

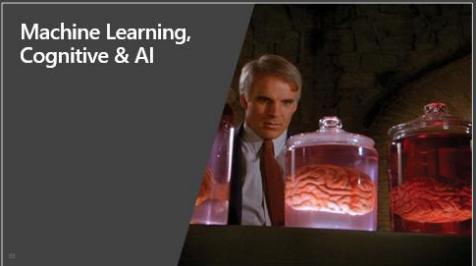
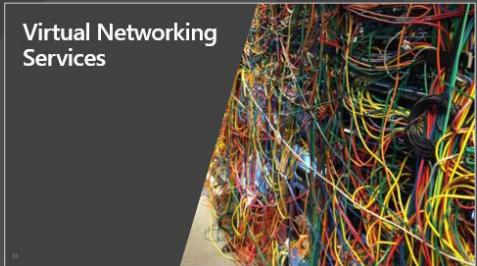


Azure

# Introduction to the Cloud with Microsoft Azure

Ben Coleman  
Ross Smith  
Mike Ormond

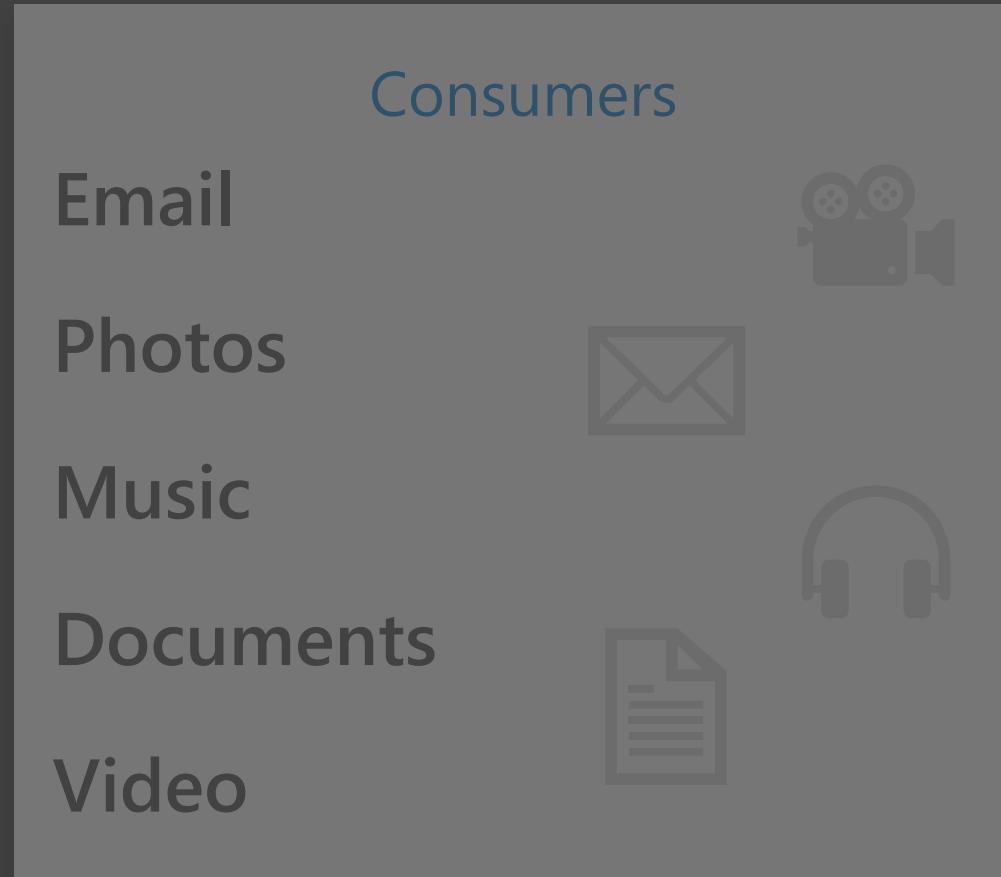
July 2018



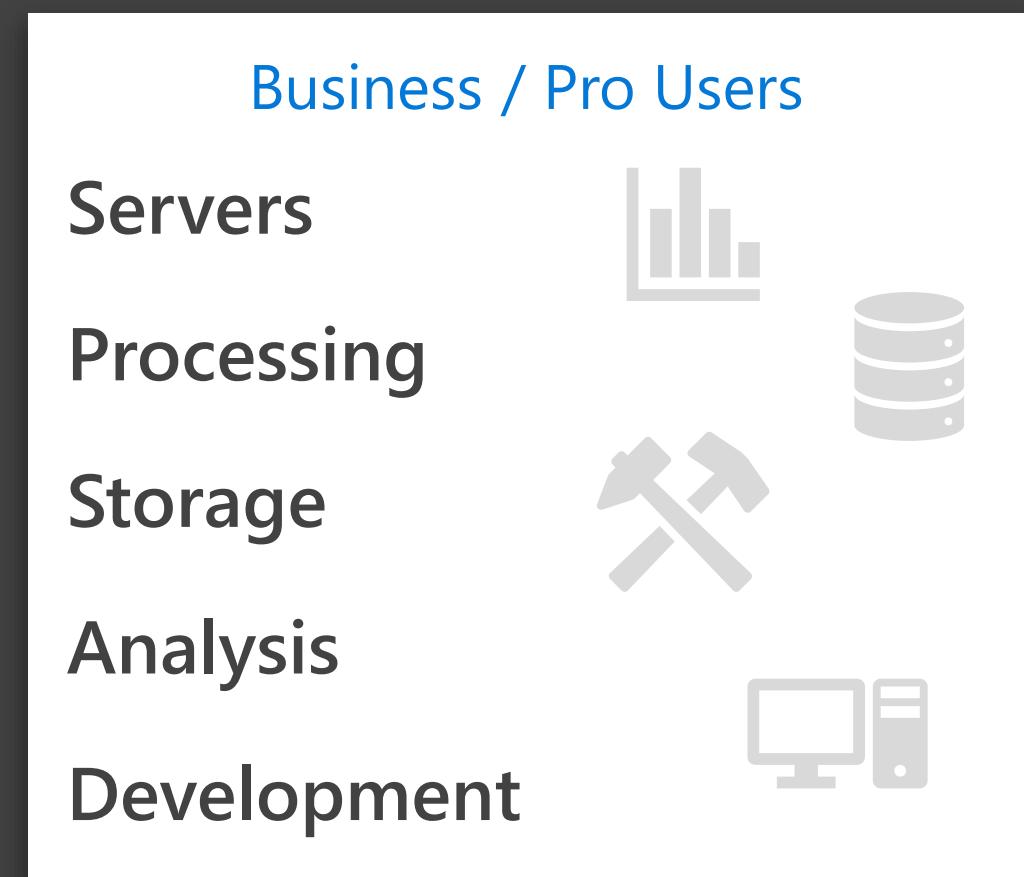
# Introduction to Azure



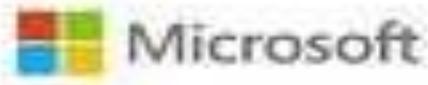
# Public Cloud



Examples:  
Gmail, iCloud, Dropbox, Google Docs,  
OneDrive



Examples:  
Microsoft Azure, AWS, Google Cloud  
Platform



# What is the cloud?

An introduction to cloud computing  
with Microsoft Azure

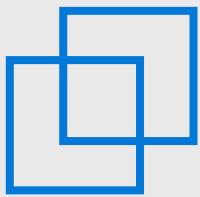
Presenter: Dan Baker

@azuredan





Productive



Hybrid



Intelligent

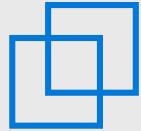


Trusted

# Azure. Cloud for all.



Productive



Hybrid

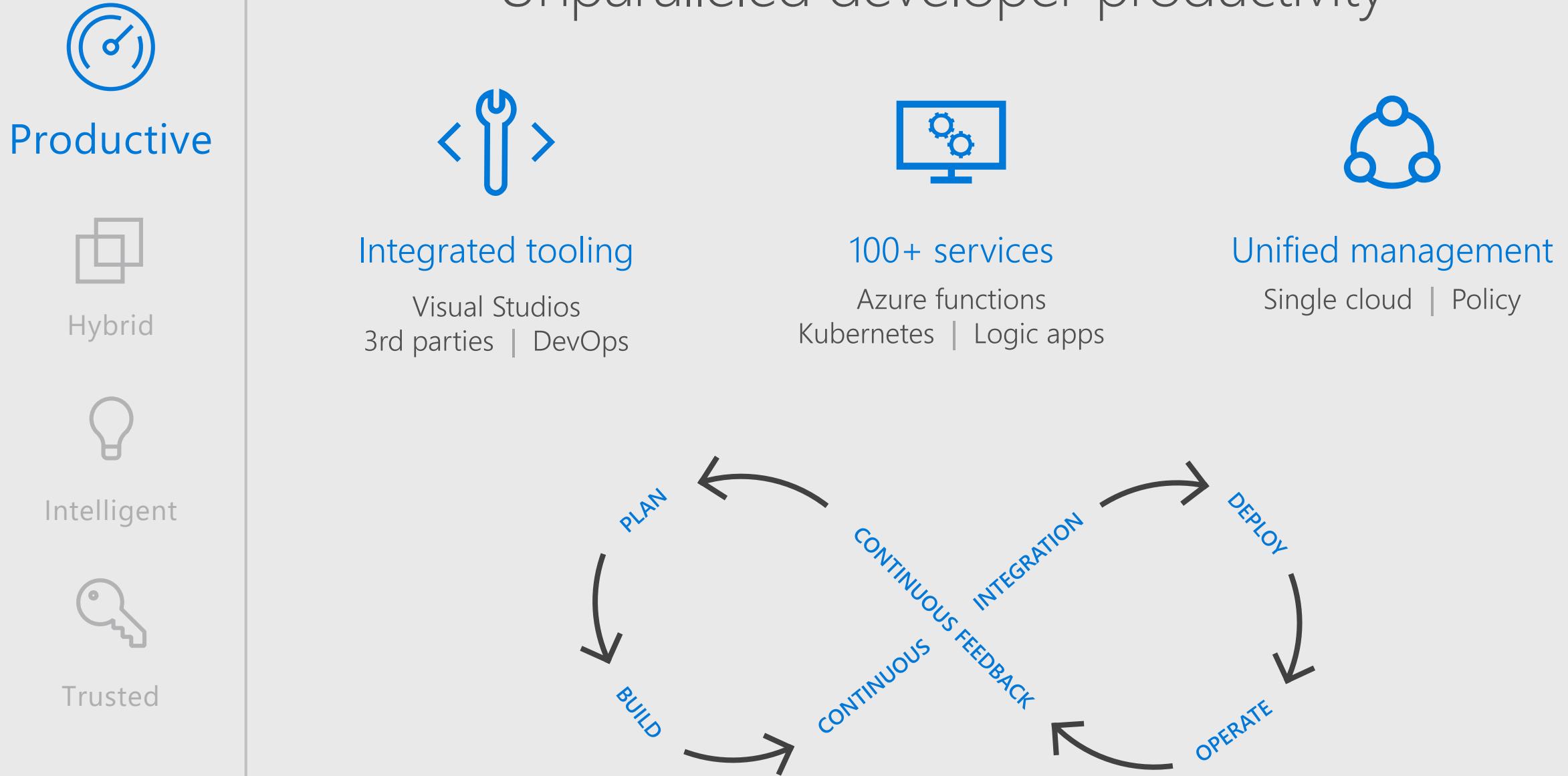


Intelligent



Trusted

# Unparalleled developer productivity



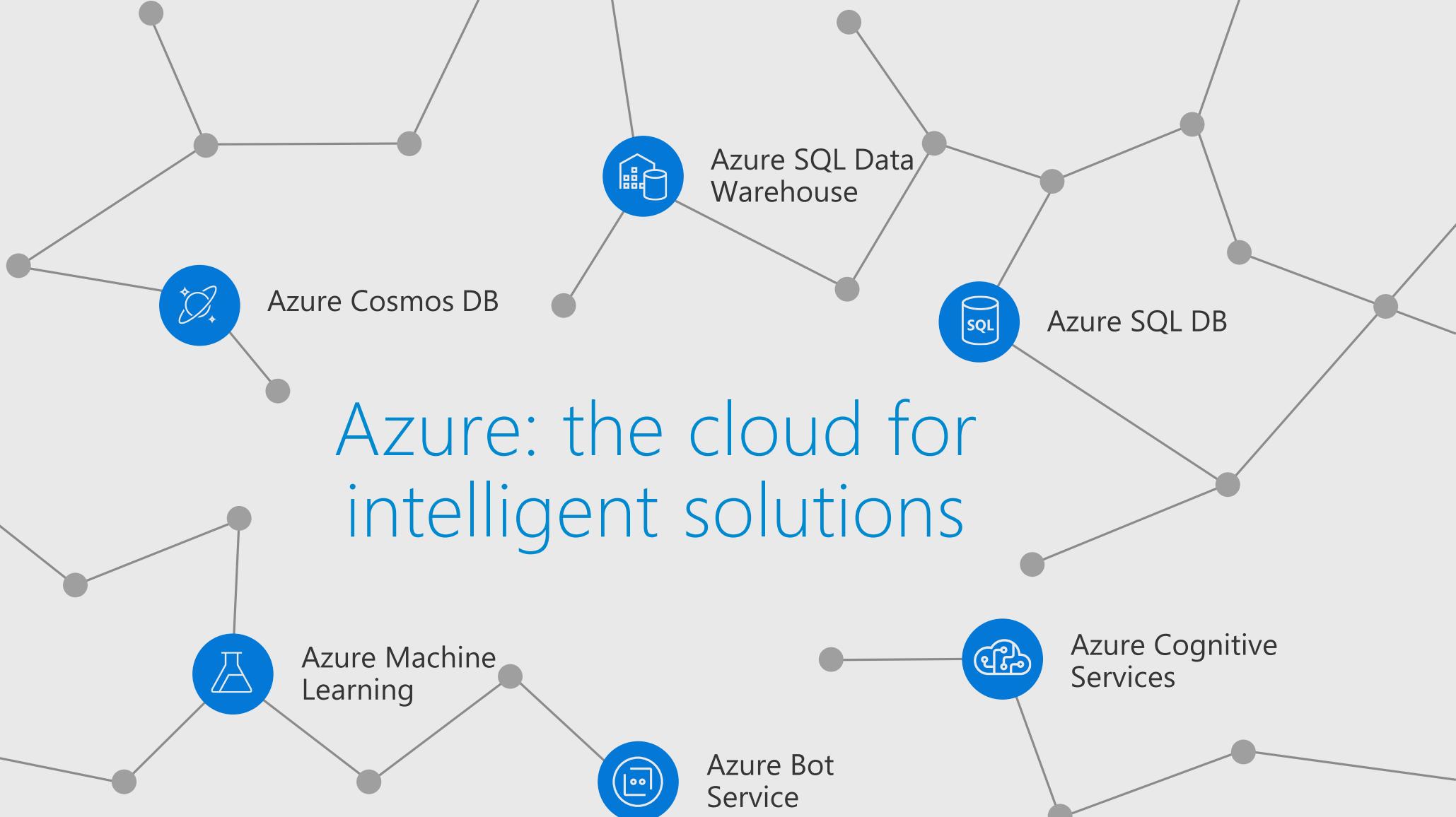
Productive

Hybrid

Intelligent

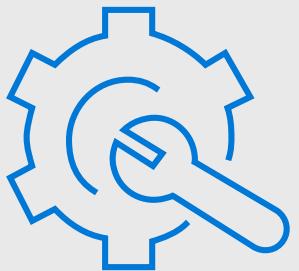
Trusted

# Azure: the cloud for intelligent solutions



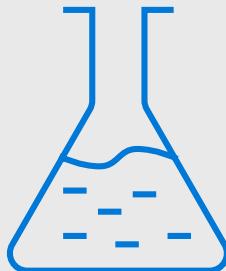


# Comprehensive deep learning, machine learning as a service



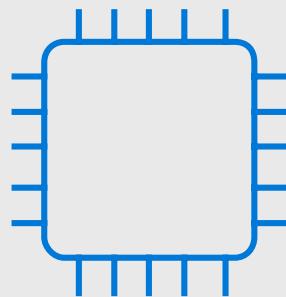
## Customizable services

ML Services, Tensor, Caffe



## Tools

Bots, Cognitive, ML



## Infrastructure and compute

CPU, GPU, FPGA

Azure



Productive



Hybrid



Intelligent



Trusted



50 Azure  
regions



## Tools

Developer Tools

DevOps

Portal +  
Scripting



## Advanced workloads

Web + Mobile

Identity

Internet of Things

Data + Analytics

Microservices

Artificial Intelligence

Containers

Cognitive Services

Serverless

High Performance Computing



## Core infrastructure

Security

Management

Compute

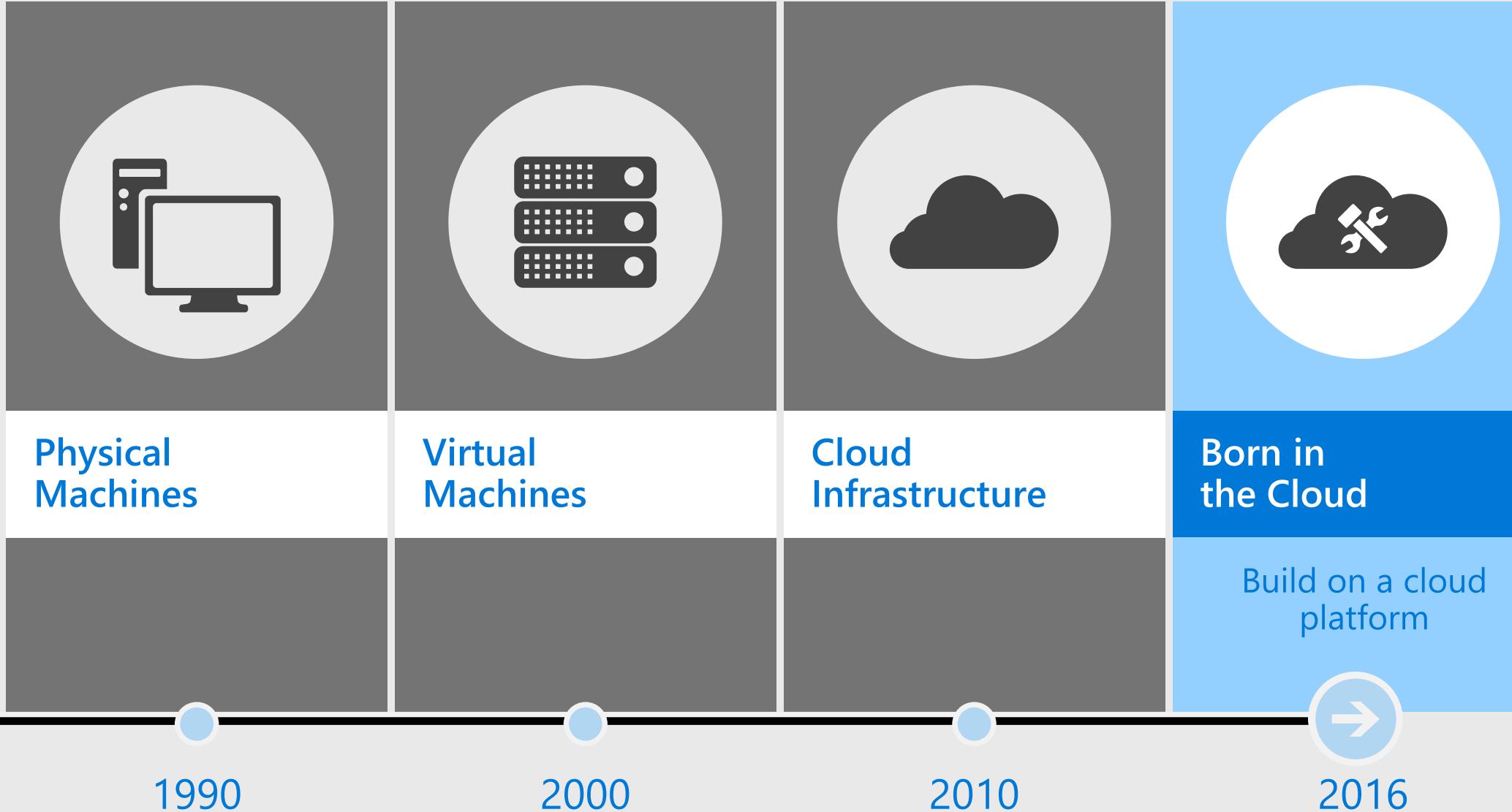
Storage

Networking



# The changing world of app development

Mainframe  
Monolithic  
Client/Server  
3 Tier  
Component  
RAD  
Distributed  
SOAP  
SOA  
Web  
REST  
Mobile  
Microservices  
Containers  
Serverless



