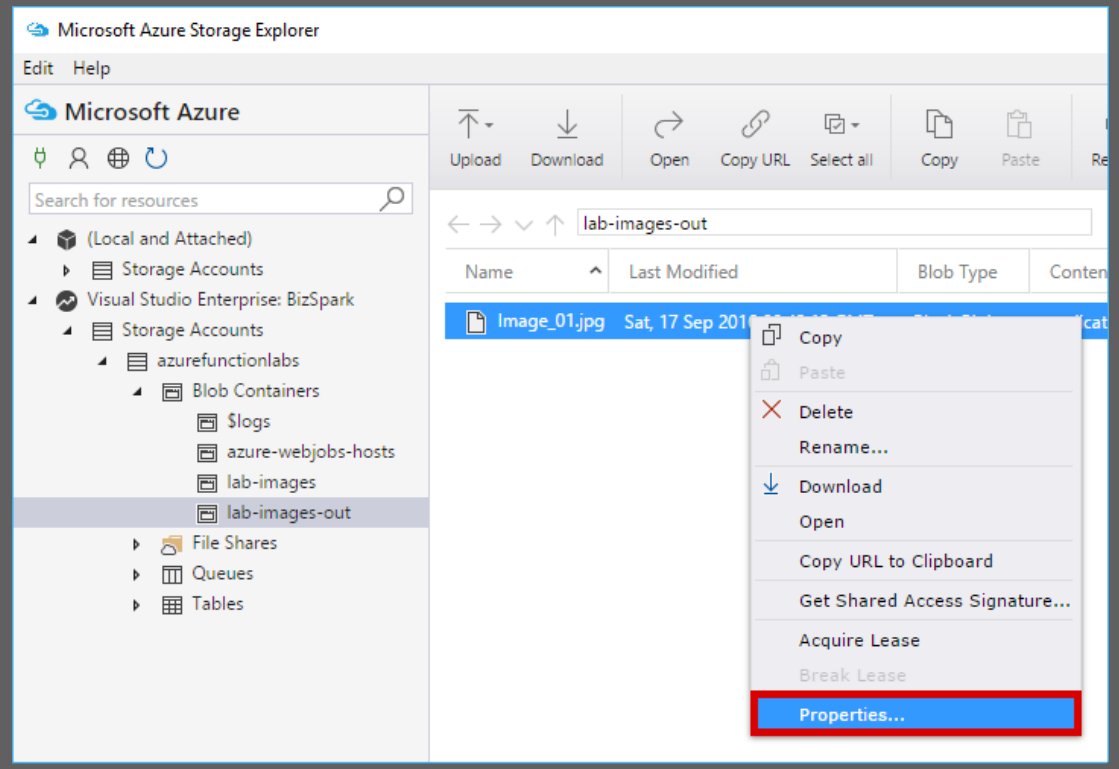
Function Bindings

Bindings serve as the basis for all connections to and from a function. Many bindings can be “bi-directional” as well.

Type	Service	Trigger	Input	Output
Schedule	Azure Functions	✓		
HTTP (REST or webhook)	Azure Functions	✓		✓*
Blob Storage	Azure Storage	✓	✓	✓
Events	Azure Event Hubs	✓		✓
Queues	Azure Storage	✓		✓
Tables	Azure Storage		✓	✓
Tables	Azure Mobile Apps		✓	✓
No-SQL DB	Azure DocumentDB		✓	✓
Push Notifications	Azure Notification Hubs			✓

Testing Functions

- Command-line tools
- 3rd party products such as Postman and Swagger
- Direct web calls via cURL
- Nested functions
- Microsoft Azure Storage Explorer
- Visual Studio Cloud Explorer



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Q & A

Reference

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