# Cloud Usage Models

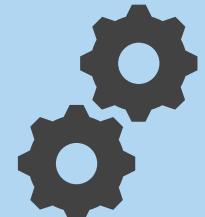
## Infrastructure As A Service

Standard computers & servers, e.g. virtual machines running Windows or Linux



## Platform As A Service

Provide a specific service, e.g. host a web site, store data, send a message



## Software As A Service

Self service, off the shelf products, e.g. email account



# Balance of responsibility

Balance of control and responsibility depends on the category of the service

## - READY TO GO

Use immediately with minimal configuration

## - SOME ASSEMBLY REQUIRED

Existing services are a starting point, with additional configuration for a custom fit

## - BUILD FROM THE GROUND UP

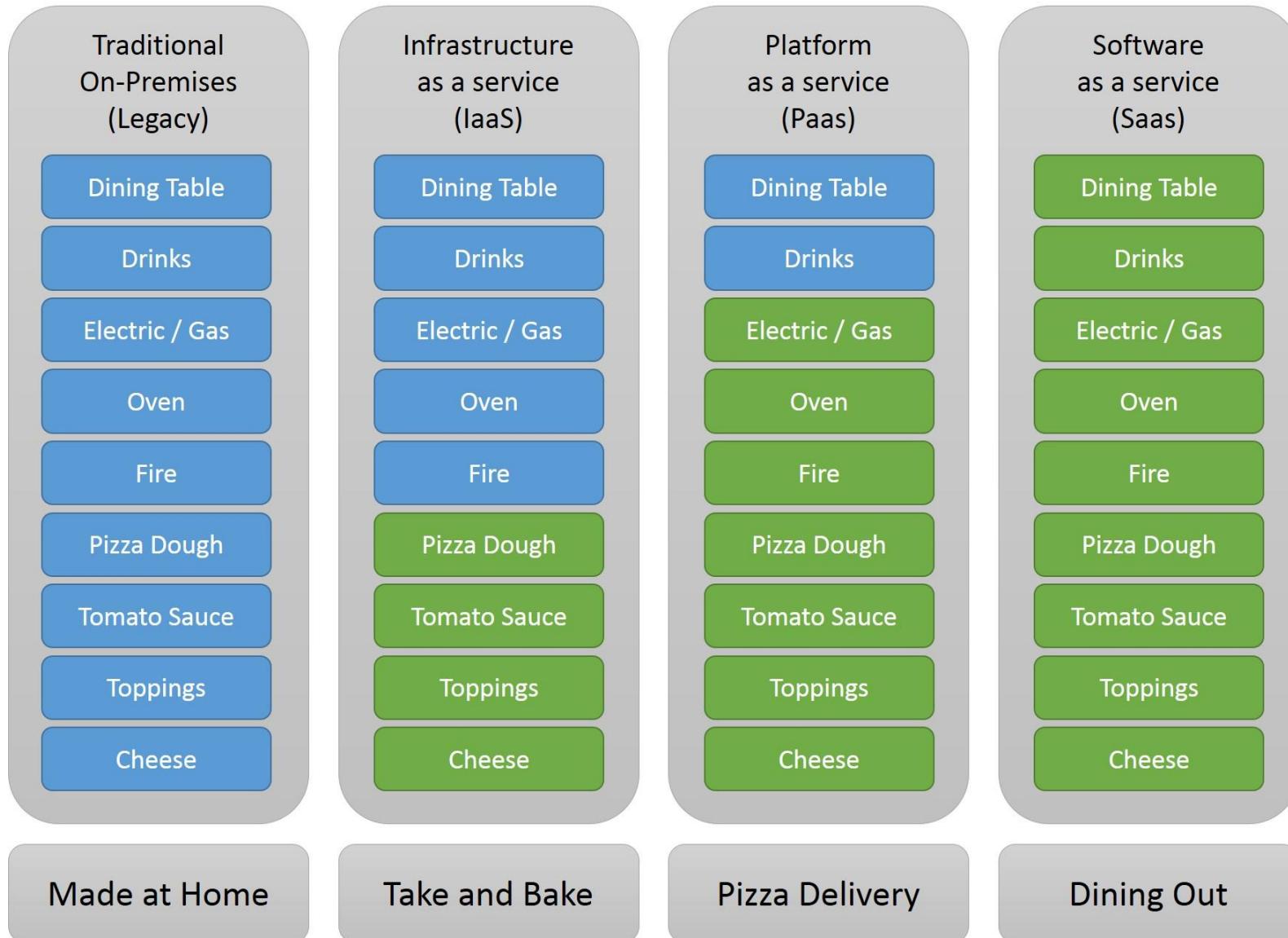
Building blocks, create your own solution or apps from scratch-

Responsibility	On Prem	IaaS	PaaS	SaaS
Applications				
Data				
Runtime				
Middleware				
O/S				
Virtualization				
Servers				
Storage				
Networking				

Customer

Microsoft

# Pizza as a Service



■ You Manage

■ Vendor Manages

# Azure - Open source support

DevOps



Nagios®



Management



ANSIBLE

SALTSTACK



Applications



Drupal™



App frameworks & tools

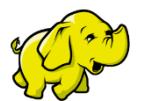


nodeJS



eclipse

Databases & middleware



redis

CLEARDB

cloudera

MySQL™

mongoDB



Couchbase

Infrastructure



suse



ORACLE LINUX

FreeBSD



# Hands On Exercise 1

Getting Started  
With Azure



# Hands On Exercise 1 – Getting Started

Activate your Azure Pass

Access your new Azure Subscription

Use the Azure Portal

Create a Dashboard View

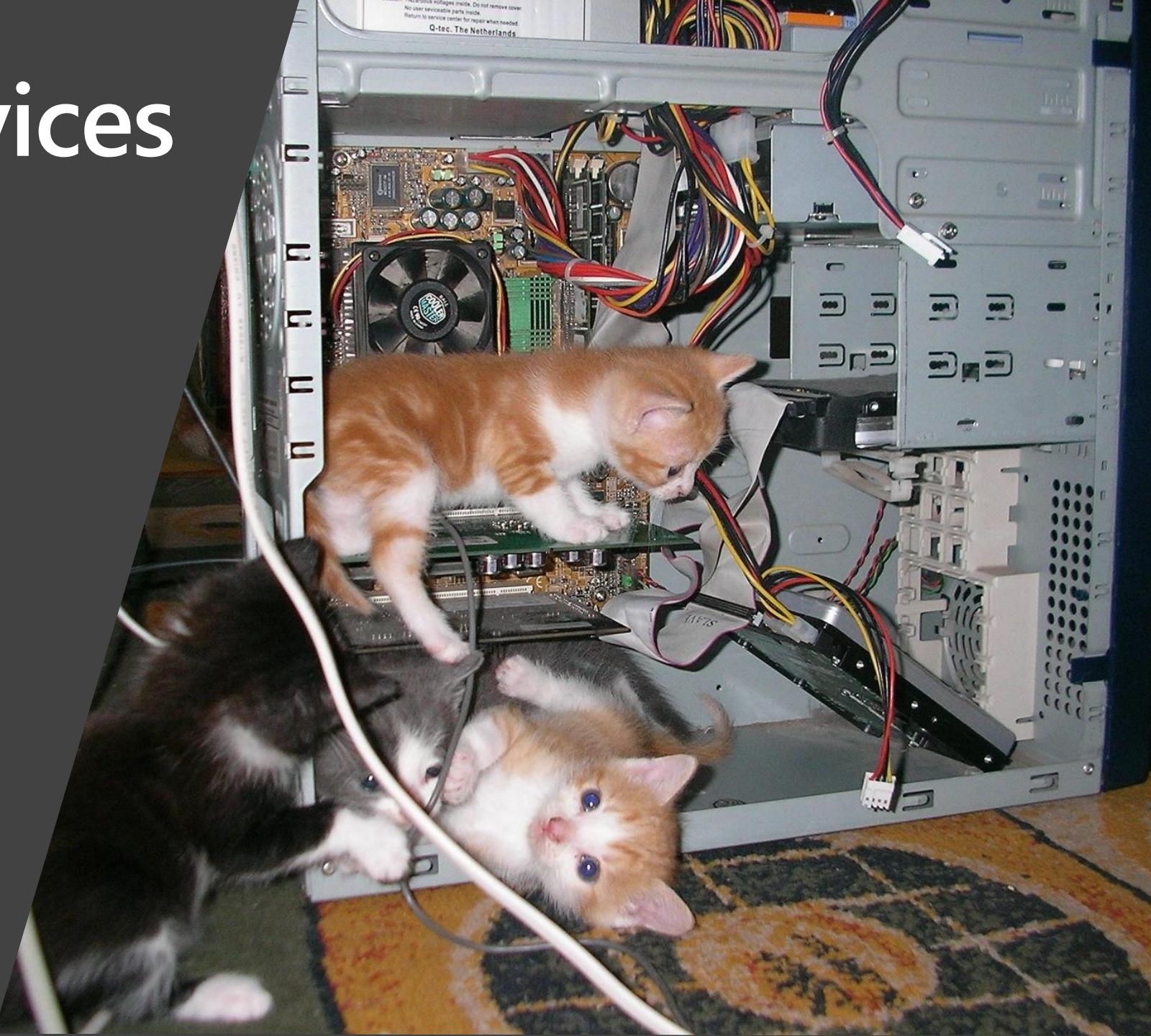
Create a Azure Resource Group

Explore the Azure Marketplace

[aka.ms/azure-day](http://aka.ms/azure-day)

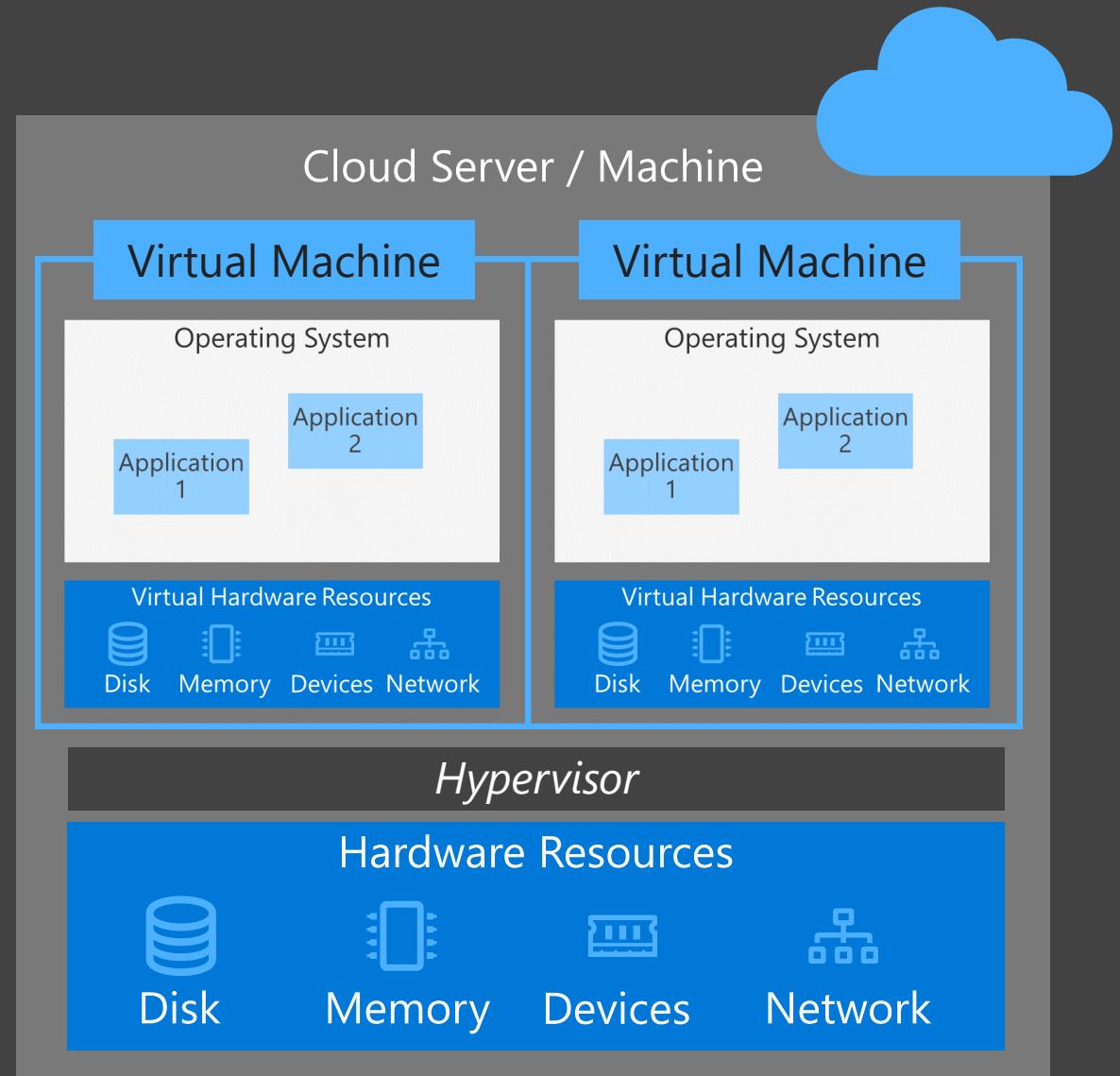
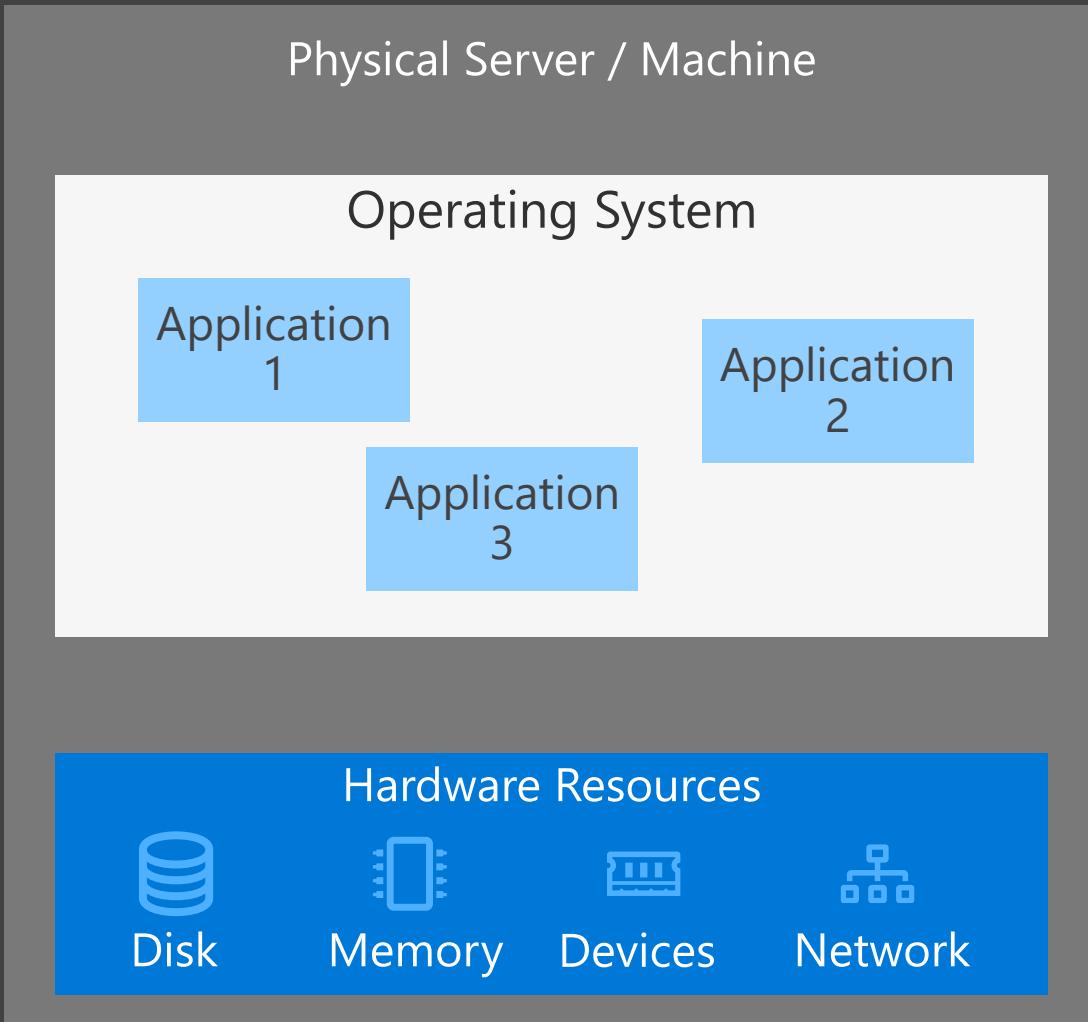


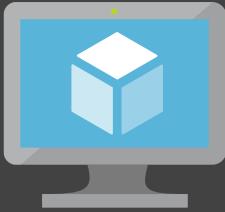
# Compute Services



# Machine Virtualization

## What is a Virtual Machine (VM)?





# Virtual Machines

Windows & Linux

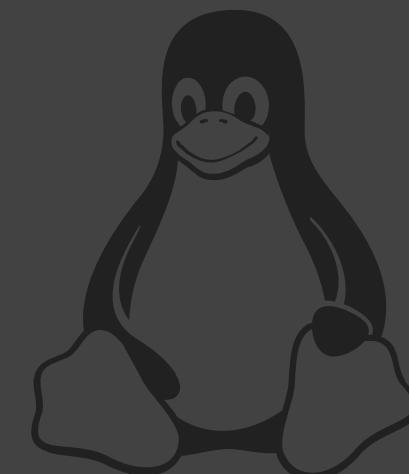
Source images - marketplace or custom

Deploy via Portal, command line, PowerShell or  
templates

Sized & priced by Memory & CPU

## Disks

- OS Disk & Data Disk
- Premium or Standard



# Virtual Machine Marketplace

## Recommended



Windows Server

Microsoft



Red Hat Enterprise  
Linux

RedHat



Ubuntu Server

Canonical



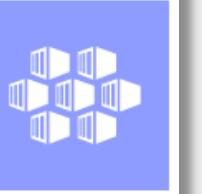
SQL Server 2017  
Enterprise

Microsoft



Virtual machine  
scale set

Microsoft



Container Service

Microsoft

More

## Virtual Machine Images

Quest Quest



Unified  
Communications

Quest Software

RemoteScan  
Enterprise

Quest Software

Pivotal Cloud  
Foundry on

Pivotal Software...



Aqua Container  
Security Platform

Aqua Security



Commvault Trial

Commvault



BPM - Document  
Management

AuraPortal

More

## Operating Systems



Windows Server

Microsoft



Ubuntu Server



Red Hat Enterprise  
Linux 7.5

Red Hat



Windows Client

Microsoft



CentOS-based 7.3

Rogue Wave Software



SLES 12 SP3

SUSE

NAME	PUBLISHER
Data Science Virtual Machine for Linux (Ubuntu)	Microsoft
Ubuntu Server 16.04 LTS	Canonical
Kali Linux	Kali Linux
Clear Linux OS Basic	Clear Linux Project
Clear Linux OS - Machine Learning	Clear Linux Project
Clear Linux OS - Containers	Clear Linux Project
CoreOS Linux (Alpha)	CoreOS
Oracle Linux 6.9	Oracle
CoreOS Linux (Stable)	CoreOS
Oracle Linux 7.4	Oracle
KAV for Linux File Server	Kaspersky Lab
Stratis Full Node for Linux	Stratis
Jitterbit Harmony Linux Agent	Jitterbit
Red Hat Enterprise Linux 7.2	Red Hat
Red Hat Enterprise Linux 6.7	Red Hat
RadiantOne Cluster on Linux	Radiant Logic, Inc.
Single RadiantOne Server on Linux	Radiant Logic, Inc.
CoreOS Linux (Beta)	CoreOS
Red Hat Enterprise Linux 7.5	Red Hat
Red Hat Enterprise Linux 7.3	Red Hat

# Azure Compute – Core Services



## Virtual Machines

Windows and Linux VMs



## Azure Kubernetes Service

Deploy and manage clustered containers in Kubernetes



## Scale Sets

Elastically scale 100s of VMs without pre-provisioning



## Azure Container Registry

Secure Docker private registry, provided as a service



## Batch

HPC and large scale batch processing. Scales to hundreds or thousands of VMs



## Service Fabric

Highly scalable microservice platform for stateless and stateful services

# Compute families



Entry  
Level



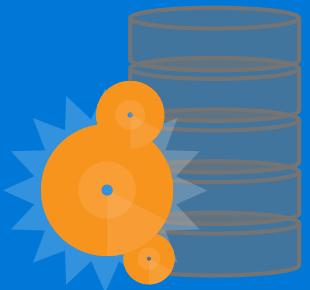
General  
Purpose VMs



Compute  
Optimized VMs



Large Memory  
VMs



>80,000 IOPs  
Premium Storage

Dev/Test and  
entry-level workloads

Earliest generation, HDD

100 ACU/core

Good combination of  
memory, SSD for most  
common production  
applications

Memory-intensive  
variants

210 ACU/core

Compute-intensive apps  
like Gaming, Analytics

More CPU to  
memory ratio

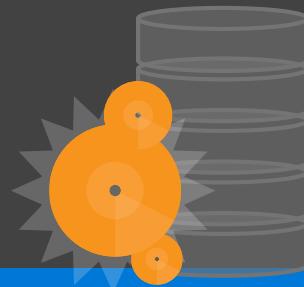
210 ACU/core

Large VMs for large  
databases requiring fast  
Storage

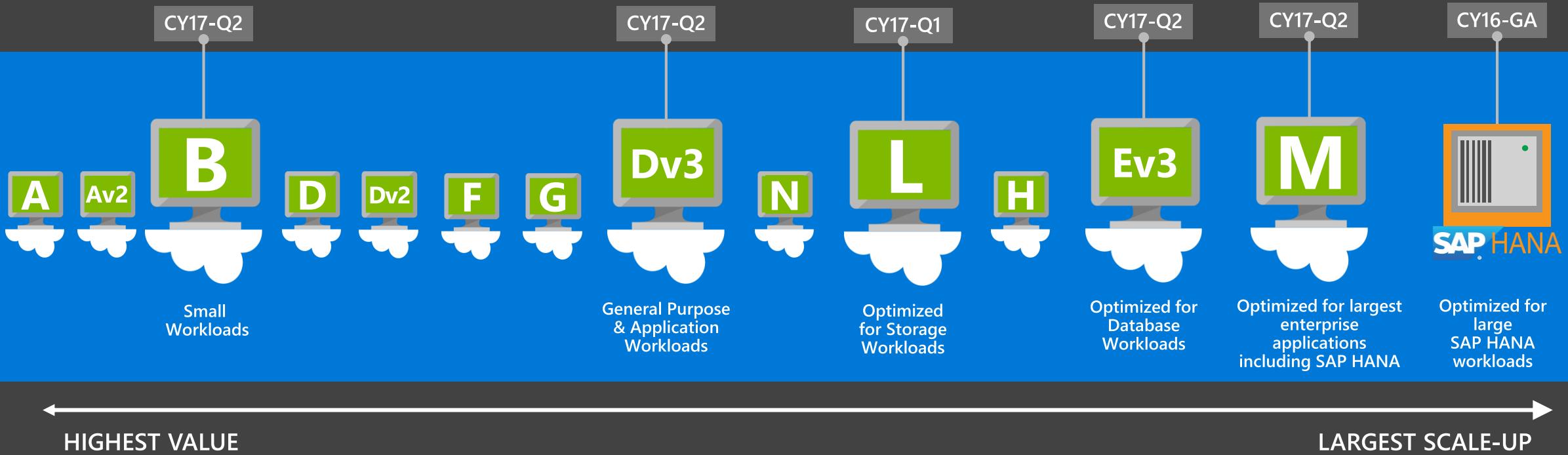
Intel Haswell processor  
with 0.5TB RAM

180 ACU/core

# New compute size options



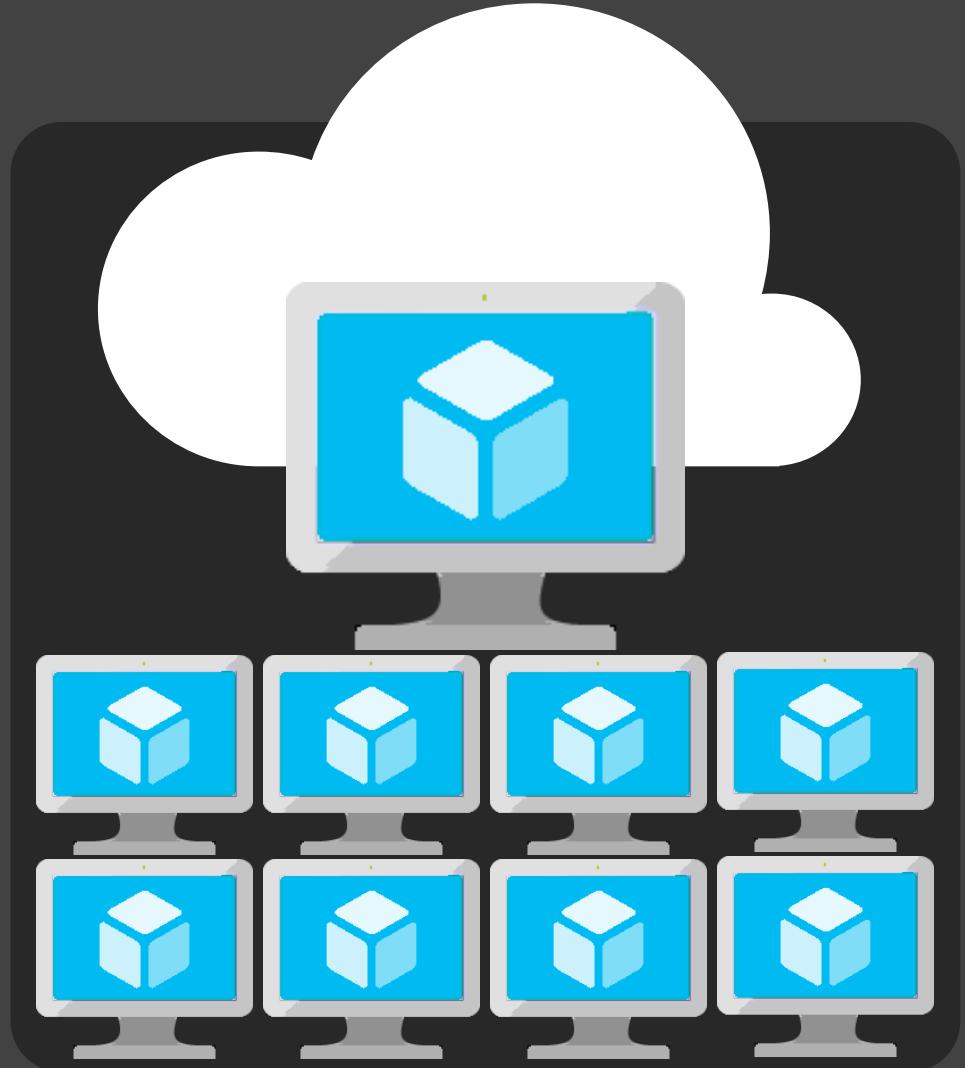
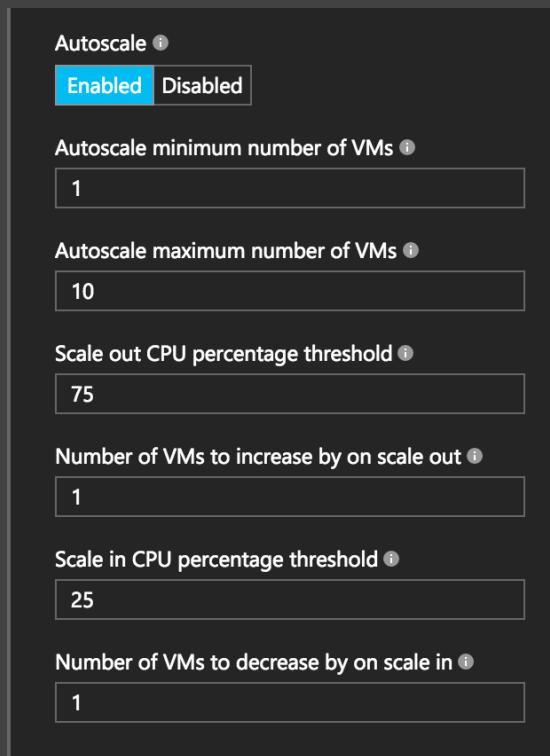
# New compute size options

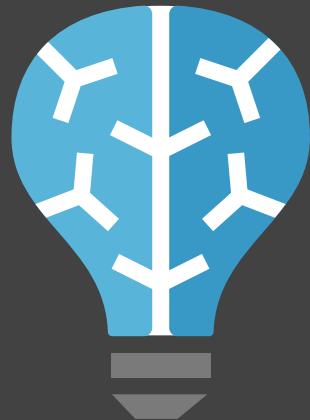


More than doubling the compute offerings in 2017

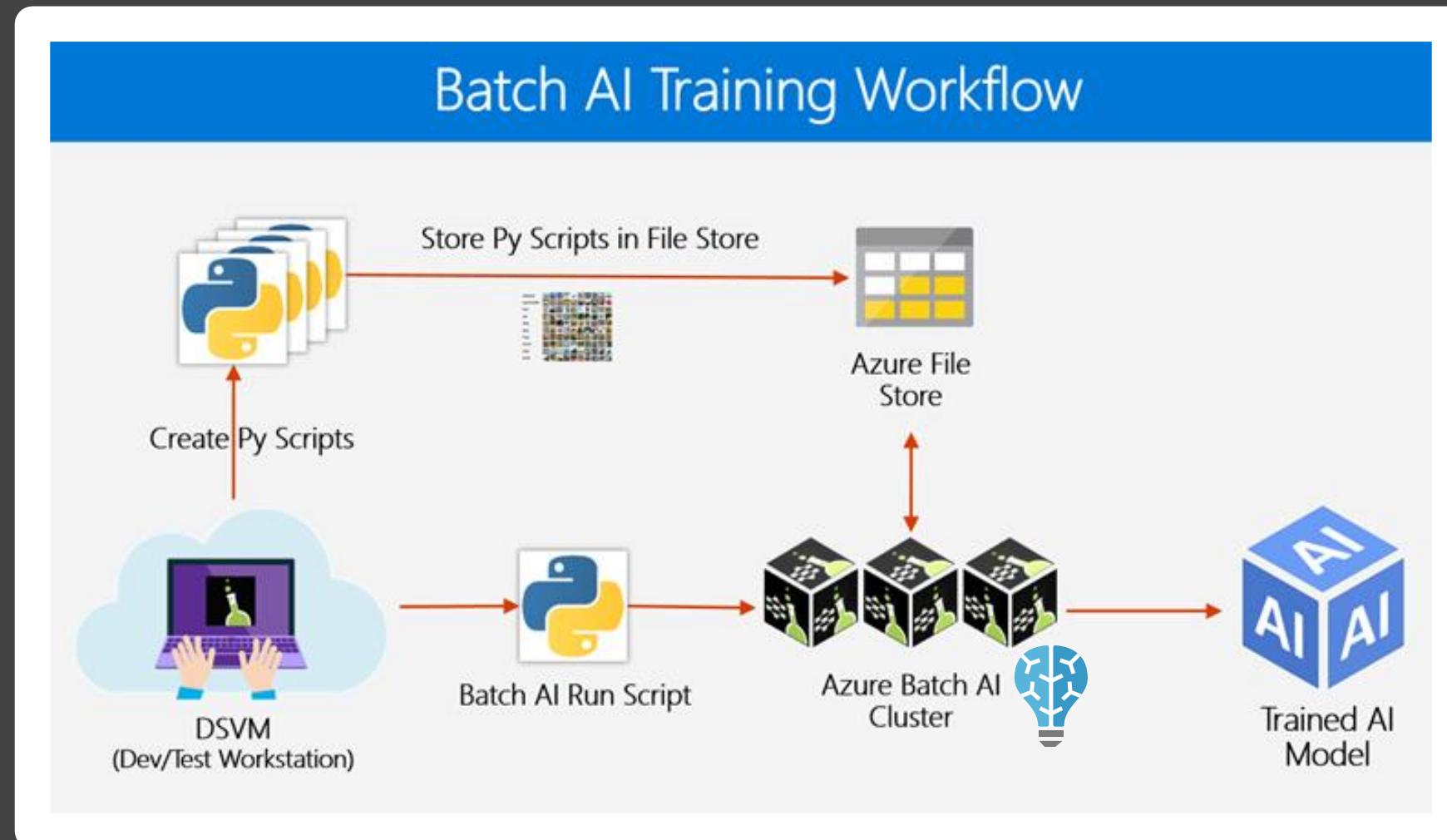
# VM Scale Sets

- Manage identical VMs at Scale
- High performance provisioning of 1-1000 VMs
- Auto-configuration at scale
- Auto-scale based on schedule and resource metrics
- Easy updates at scale
- Managed Disk support
- Single ARM resource





**Azure Batch AI** helps you experiment with your AI models using any framework and then train them at scale across GPU and CPU clusters



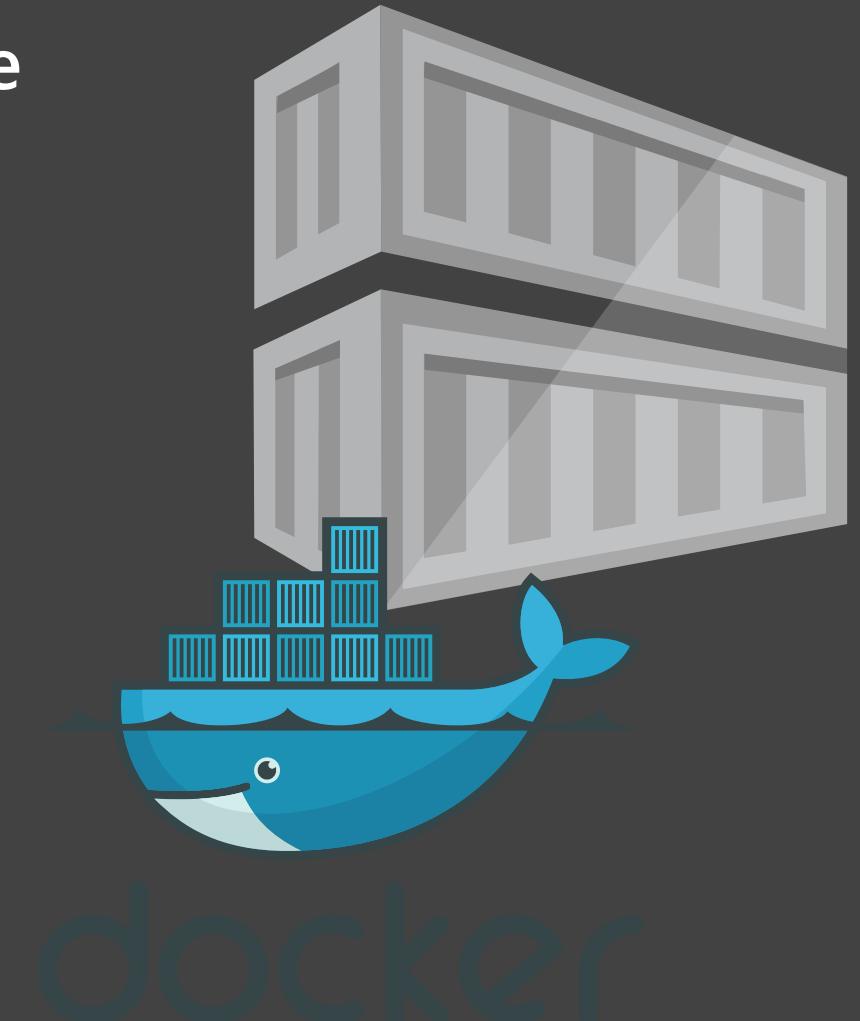
# Containers as Infrastructure

Use Azure Container Instances(ACI) to create and manage Docker containers in Azure

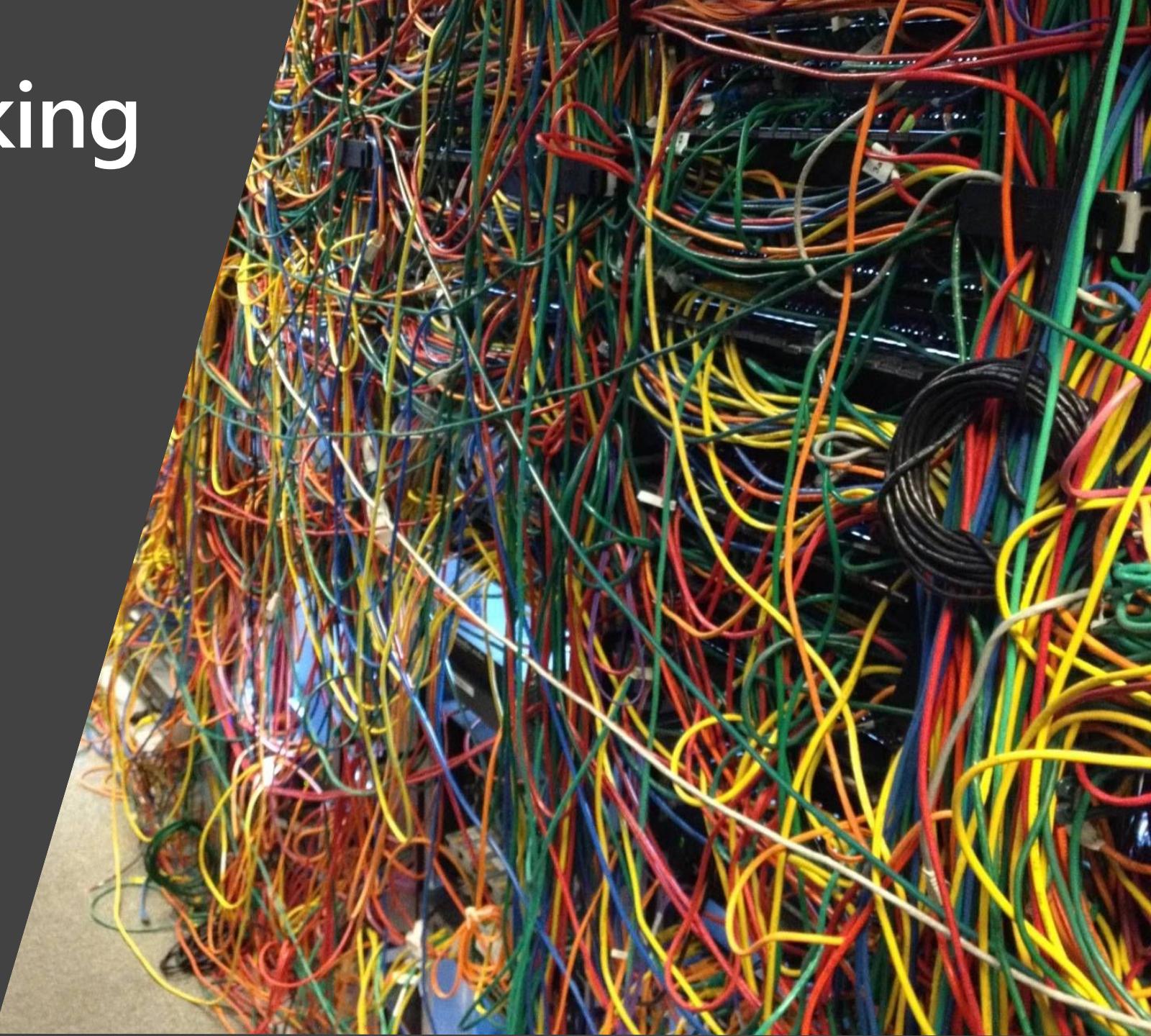
Containers as first class resources. No need for provisioning of virtual machines

Exposed to the internet with a public IP address

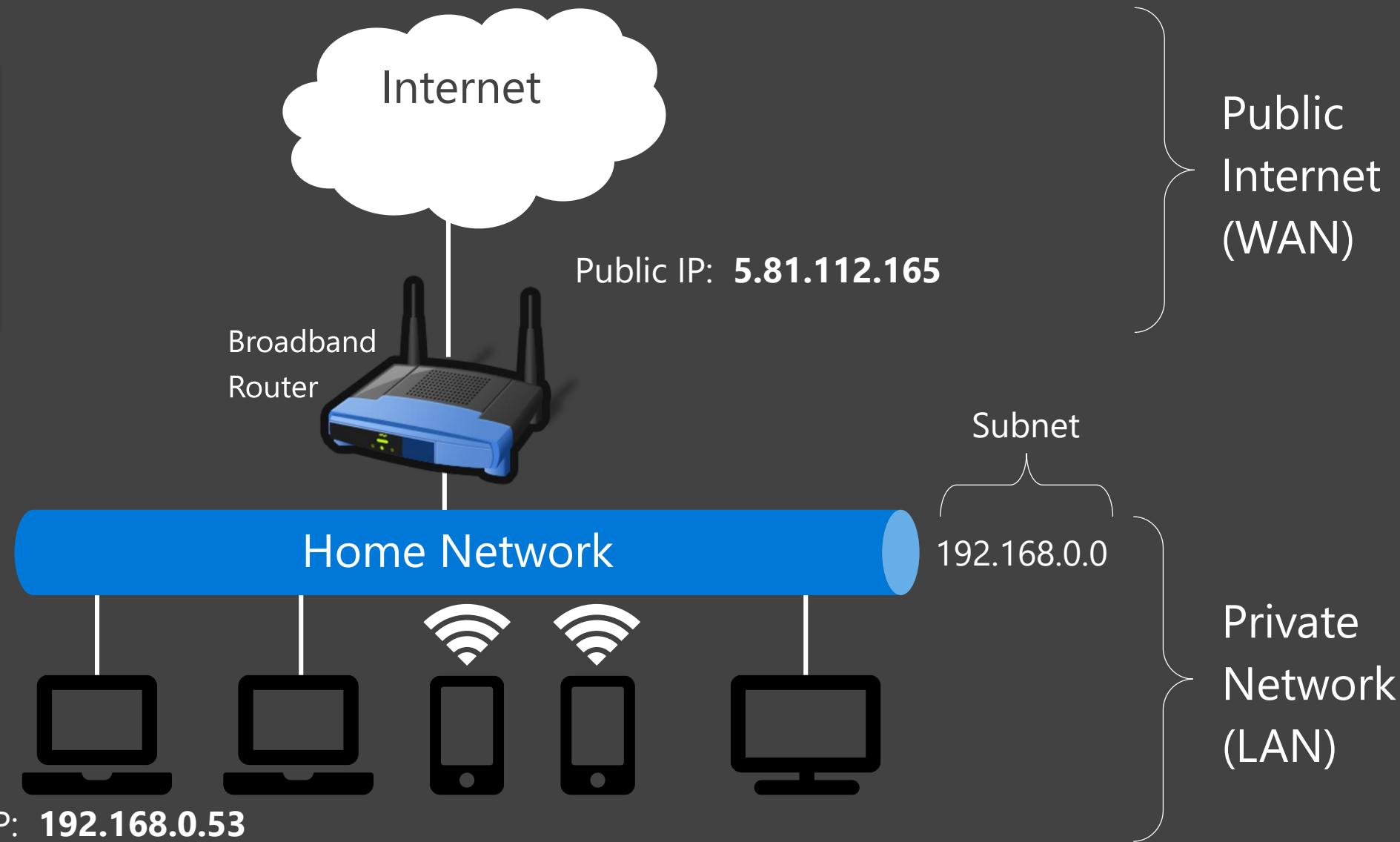
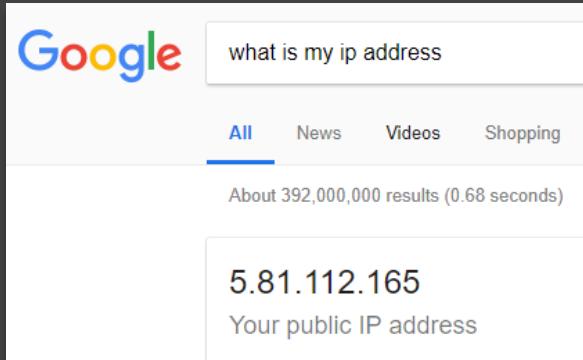
Per second billing



# Virtual Networking Services



# Introduction to Networks

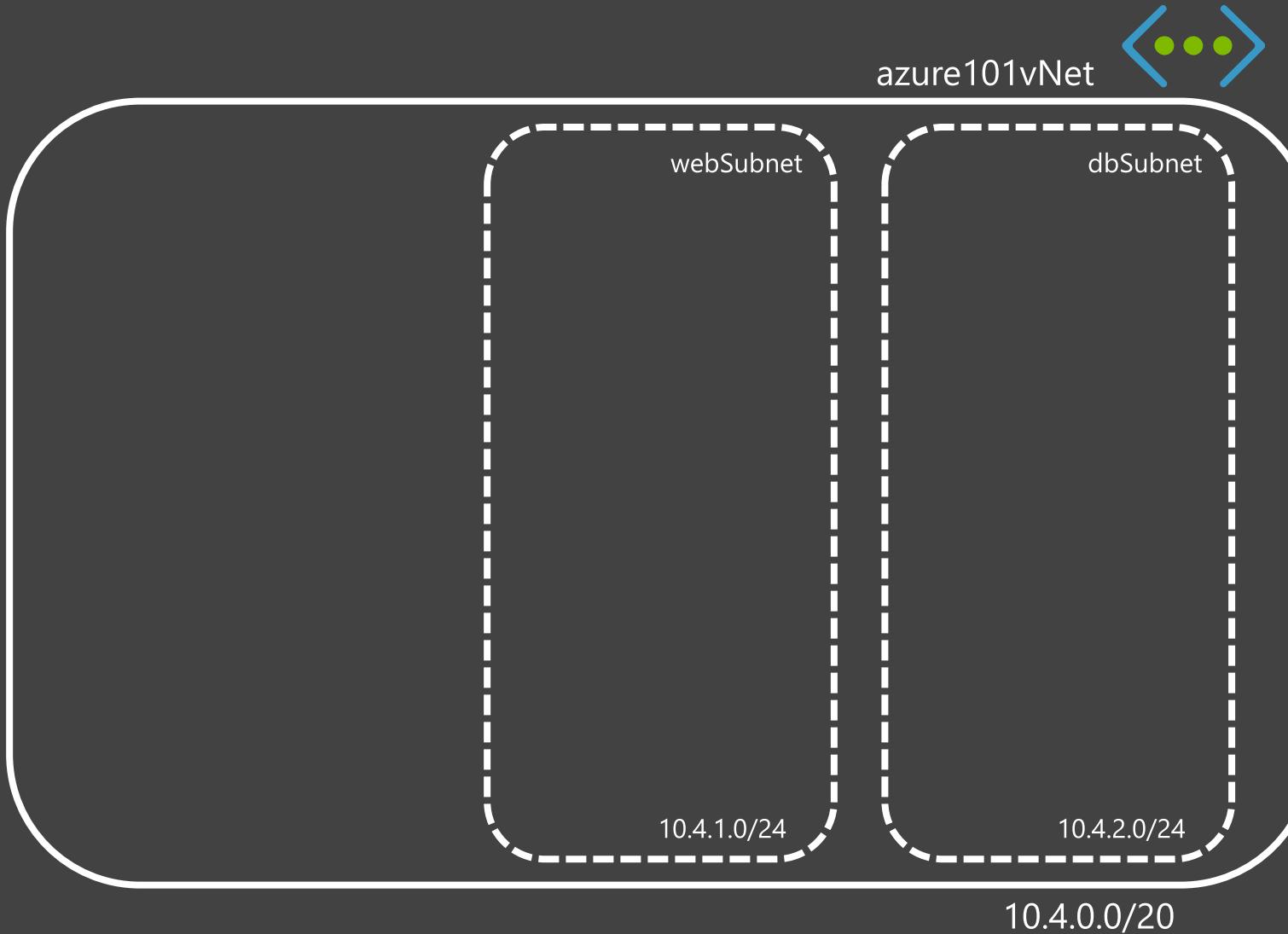


# Virtual Network



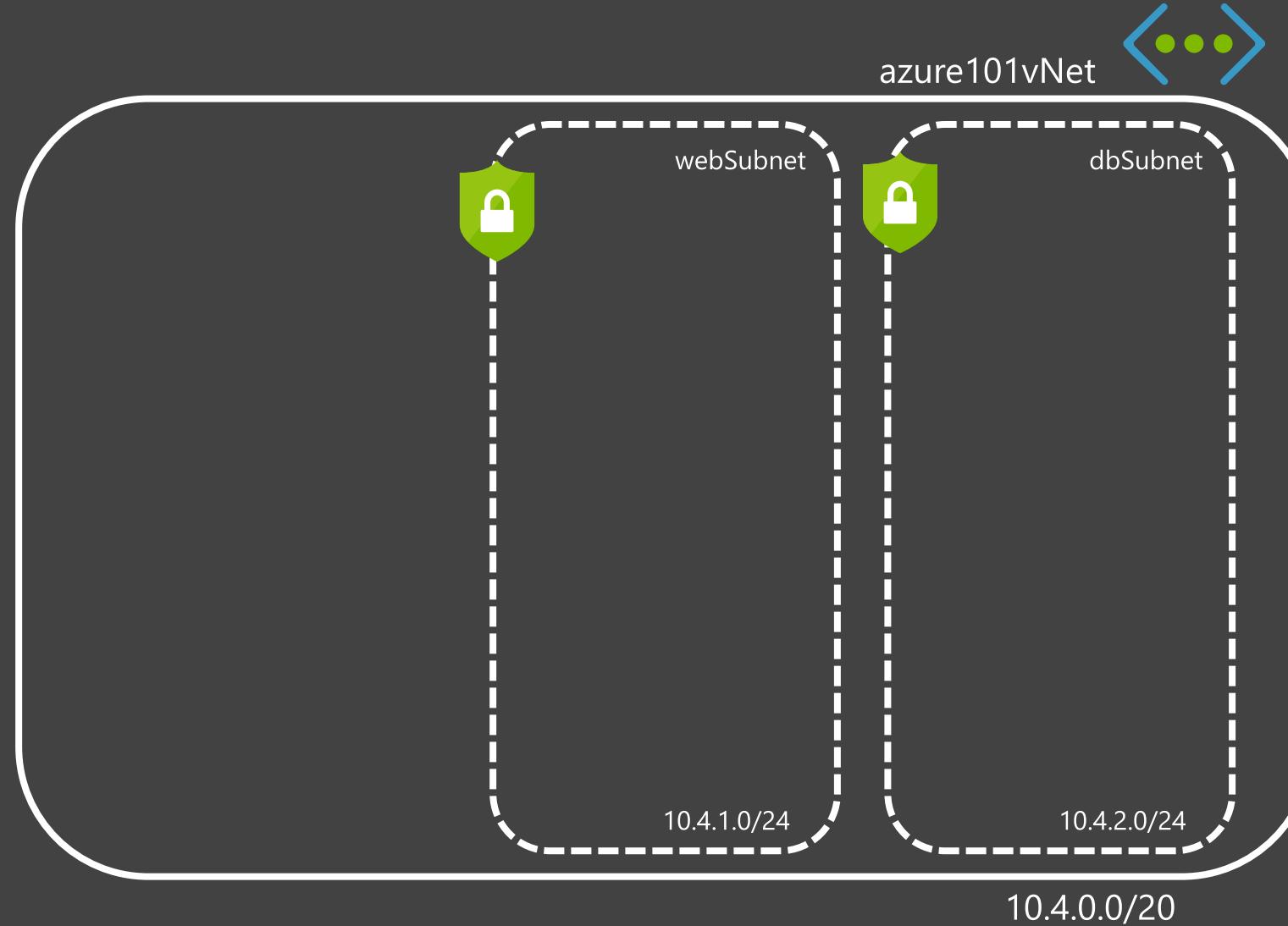
- Private network address space(s)
- Dedicated to the subscription
- Isolated
- CIDR notation

# Subnets



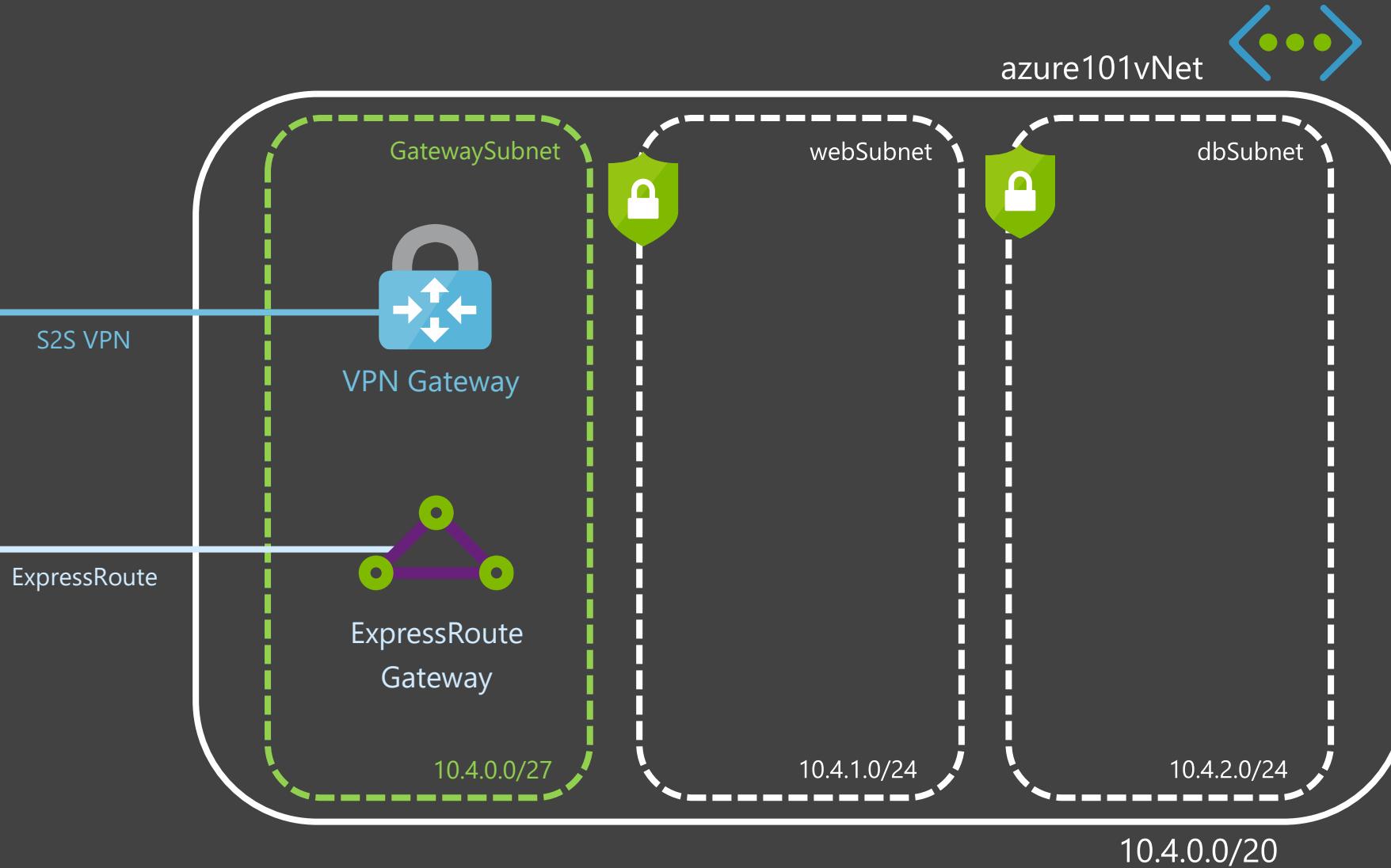
- Subnets within the vNet address space
- Non-overlapping
- Do not need to be contiguous
- Automatic route table between subnets
- Default route out to internet

# Network Security Groups



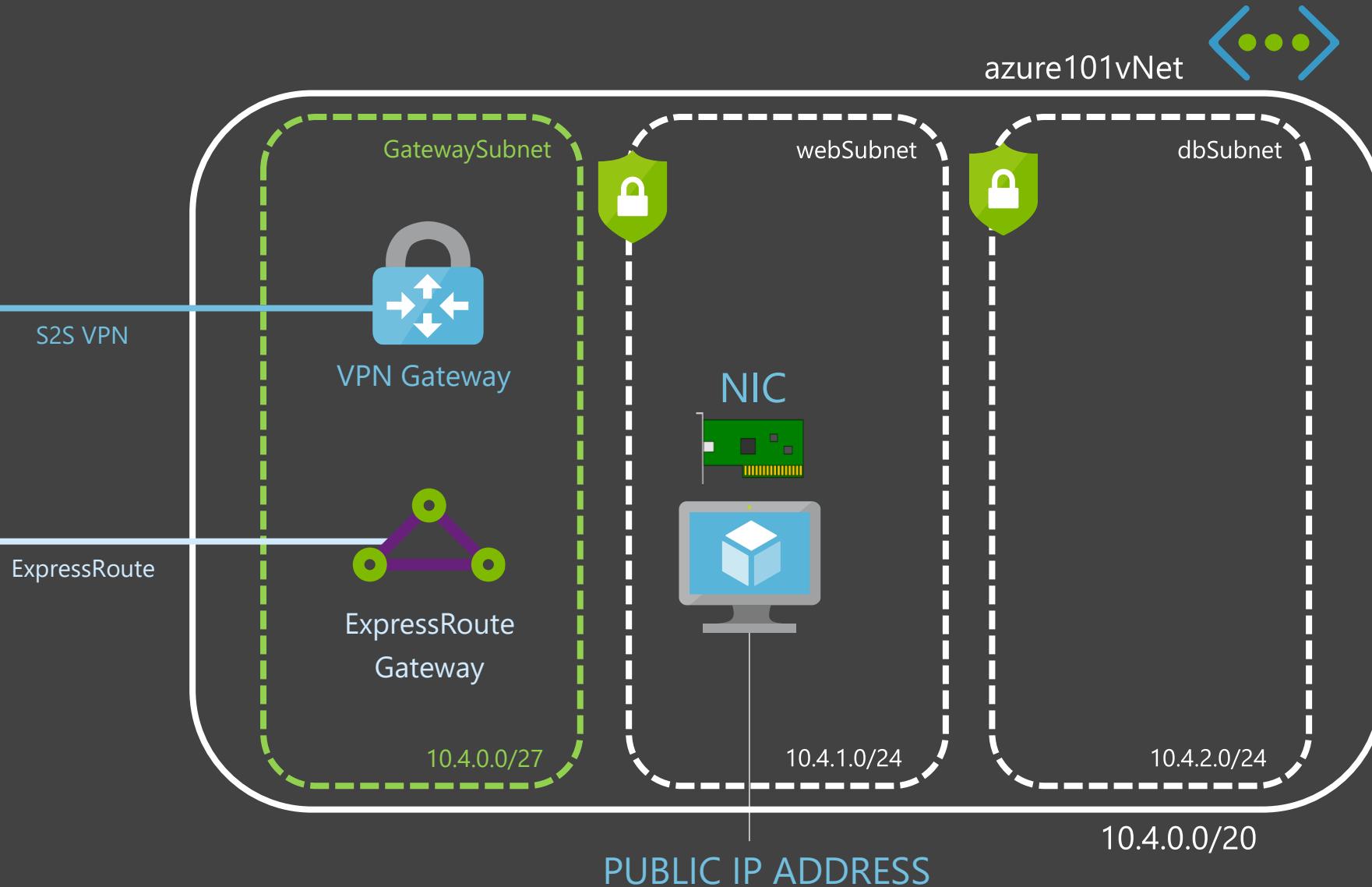
- Layer 4 security rules
- Inbound & outbound
- Tuples – address, port, protocol
- Subnets and NICs
- Defaults
  - Within vNet
  - To the internet
  - Load balancer
  - RDP & SSH

# Gateway Subnet and Virtual Network Gateways



- Special case
- Virtual Network Gateways
  - VPN Gateway
  - ExpressRoute
- No NSG

# NICs and PIPs



- One NIC by default
- IP allocated, may be reserved
- Multiple NICs
- Multiple IPs
- Public IP (PIP)
- Azure DNS name

# Azure Networking – Core Services



## VNET

Secure IPv4 / IPv6 private network



## NIC

Network interface



## Network Security Groups

Firewall and ACL



## Load Balancer

Layer 4 load balancer with NAT



## VPN Gateway

Site to Site IPsec VPN tunnels



## Application Gateway

Layer 7 LB with SSL offloading & affinity rules



## Traffic Manager

Globally distribute load across regions



## Azure CDN

Scalable content caching from Akami & Verizon



## Azure DNS

Name servers & manageable DNS zones



## Express Route

Private L3 provider connection into Azure datacenters

# Hands On Exercise 2

Deploying &  
Using A Virtual  
Machine



# Hands On Exercise 2 – Building a VM

Use the Azure Portal

Browse marketplace

Deploy 'Data Science Virtual Machine'

Look at VM size options

Access new VM

Try out Data Science Virtual Machine

Start Jupyter Notebook & experiment

Configure VM for auto-shutdown

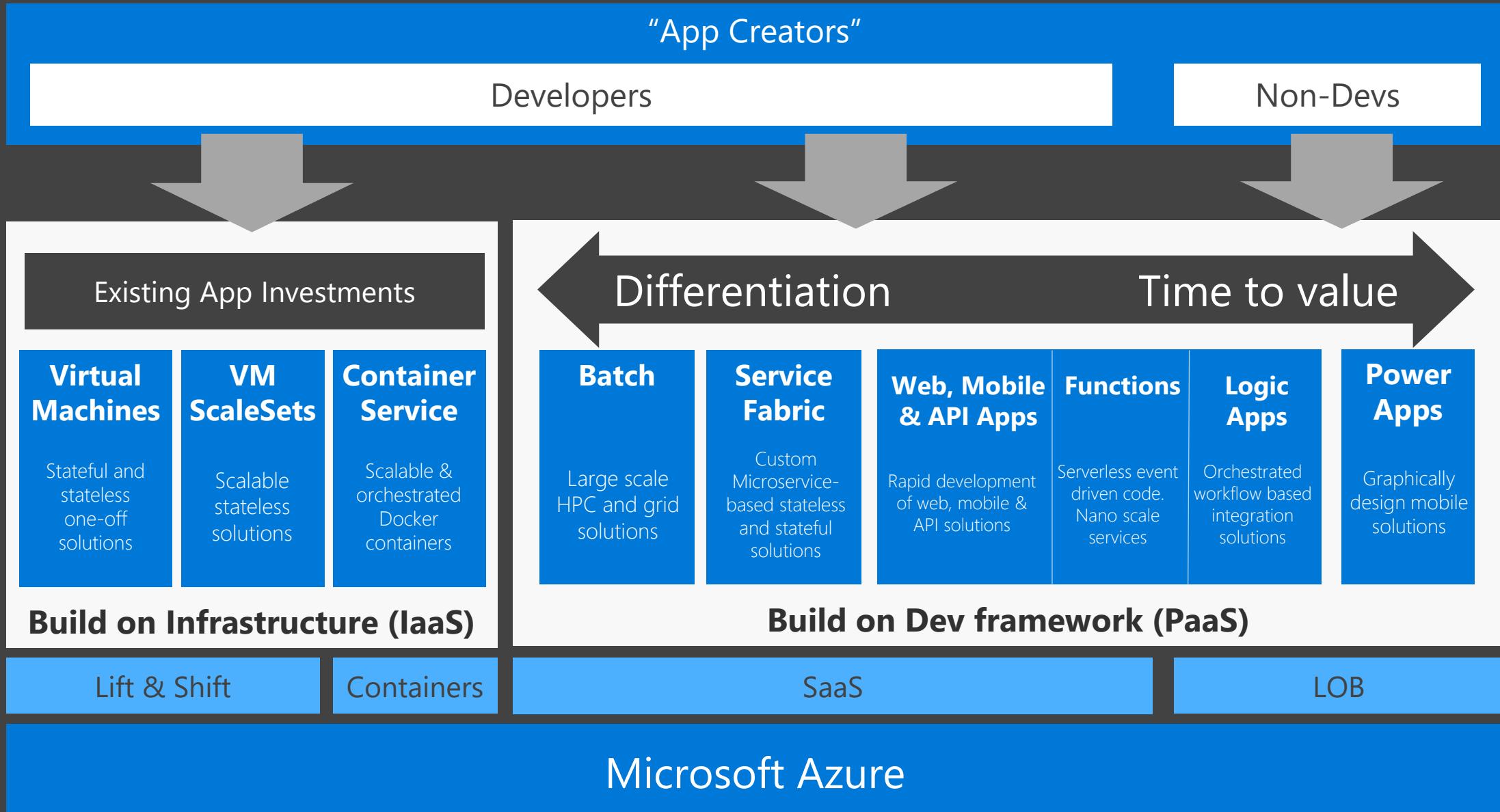
[aka.ms/azure-day](http://aka.ms/azure-day)



# Application & Platform Services



# Azure IaaS & PaaS Spectrum



# App Service – Azure PaaS



## Web Apps

Web apps that scale with your business



## Mobile Apps

Build Mobile apps for any device



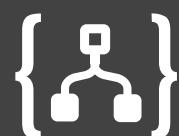
## Functions

Create serverless apps without infrastructure



## API Apps

Easily build and consume APIs in the cloud



## Logic Apps

Automate business process across SaaS and on-premises



# Azure App Service

Enterprise-grade apps



Global data  
center footprint



Hybrid support

Fully managed platform



Built-in auto scale  
and load balancing



High availability  
with auto-patching

High productivity  
development



.NET, Java, PHP,  
Node, and Python



Staging and  
deployment



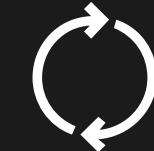
Active Directory  
integrated



Secure + compliant



Reduced  
operations costs



Backup and  
recovery



Testing in  
production

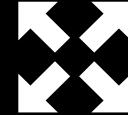


App gallery  
marketplace

# App Service



**DevOps productivity**

- 
- 
- 
- 
- 

Source code control integration   CI/CD build and deploy   Staged deployments with slots   Auto scale on demand   Monitoring and alerting

**Application templates**

- 
- 
- 
- 
- 
- 
- 

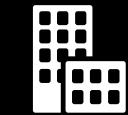
Umbraco   Orchard   Episerver   WordPress   DNN Platform   Joomla   Drupal

**Multiple languages and frameworks**

- 
- 
- 
- 
- 
- 

ASP.NET   ASP.NET CORE   Java   python   node.js   PHP

**Enterprise workloads**

- 
- 
- 
- 
- 
- 
- 

Industry standards   Global scale   Corporate connectivity   Azure Active Directory   Dedicated environments

# App Service



# App Service



Web Apps



Mobile Apps



API Apps

## API fundamentals



Swagger  
API Metadata



CORS enablement

## Authentication / Access Control



EasyAuth

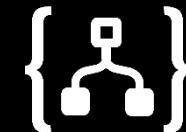


Service Principle  
Authentication

## API Consumption



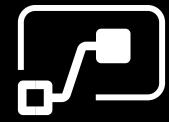
Client SDK  
Generation



Logic Apps

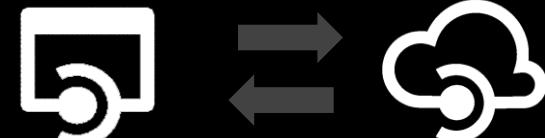


Power Apps



Flow

## Integration with API Management



# Compute Scaling

## Scale Up

### – aka Vertical Scaling

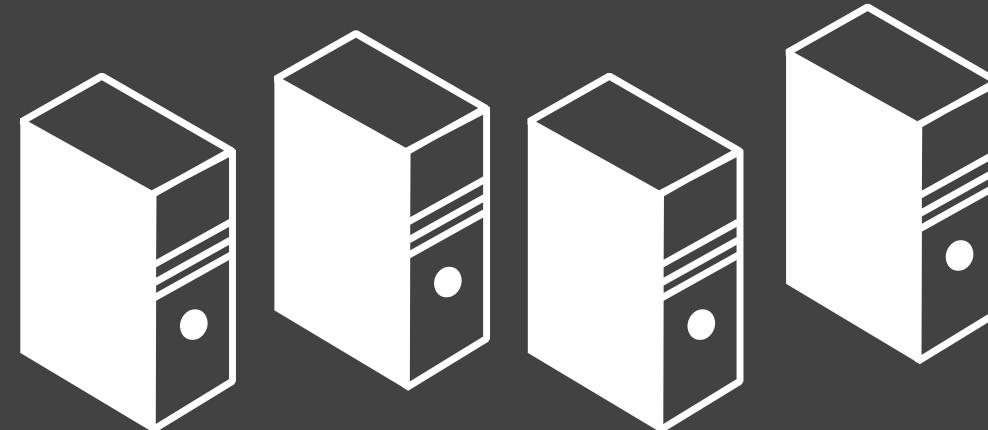
- Increase resource capacity within existing node



## Scale Out

### – aka Horizontal Scaling

- Increase resource capacity by adding load balanced nodes
- Auto scale based on metrics & rules you define



# Common Misconceptions

## Vendor Lock In

*"I'll be locked into the Microsoft & Azure Platform"*

App Service is just a standard webserver + runtime

Drop in your code as .zip or .war

No specific APIs

Deploy via Git, FTP, Bitbucket etc

## Microsoft Only

*"We don't use Windows or .NET"*

App Service supports many open source platforms

Node.js, Java, Ruby, PHP, Python, Ruby

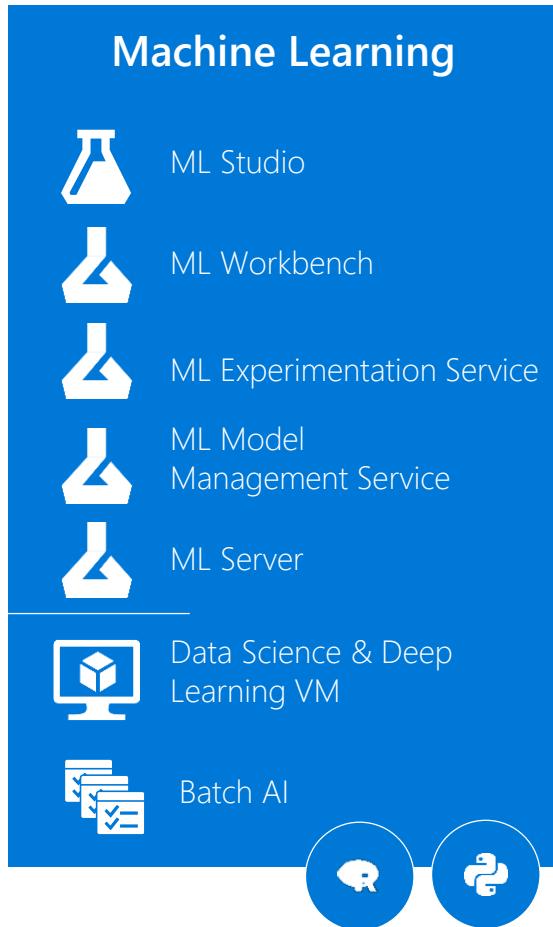
Linux and container support

# Machine Learning, Cognitive & AI

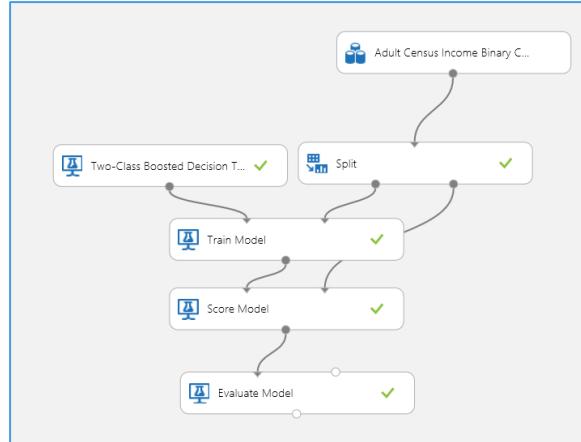




# Azure as your Machine Learning Platform



## ML Studio



## ML Workbench

Screenshot of the Azure Machine Learning Workbench interface. It shows a 'Project Dashboard' with a 'TrainDataWS' workspace. A 'DERIVE COLUMN BY EXAMPLE' dialog is open, showing a preview of data from 'BostonWeather'. The data table includes columns like DATE, dtc.Column, dtc.REPORTTYPE, dtc.HOURLYID, dtc.HOURLYRise, and dtc.HOURLYFall. The interface also includes a preview of the data and a 'Reference database' dropdown.



ML Experimentation Service



ML Model Management Service



Well Known Use-cases  
Visual Interface

Developer Friendly  
Workbench & Code

Operationalisation  
& Scale

# AI TOOLING BY SKILLSET

Data Scientist



Code First ML

Platform

Prebuilt

Data Professional

Developer

Cognitive Toolkit (CNTK)

Azure Machine Learning Workbench

Azure Machine Learning Experimentation service

Azure Machine Learning Model Management

Data Science Virtual Machine

HDInsight / DataBricks - SparkML Python | R

Microsoft Machine Learning Server (R Server)

SQL 2017 (R | Python)

Azure Machine Learning Studio

ML.NET

Power BI R

Cognitive Services

Bot Framework

# WHY COGNITIVE SERVICES?



Easy

REST APIs



Flexible

Integrate into the language  
and platform of your choice



Tested

Built by experts in their field  
from Microsoft Research, Bing,  
and Azure Machine Learning.  
Great samples & documentation

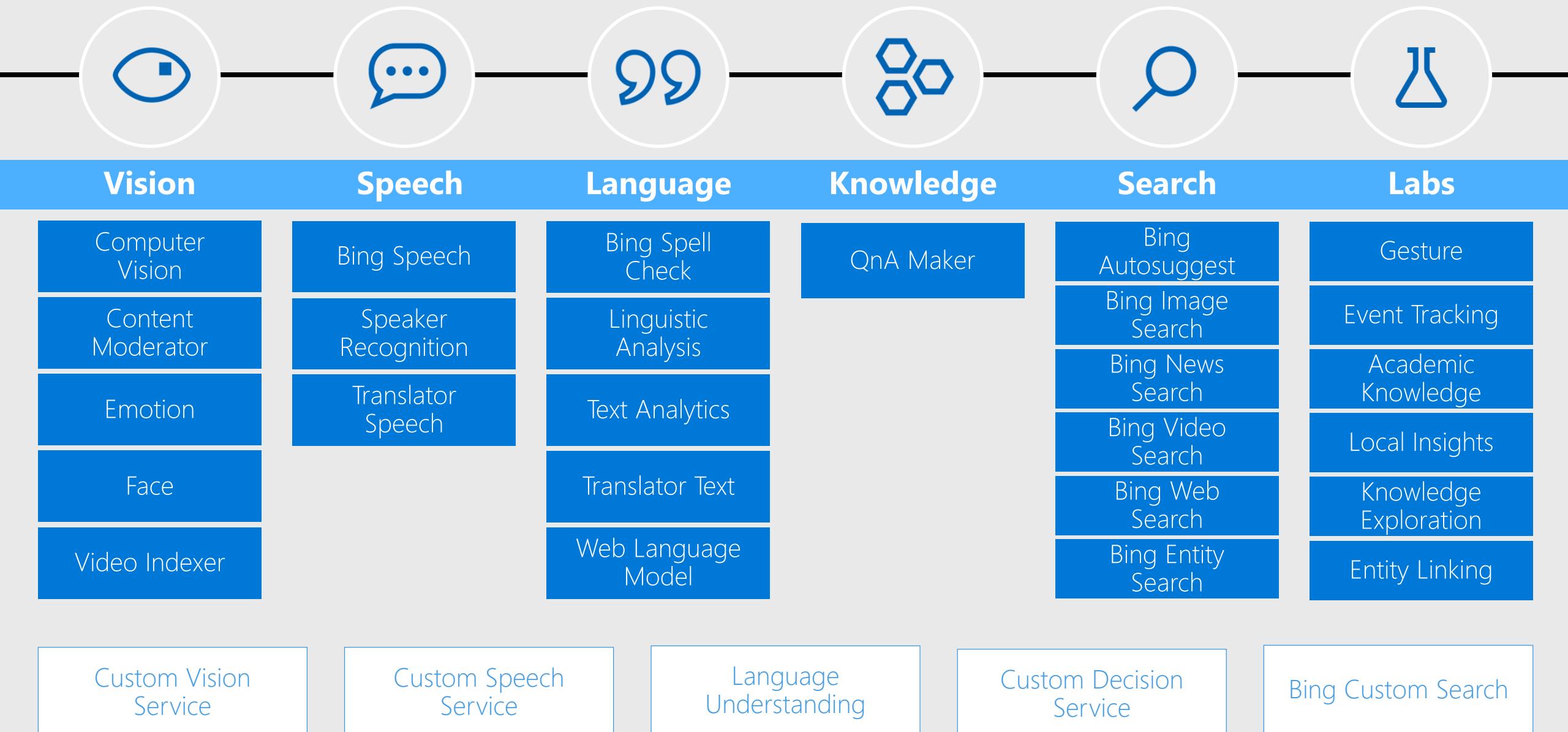
GitHub

stackoverflow

msdn

uservoice

# Cognitive Services



# COMPUTER VISION



- Computer Vision API Extract rich information from images to categorise and process visual data, with machine-assisted moderation of images to help curate your services.

Now available

This is now generally available.

Racy score 0.0505403951

Categories [ { "name": "others\_", "score": 0.0078125 }, { "name": "outdoor\_",
"score": 0.0078125 } ]

Faces []

Dominant colour background

■ "Grey"

Dominant colour foreground

□ "White"

Accent colour

■ #3B435C

# TEXT ANALYTICS

This is a great service. You get loads of really useful stuff out in JSON. I don't know why everyone doesn't use the Azure Text Analytics API every day for all the things that they want to do with their text. Look at that mans beard. I mean, it's really big. Are you still reading this example text? All the way to here? Will, I better keep going then. It is just an example block of text so I can take a nice screen grab after all. Bill Gates would like this example I am sure. While he is drinking a Starbucks coffee in Seattle.

Analysing

5,000 free transactions a month!

Now available

This is now generally available.

Analysed text

JSON

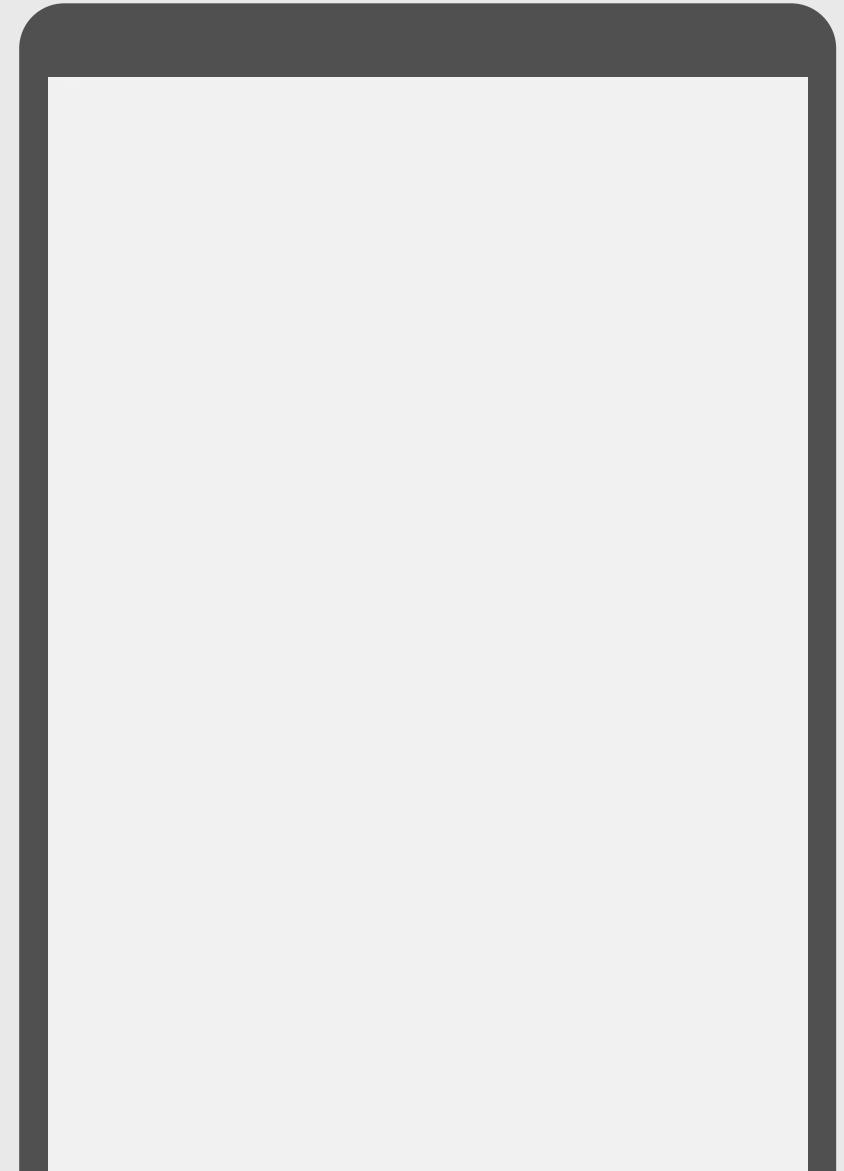
```
;;
  "sentiment": {
    "documents": [
      {
        "id": "4c9e2347-63cb-4797-b6b8-6e745992b6fc",
        "score": 0.9542820453643798
      }
    ],
    "errors": []
  },
  "entities": {
    "documents": [
      {
        "id": "4c9e2347-63cb-4797-b6b8-6e745992b6fc",
        "entities": [
          {
            "name": "Coffee in Seattle",
            "matches": [
              {
                "text": "While he is drinking a Starbucks coffee in Seattle."
              }
            ]
          }
        ]
      }
    ]
  }
};
```

# Microsoft Bot Framework

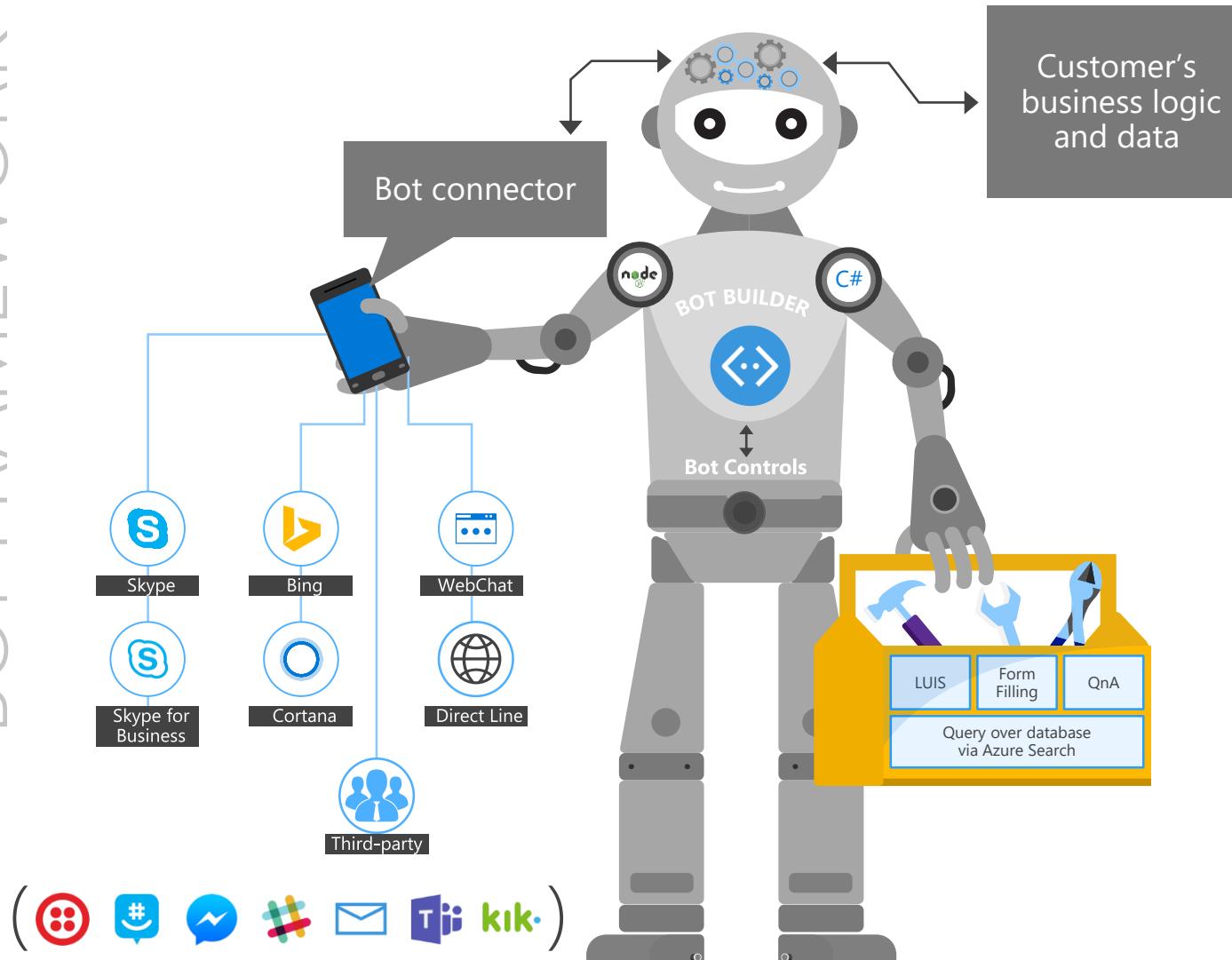
## Build a great conversationalist!

Build and connect intelligent bots to interact with your users naturally wherever they are.

From your website or mobile app to Cortana, Skype, Teams, Office 365 mail, Slack, Facebook Messenger and more...



# BOT FRAMEWORK



## Bot Builder

Tools and services to build great bots that converse wherever your users are.



## Developer Portal

Connect your bots to text/SMS, Skype, Slack, Facebook Messenger, Office 365 mail and other channels.



## Cognitive Services

ML and AI services to add predictable, configurable intelligence into any software

**Get Started!**  
[dev.botframework.com](http://dev.botframework.com)

99

<https://www.luis.ai>



LUIS

## Language

See Language Understanding in action

What the user says (utterances)

Book me a flight to Cairo

Order me 2 pizzas

Remind me to call my dad tomorrow

Where is the nearest club?



What LUIS returns

```
{
  "query": "Book me a flight to Cairo",
  "topScoringIntent": {
    "intent": "BookFlight",
    "score": 0.9887482
  },
  "intents": [
    {
      "intent": "BookFlight",
      "score": 0.9887482
    },
    ...
  ]
}
```

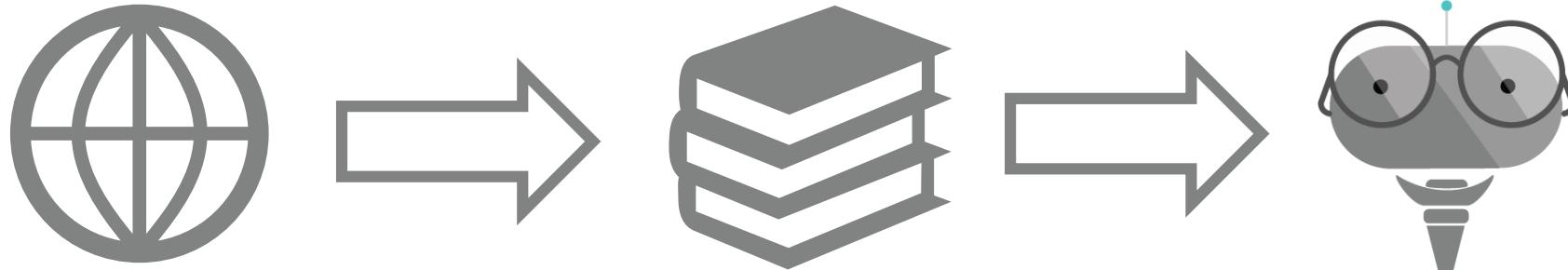
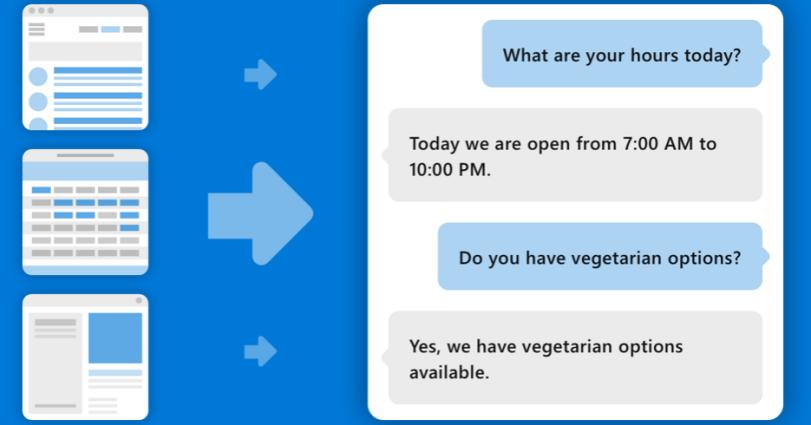
GET STARTED NOW!

<https://www.qnamaker.ai/>

## From FAQ to Bot in minutes.

Build, train and publish a simple question and answer bot based on FAQ URLs, structured documents, product manuals or editorial content in minutes.

[GET STARTED >](#)



# Hands On Exercise 3

Custom Vision  
Cognitive Service



# Hands On Exercise 3 – Custom Vision Service

- Download a sample set of images
- Access the Custom Vision Service
- Create a new project
- Upload initial images to project & tag them
- Train the model & test
- Upload extra images to project & tag them
- Re-train model & re-test

[aka.ms/azure-day](http://aka.ms/azure-day)



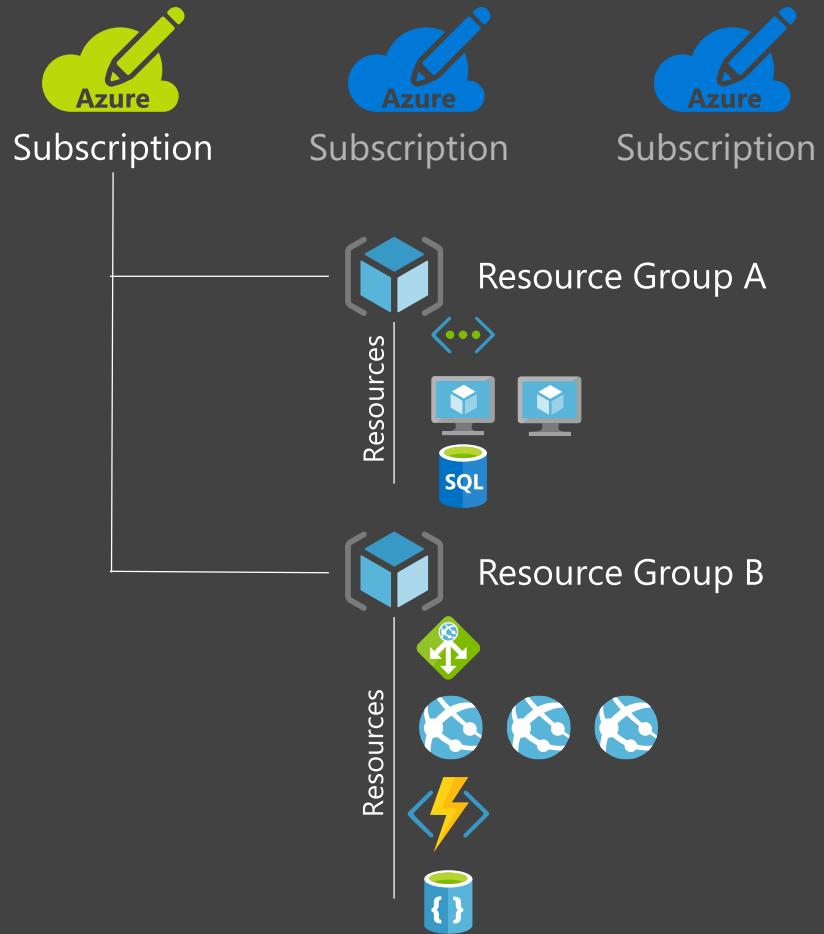
# Management, Automation & Monitoring

# DevOps



# Role Based Access Control

Global Administrator



Microsoft Account



Work Account

- Global Admin by default
- Can add and change Global Admins
- Role Based Access Control on
  - Scope
    - Subscription
    - Resource Group
    - Resource
  - Role
    - [Built In Roles](#)
    - [Custom Roles](#)
- AAD Users & Administrative Units

# Modern cloud management with Azure



## Build & DevOps

- Visual Studio Team Services
- ARM Templates
- Azure DevTest Labs



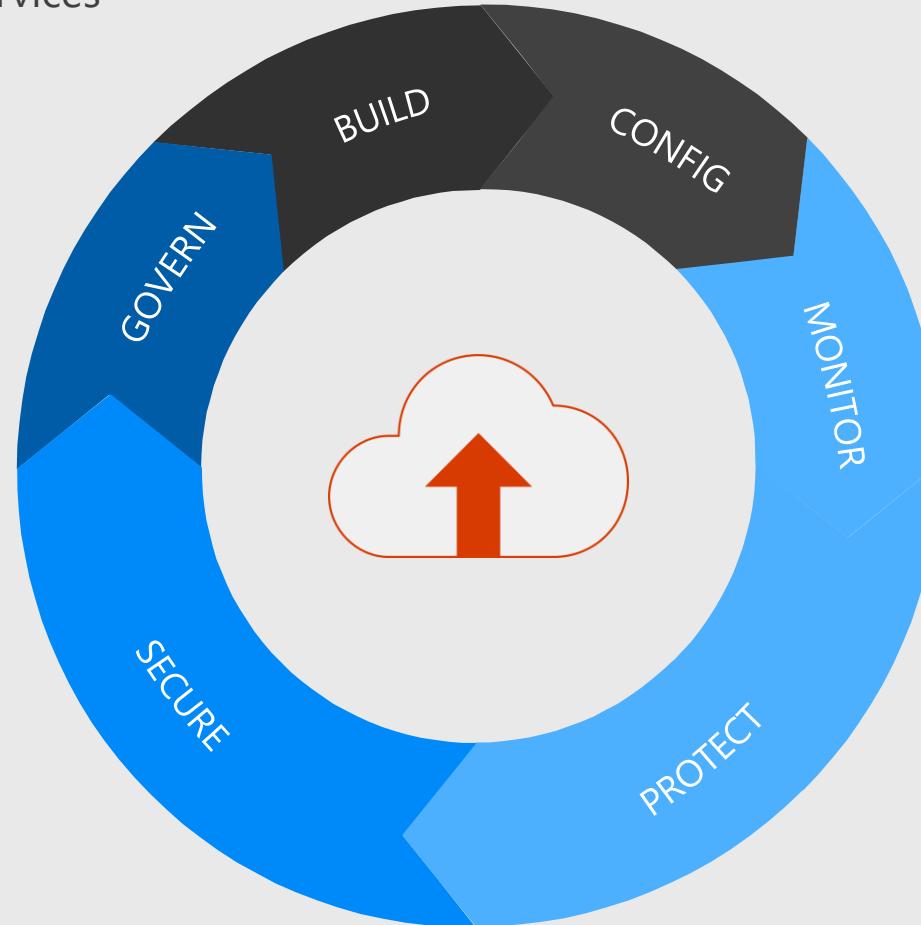
## Govern

- Billing Hub
- Resource Policies
- Azure Advisor



## Secure

- Azure Security Centre
- Azure Key-vault
- Network Security Groups



## Configure

- Azure Automation
- Desired State Config
- ARM Templates



## Monitor

- App Insights
- OMS Log Analytics
- Azure Monitoring



## Protect

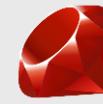
- Azure Backup
- Azure Site Recovery

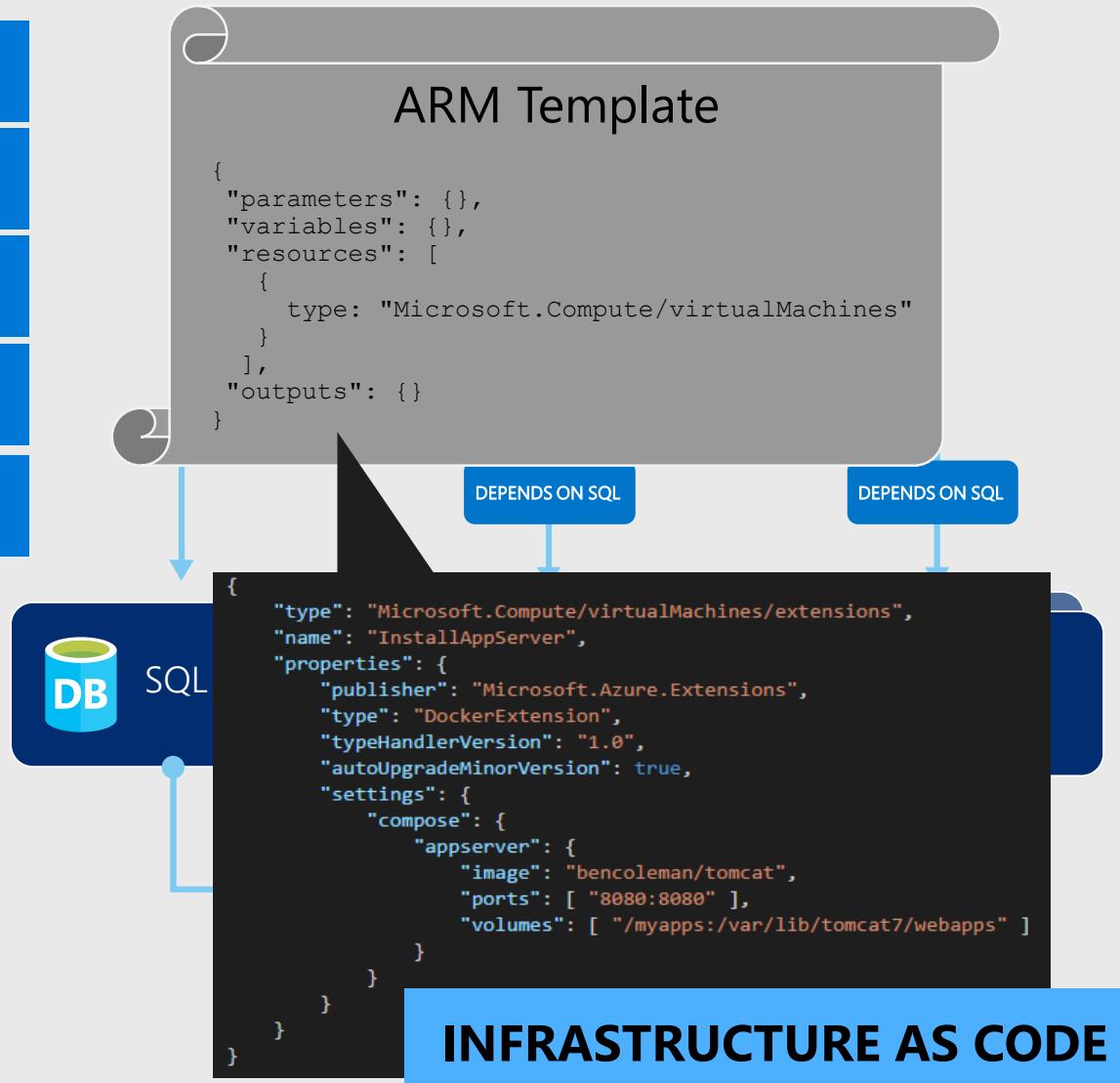


# AZURE RESOURCE MANAGER

- 1 Specify resources & dependencies
- 2 Simple orchestration
- 3 Repeated deployment in consistent state
- 4 Incremental deployments
- 5 JSON based templates

   
**Cross platform CLIs & PowerShell**

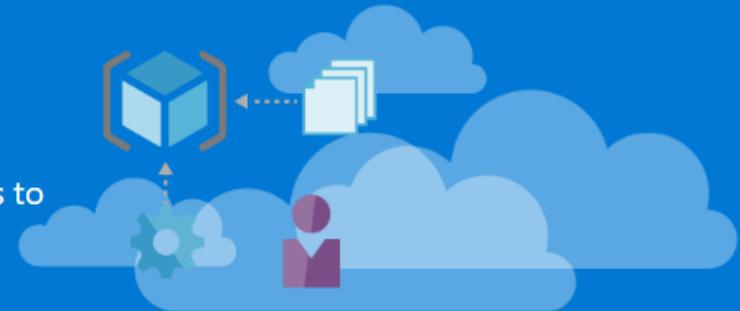
    
**SDKs**



# aka.ms/azure-templates

## Azure Quickstart Templates

Deploy Azure resources through the Azure Resource Manager with community-contributed templates to get more done. Deploy, learn, fork and contribute back.



[Creates an HDInsight cluster running ADAM](#)

Creates an HDInsight linux cluster running the genomics analysis platform ADAM



by Jason Ingram,  
Last updated: 07/10/2015

[Enterprise Risk Analysis- Datameer,HDInsight,TrendMicro,Chef](#)

Enterprises that offer end-user payment transactions have to account for the below considerations: Risk evaluation on business transactions, Infrastructure risk management, Infrastructure configuration management. This Azure Partner QuickStart push to pilot solution la...



by Gururaj Pandurangi,  
Last updated: 28/08/2016

[Informatica-ADF\(HDInsight\)-PowerBI Quickstart](#)

This Quickstart launches a Big Data solution stack which has Informatica, Azure Data Factory, HDInsight, Azure SQL Dataware house and PowerBI as stack components. This integrated stack is ready to use pre production environment.



by uday-sg,  
Last updated: 06/10/2016

[Create a Data Factory Pipeline with Hive Activity](#)

This template creates a data factory pipeline with a HDInsight Hive activity.



by Sreedhar Pelluru,  
Last updated: 11/10/2016

700 templates to get you started quickly

Tested and verified

Deploy straight into your subscription

# Azure Monitor



Metrics



Activity Logs



Diagnostic Logs



Alerts



Health, metrics & alerts  
across all Azure resources



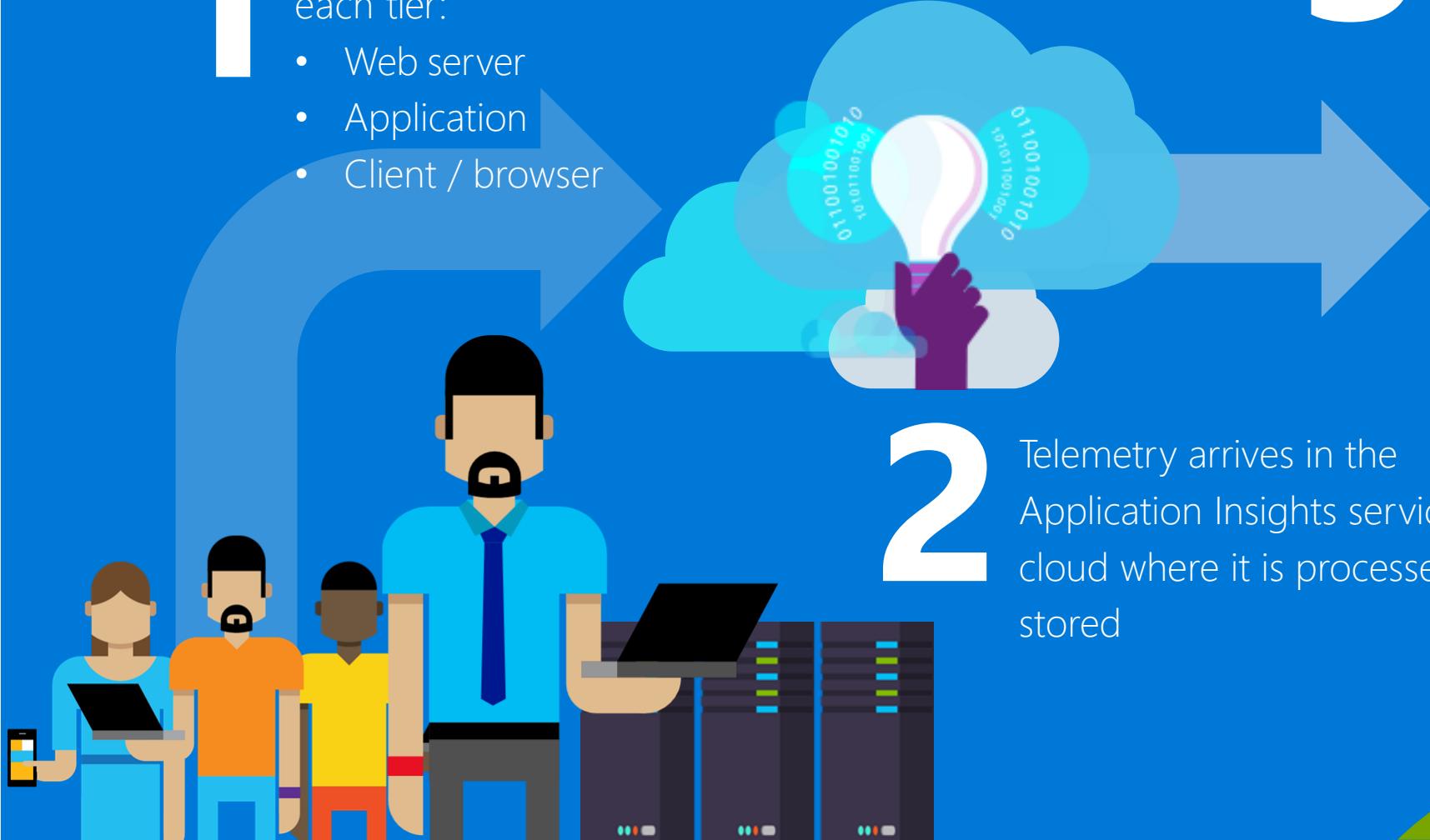
**Azure Monitor**

# Application Insights

1

Telemetry is collected at each tier:

- Web server
- Application
- Client / browser

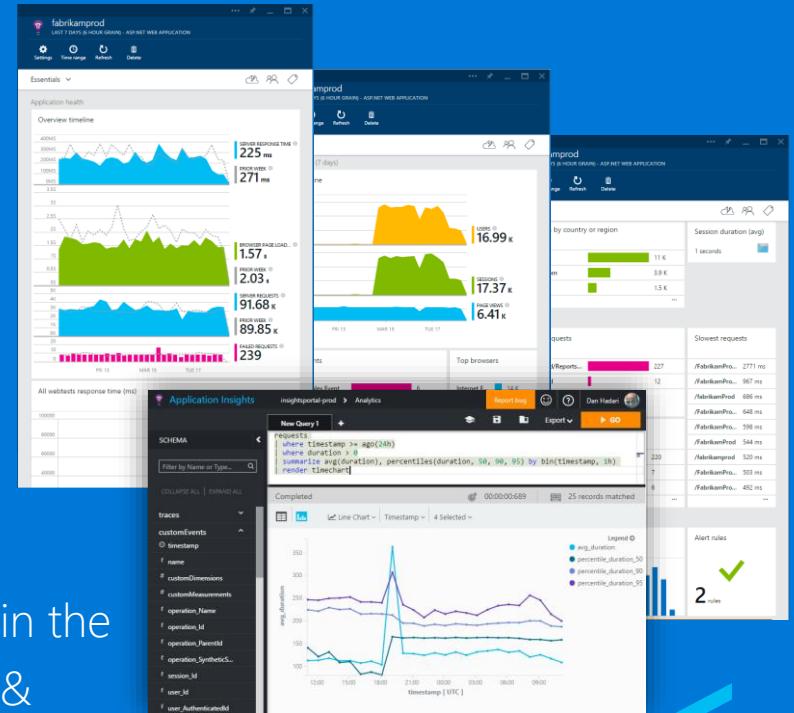


2

Telemetry arrives in the Application Insights service in the cloud where it is processed & stored

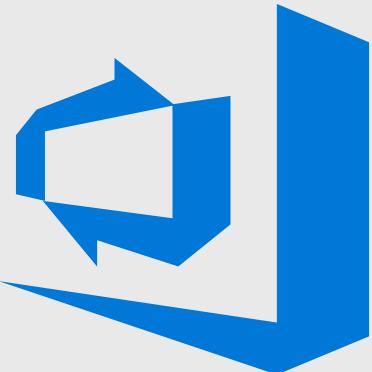
3

Detect & Diagnose problems in Azure Portal; Ask ad-hoc queries in Analytics; Integrate, Extend & Customize



# Introducing DevOps Projects

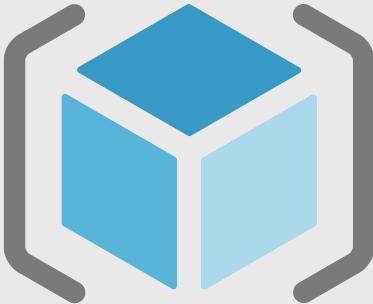
Team Services



Azure



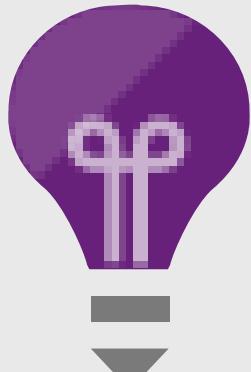
Deployment



Platform

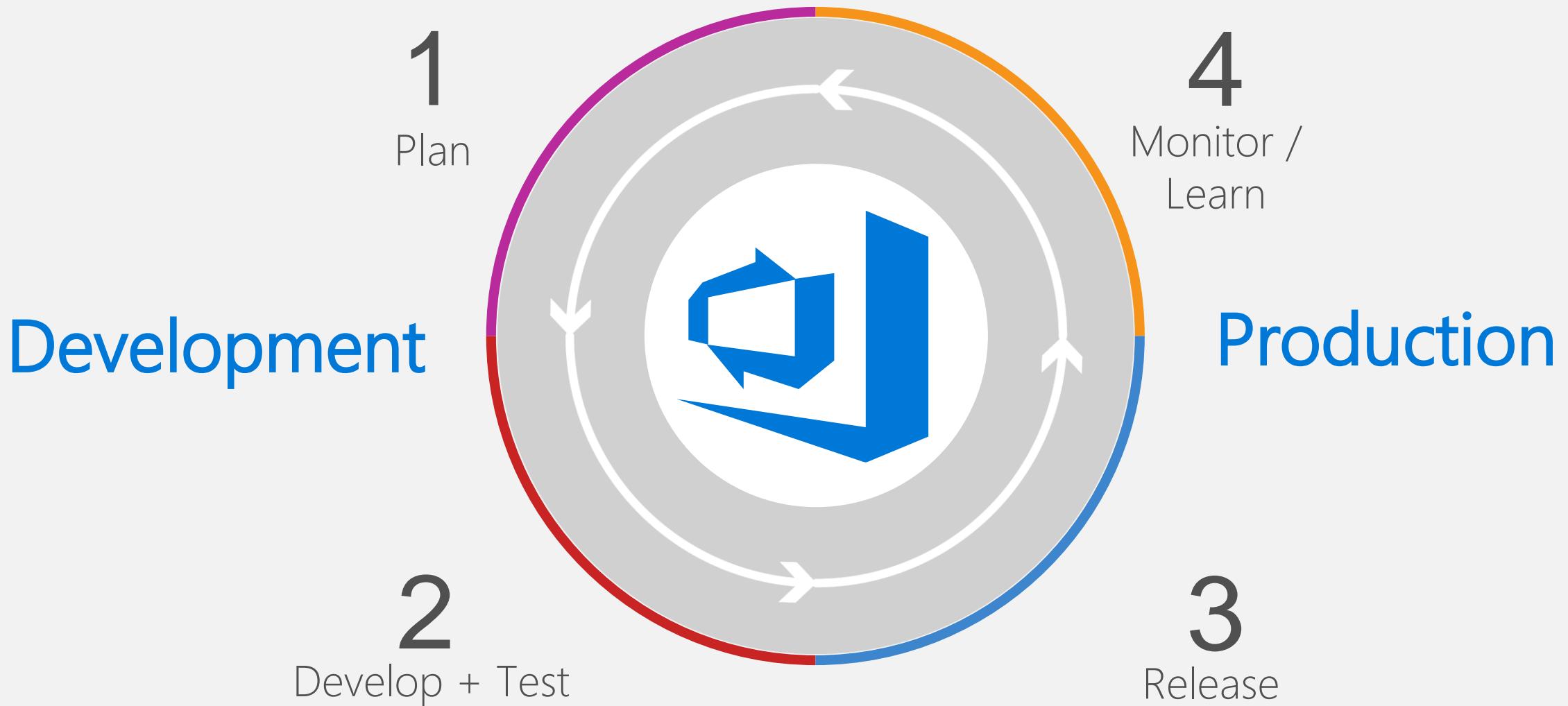


Monitor



*"Build & deploy any application, on any Azure service, in less than five minutes"*

# DevOps in Azure – Team Services



# Team Services open & extensible

## Choice

- Build on Windows, Linux, macOS and containers
- Work with Node.js, Java, Python, Swift, Ruby, Go, PHP, JavaScript, C#, TypeScript, C++, Dart... etc

## Open Source Integration

- Integrate the best-of-breed tools you use
- Extend DevOps with new scenarios
- All popular OSS tools supported

## Marketplace

- Add and extend with add-ons & extensions
- Single point for customers to find value

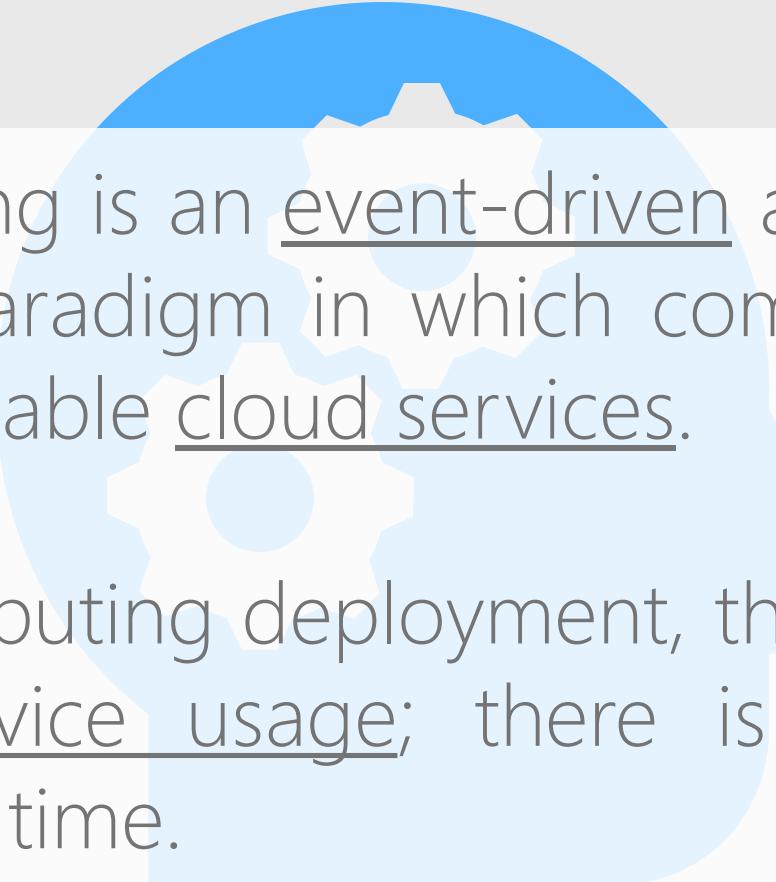
The screenshot shows the Jenkins Marketplace interface. At the top, there's a search bar with the text "Jenkins AWS Chef Terraform" and a magnifying glass icon. Below the search bar are filters: "Showing: Build and release", "Hosted On: Any", "Price: Any", and "Sort By: Relevance". The main area displays a grid of extension cards. A large blue overlay with the text "ANY PLATFORM ANY LANGUAGE" is centered over the grid. The extensions visible include:

- Docker Integration** by Docker (5.7K): Continuous integration and deployment for Docker applications.
- GitHub Integration** by Microsoft (3.3K): Continuous integration and deployment for .NET, Java, Node.js, Android, iOS, Docker, and GitHub actions.
- Bower** by Touchify (1.9K): A package manager for the web.
- AWS S3 Upload** by Marcus Felling (366): Build task to upload a file to S3 bucket in AWS.
- AWS Tools for Microsoft Jenkins** by Amazon Web Services (572): Tasks for Amazon S3, AWS Lambda, Elastic Beanstalk, AWS CodeDeploy, AWS Lambda.
- Terraform** by Peter Groenewegen (FREE): Build extension that enables you to run Terraforms on the build agent.
- Chef Automate** by Chef Software (FREE): Tasks for performing common Chef operations against the Chef Automate.
- Docker Actions** by Docker (FREE): Adds a build task that enables Docker actions.
- GitHub Integration for Jenkins** by Marcus Felling (FREE): Build and Release tasks for Visual Studio Team Services for GitHub integration.
- CloudBees Jenkins Platform** by CloudBees (62): Configure CloudBees Jenkins Platform to integrate with your Visual Studio Team.
- SonarQube** by SonarSource (5.5K): Use the SonarQube build tasks in your continuous integration builds to track code quality.
- MyGet Package Manager** by MyGet (437): Securely create, host, manage, and share NuGet, symbols, npm, Bower, Maven, PHP, and Docker packages.
- Container Security** by Aqua Security (72): Vulnerability scanner for container images.
- Marathon API tasks** by Cdiscount Alm (9): VSTS Build tasks which allow interactions with Mesos Marathon API.
- Git Tasks** by naked Agility Ltd (513): Do you need to interact with Git? Do you want to OpenSource your VSTS Git.

# Serverless & Events



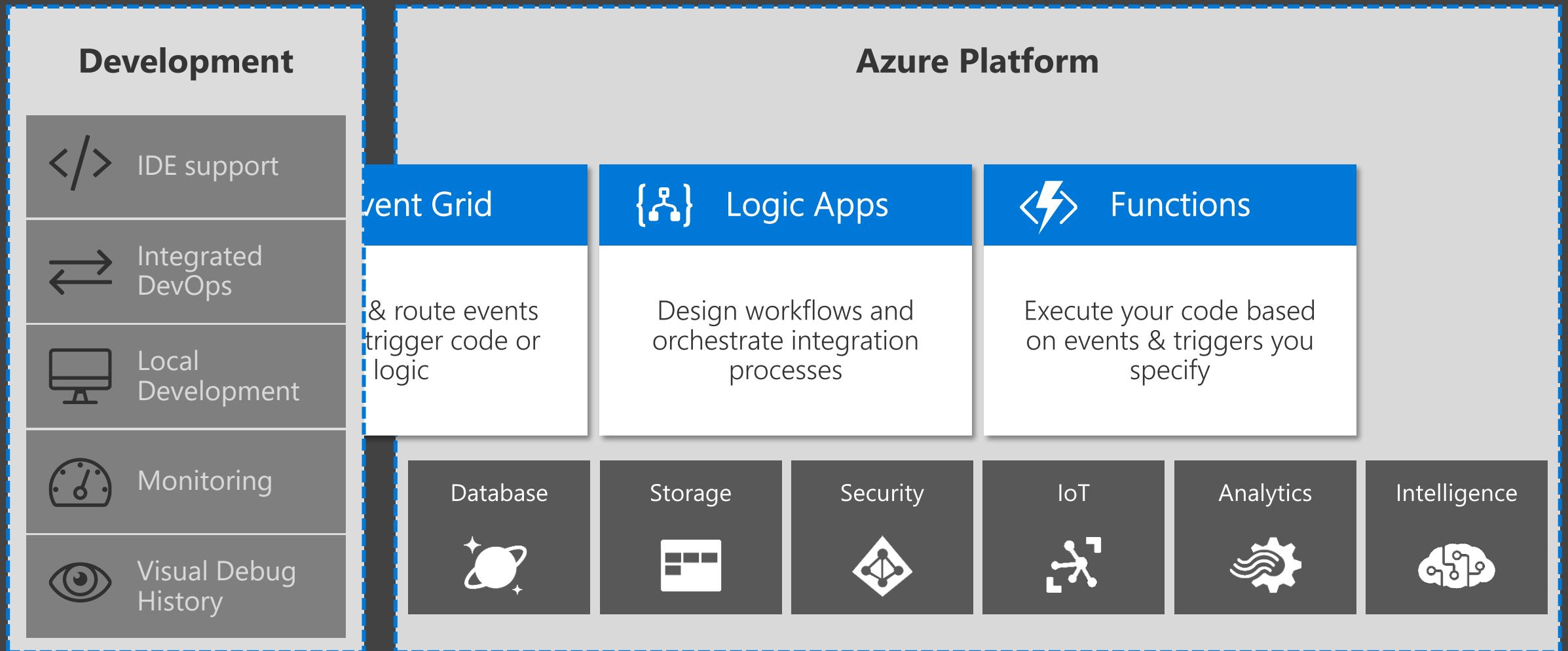
# Serverless Computing



Serverless computing is an event-driven application design and deployment paradigm in which computing resources are provided as scalable cloud services.

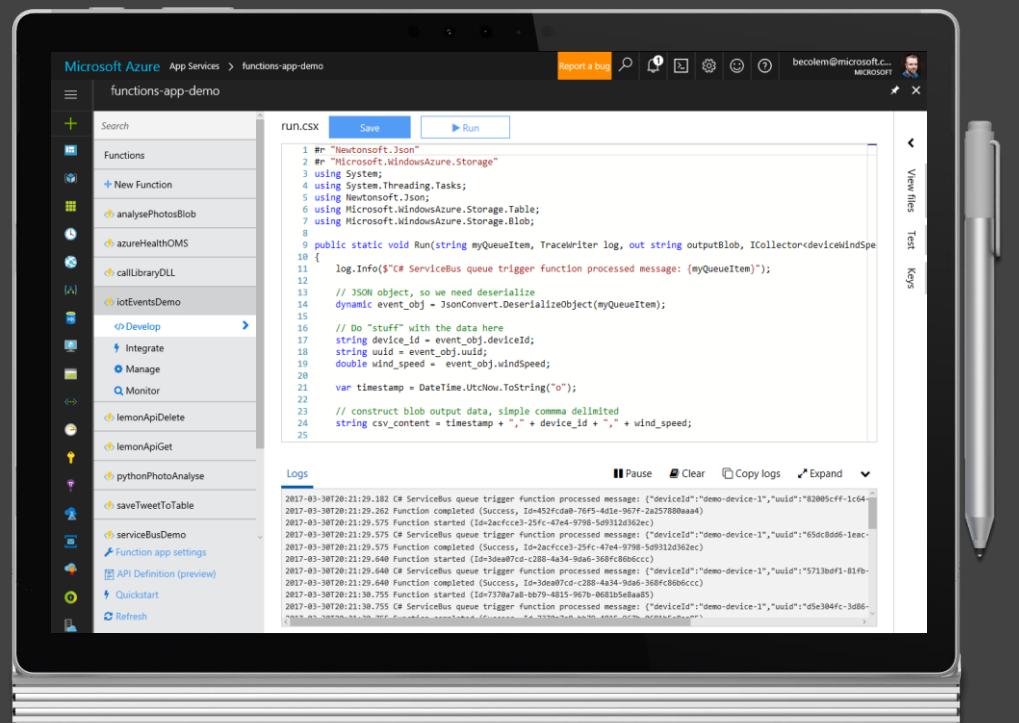
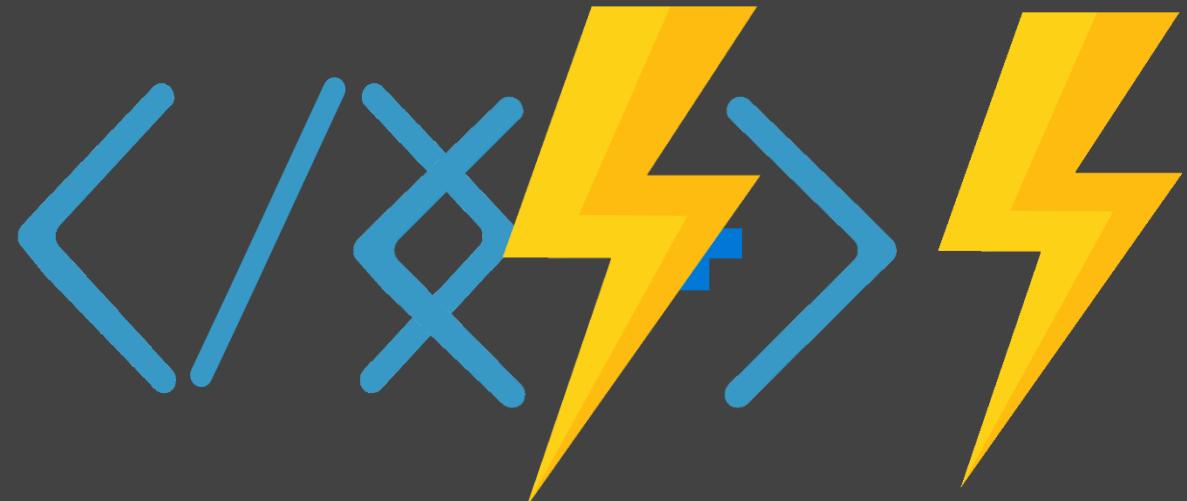
In a serverless computing deployment, the cloud customer only pays for service usage; there is never any cost associated with idle time.

# Serverless application platform components



Code

Events + data



# Azure Functions

Serverless compute

aka - Function as a Service (FaaS)

Trigger on events & external services / feeds

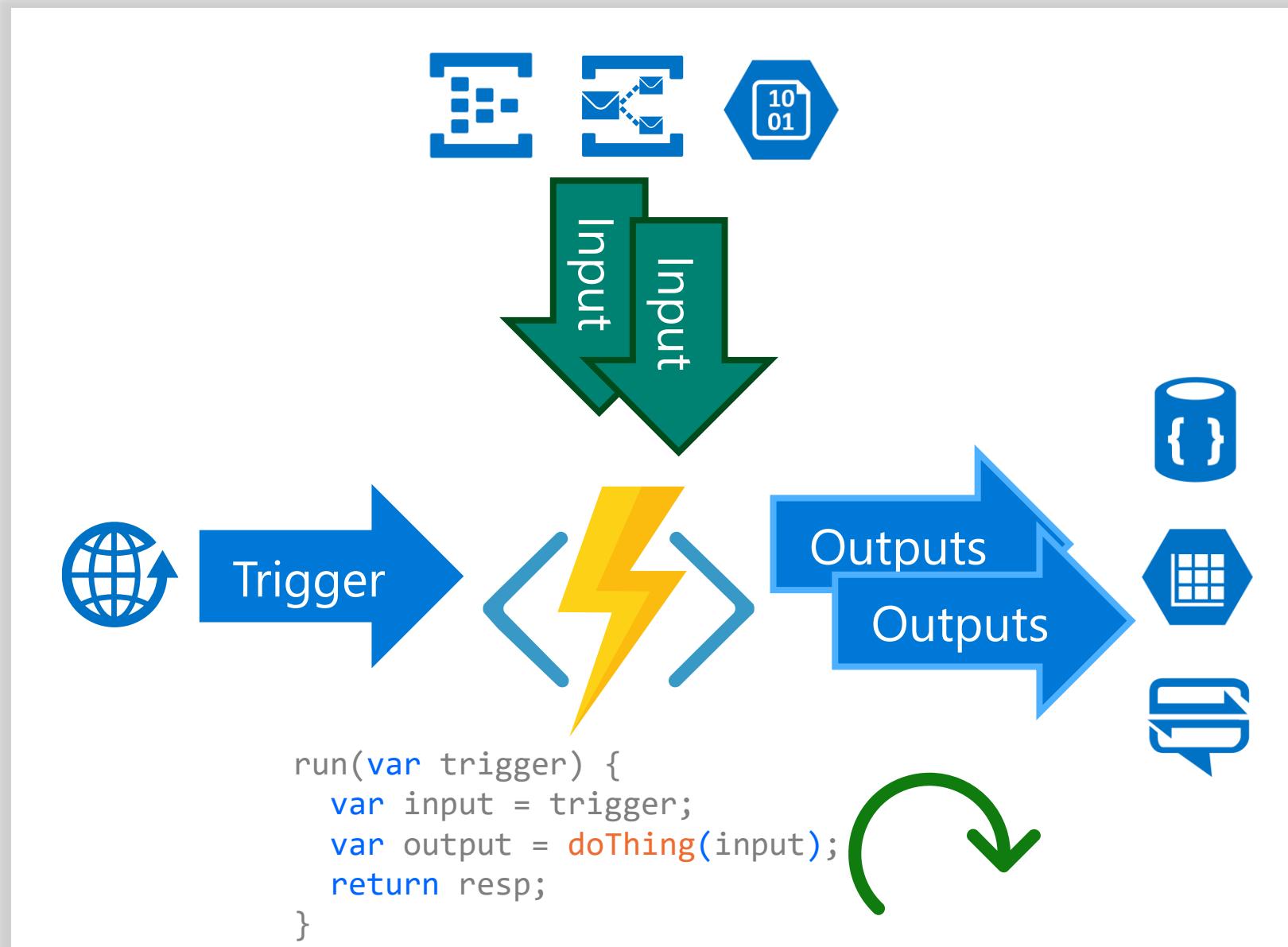
Pay only per execution

Choice of languages

Open source runtime runs anywhere

# Triggers & Bindings

- HTTP / webhook
- Timer / scheduler
- Storage Blob
- Storage Queue
- Storage Table
- Service Bus
- Cosmos DB
- Event Hubs / IoT Hubs
- Mobile Apps
- Twilio
- Notification Hubs
- Event Grid



# Develop In Browser

The screenshot shows the Microsoft Azure App Services developer interface for a function app named "functions-app-demo - saveTweetToTable".

**Left Sidebar:** Shows the Azure portal navigation bar and a sidebar with various icons for managing resources like Function Apps, Storage, and Container Registry.

**Middle Panel:** Displays the code editor for the "run.csx" file. The code is written in C# and uses the WebJobs SDK to interact with an Azure Table storage table named "outputTweetTable". It handles an incoming HTTP POST request, deserializes the JSON payload into a dynamic object, and then creates a new "Tweet" POCO object from it. Finally, it adds the POCO to the output collection.

```
1 #r "Newtonsoft.Json"
2 using System;
3 using System.Net;
4 using Newtonsoft.Json;
5
6 public static async Task<object> Run(HttpRequestMessage req, ICollector<Tweet> outputTweetTable, TraceWriter log)
7 {
8     // Get input HTTP request, and deserialize from JSON to a dynamic
9     string jsonContent = await req.Content.ReadAsStringAsync();
10    dynamic tweet_input = JsonConvert.DeserializeObject(jsonContent);
11
12    log.Info($"### New tweet received: {tweet_input.TweetId}");
13
14    try {
15        // Don't look at this code too closely
16        // Listen to the nice man talking about Azure instead
17        Tweet t = new Tweet();
18        string dayISO = tweet_input.CreatedAtIso.ToString("o").Substring(0, 10);
19        t.PartitionKey = dayISO;
20        t.RowKey = tweet_input.TweetId;
21        t.Text = tweet_input.TweetText;
22        t.User = tweet_input.TweetedBy;
23        t.Lang = tweet_input.TweetLanguageCode;
24
25        // Add POCO to collection for the Webjob SDK to magically push into the output Table
26        outputTweetTable.Add(t);
27    } catch(Exception e) {
28        // Bummer return a HTTP 400 and spit out some logs
29        log.Error($"!!! {e.Message}");
30    }
31 }
```

**Right Panel:** A preview pane showing the function's configuration and test results.

- HTTP method:** POST
- Query:** foo bar
- Headers:** content-type application/json
- Request body:**

```
1 {
2     "CreatedAtIso": "2017-04-05T18:03:02+00:00",
3     "TweetId": "64352433",
4     "TweetLanguageCode": "en-gb",
5     "TweetText": "Listen to the nice man talking",
6     "TweetedBy": "@nobody"
7 }
```
- Output:** (Empty)

**Logs:** Shows the execution logs for the function.

```
2017-04-06T07:35:46.435 ### New tweet received: 64352433
2017-04-06T07:35:46.528 ### Tweet inserted into Azure table OK, bye
2017-04-06T07:35:46.622 Function completed (Success, Id=b5011ca9-367b-4ca3-b06d-81400110e988)
2017-04-06T07:35:47.357 Exception while executing function: Functions.saveTweetToTable. Microsoft.Azure.WebJobs.Host: Error: RequestId:acf86d62-0002-0083-08a8-aef063000000
Time:2017-04-06T07:35:46.5959096Z.
2017-04-06T07:35:52.748 Function started (Id=0c994d9f-e8c5-4bbd-b71c-ffdec036723c)
2017-04-06T07:35:52.748 ### New tweet received: 64352433
2017-04-06T07:35:52.748 ### Tweet inserted into Azure table OK, bye
2017-04-06T07:35:52.748 Function completed (Success, Id=0c994d9f-e8c5-4bbd-b71c-ffdec036723c)
```

# Language Support



C#



F#



Java  
Script

Fully Supported Languages



Power  
Shell



Python



PHP

Preview / Experimental Languages



Bash



Batch

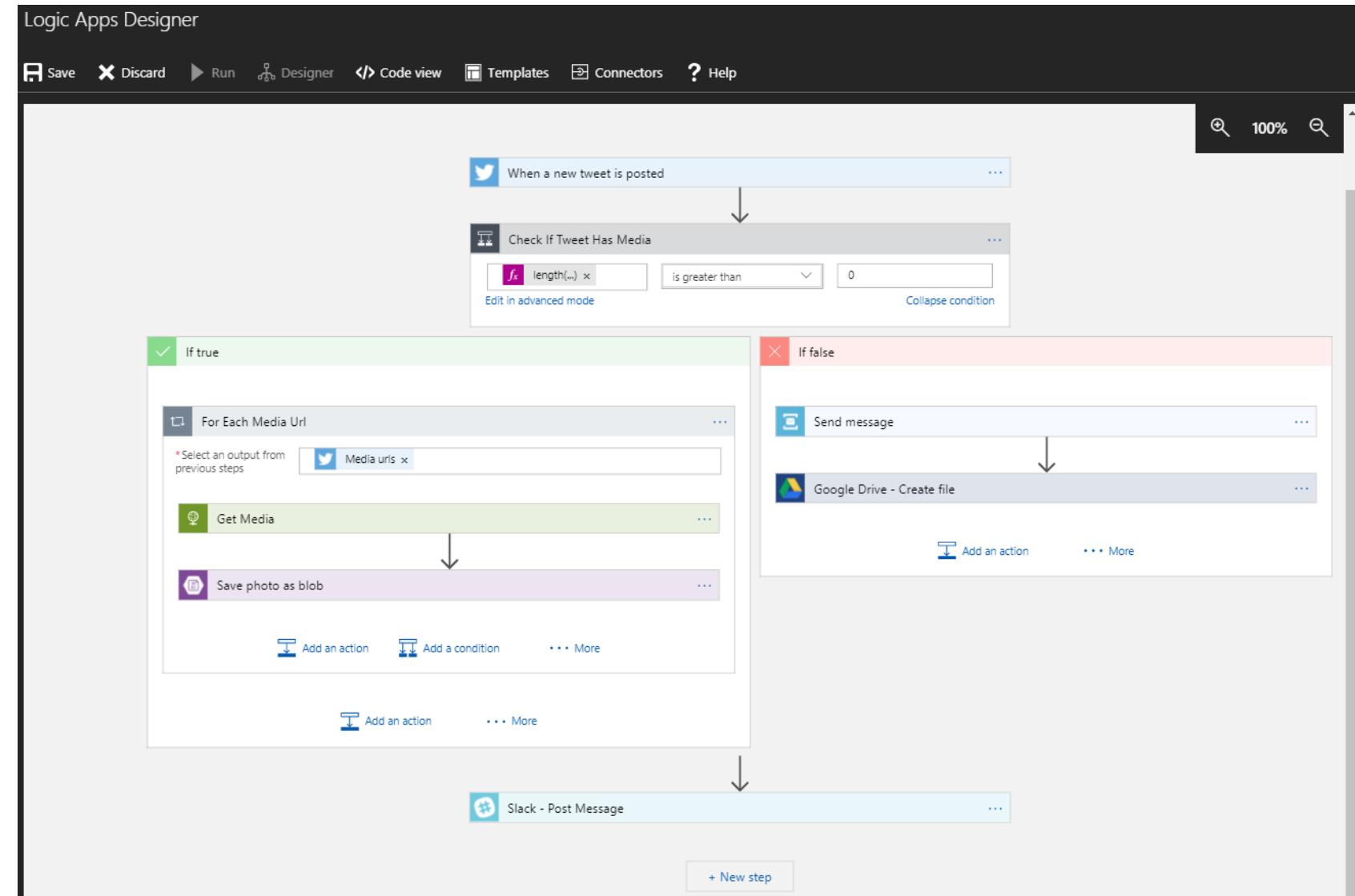


Java

# { } Logic Apps

- Create business processes and workflows visually
- Large library of SaaS and API connectors
- Deliver integration capabilities in web, mobile, and API apps
- Integrate with your SaaS and enterprise applications & processes
- Leverage Azure Functions as custom steps
- Invoke with a timer and web hooks

Develop and deliver powerful integration solutions with ease



# Logic Apps Connectors

200+ Connectors

 Request	 Schedule	 Service Bus	 Twitter	 Office 365 Outlook	 SharePoint	 FTP	 Dynamics 365	 SFTP	 Salesforce	 RSS	 OneDrive	 Event Grid	 Queues	 10to8 Scheduling
 Act!	 Adobe Creative Cloud	 Adobe Sign	 Amazon Redshift	 Apache Impala	 Appfigures	 AS2	 Asana	 AWeber	 AD	 API Management	 App Services	 Application Insights	 Automation	 Blob Storage
 Cosmos DB	 Data Lake	 Event Grid Publish	 File Storage	 Functions	 Log Analytics	 Log Analytics Data	 Logic Apps	 Resource Manager	 SQL Data Warehouse	 Table Storage	 AzureML	 Basecamp 2	 Basecamp 3	 Batch
 Benchmark Email	 Bing Maps	 Bing Search	 Bitbucket	 Bitly	 BizTalk Server	 Bizzy	 Blogger	 Box	 Buffer	 Calendly	 Campfire	 Capsule CRM	 Chatter	 Cognito Forms
 Common Data Service	 Computer Vision API	 Content Conversion	 Content Moderator	 Control	 Custom Vision	 D&B Optimizer	 Data Operations	 Date Time	 DB2	 Disqus	 DocFusion365	 Docparser	 DocuSign	 Dropbox
 Dynamics 365 Conn	 Dynamics 365 Financials	 Dynamics 365 Ops	 Dynamics NAV	 Easy Redmine	 EDIFACT	 Elastic Forms	 Enadoc	 Event Hubs	 Eventbrite	 Face API	 Facebook	 File System	 Flat File	 FlowForma
 FreshBooks	 Freshdesk	 Freshservice	 GitHub	 Gmail	 Google Calendar	 Google Contacts	 Google Drive	 Google Sheets	 Google Tasks	 GoToMeeting	 GoToTraining	 GoToWebinar	 Harvest	 HelloSign
 HipChat	 HTTP	 HTTP with AD	 iAuditor	 Informix	 Infusionsoft	 Inoreader	 Insightly	 Instagram	 Instapaper	 Integration Account	 Intercom	 JIRA	 JotForm	 LeanKit
 LinkedIn	 LiveChat	 LUIS	 MailChimp	 Mandrill	 Medium	 Microsoft Forms	 Microsoft Kaizala	 Microsoft StaffHub	 Microsoft Teams	 Microsoft Translator	 MQ	 MSN Weather	 Muhibmi PDF	 MySQL
 Nexmo	 Office 365 Groups	 Office 365 Users	 Office 365 Video	 OneDrive for Business	 OneNote (Business)	 Oracle Database	 Outlook Customer Mgr	 Outlook Tasks	 Outlook.com	 PagerDuty	 Parserr	 Paylocity	 Pinterest	 Pipedrive
 Pitney Bowes Validation	 Pivotal Tracker	 Planner	 Plivo	 PostgreSQL	 Power BI	 Project Online	 QnA Maker	 Redmine	 SAP App Server	 SAP Msg Server	 SendGrid	 ServiceNow	 Skype for Business	 Slack
 Smartsheet	 SMTP	 SparkPost	 SQL Server	 Stripe	 SurveyMonkey	 Teamwork Projects	 Teradata	 Text Analytics	 Todoist	 Toodledo	 Trello	 Twilio	 Typeform	 UserVoice
 Variables	 Video Indexer	 Vimeo	 Visual Studio Team Services	 WebMerge	 WordPress	 Workday HCM	 Wunderlist	 X12	 XML	 Yammer	 YouTube	 Zendesk		

# Azure Messaging Services



## Service Bus

Decouple your architecture with reliable message queues and topics



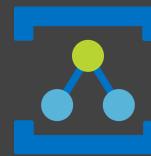
## IoT Hub

Secure message ingestion and management for billions of devices



## Azure Storage Queue

Lightweight REST based message queuing service



## Relay

Hybrid connection to on-premises & expose services through a message relay



## Event Hub

Hyperscale telemetry ingestion with real time & batch processing



## Event Grid

Intelligent event routing service for events using a publish-subscribe model

Decouple your application architecture  
**[aka.ms/azure-patterns](http://aka.ms/azure-patterns)**

# Hands On Exercise 4

Using the Cloud  
Shell &  
Command Line



# Hands On Exercise 4 – Cloud Shell

- Access the Azure Cloud Shell (bash)
- Try out and explore the Azure CLI (Command Line Interface)
- Create a resource group using the CLI
- Create a container (Custom Vision Python App)
- Test accessing container with public IP
- Delete container

[aka.ms/azure-day](http://aka.ms/azure-day)



# Storage



# Azure Storage Services

IaaS



Storage



Virtual  
machines



Networking

PaaS



Existing  
frameworks



Web  
and mobile



Microservices



Serverless  
Compute

## Disks

Persistent disks for Azure IaaS VMs

Premium Storage Disks option: SSD based, high IOPS, low latency

## Files

Fully managed file shares in the Cloud

SMB and REST access  
“Lift and shift” legacy apps

## Blob

Highly scalable, REST based cloud **object store**

Block Blobs: Sequential file I/O  
Cool Tier Available  
Page Blobs: Random-write pattern data  
Append Blobs

## Tables

Massive auto-scaling **NoSQL store**

Dynamic scaling based on load  
Scale to PBs of table data  
Fast key/value lookups

## Queues

Reliable **queues** at scale for cloud services

Decouple and scale components  
Message visibility  
timeout and update message to protect against unreliable dequeuers

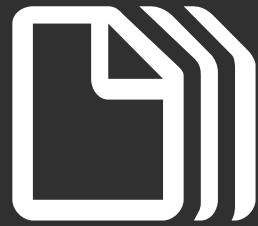
Built on a unified Distributed Storage System

Durability, Encryption at Rest, Strongly Consistent Replication, Fault Tolerance, Auto Load-Balancing

# Microsoft Azure Storage Sub-Services

## Azure Storage Account

### Object Storage



#### **Blob**

Simple named data objects along with metadata, can be any size

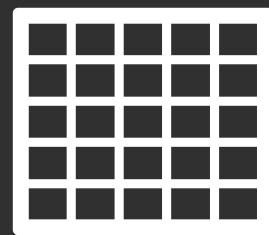
### Messaging



#### **Queues**

Reliable storage and delivery of messages for an application

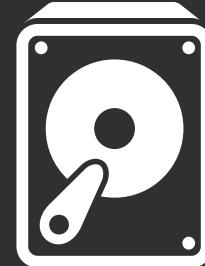
### NoSQL



#### **Tables**

Structured storage. A table is a set of entities with properties

### File share

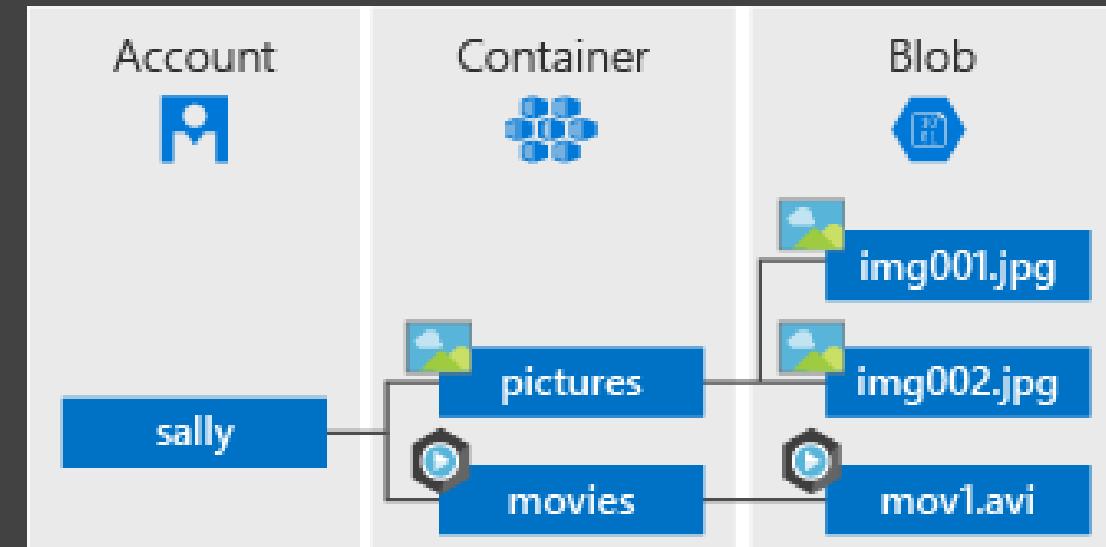


#### **Azure Files**

Shared network storage with drive mapping capability.

# Azure Blob Storage

- Optimized for storing massive amounts of unstructured data, such as text or binary data
  - Serving images or documents directly to a browser
  - Storing files for distributed access
  - Storing data for backup and restore, disaster recovery, and archiving
  - Storing data for analysis by an on-premises or Azure-hosted service
- Objects can be accessed from anywhere in the world via a URL
- Client libraries are available for .NET, Java, Node.js, Python, PHP, and Ruby.



# Big Data with Azure Blob Storage

## Big Data Use Cases

### Ingest & ETL



### Streaming



### Analytics & Machine Learning



### Data Aggregation



Azure HDInsight



## Azure Blob Storage

Open &  
Interoperable

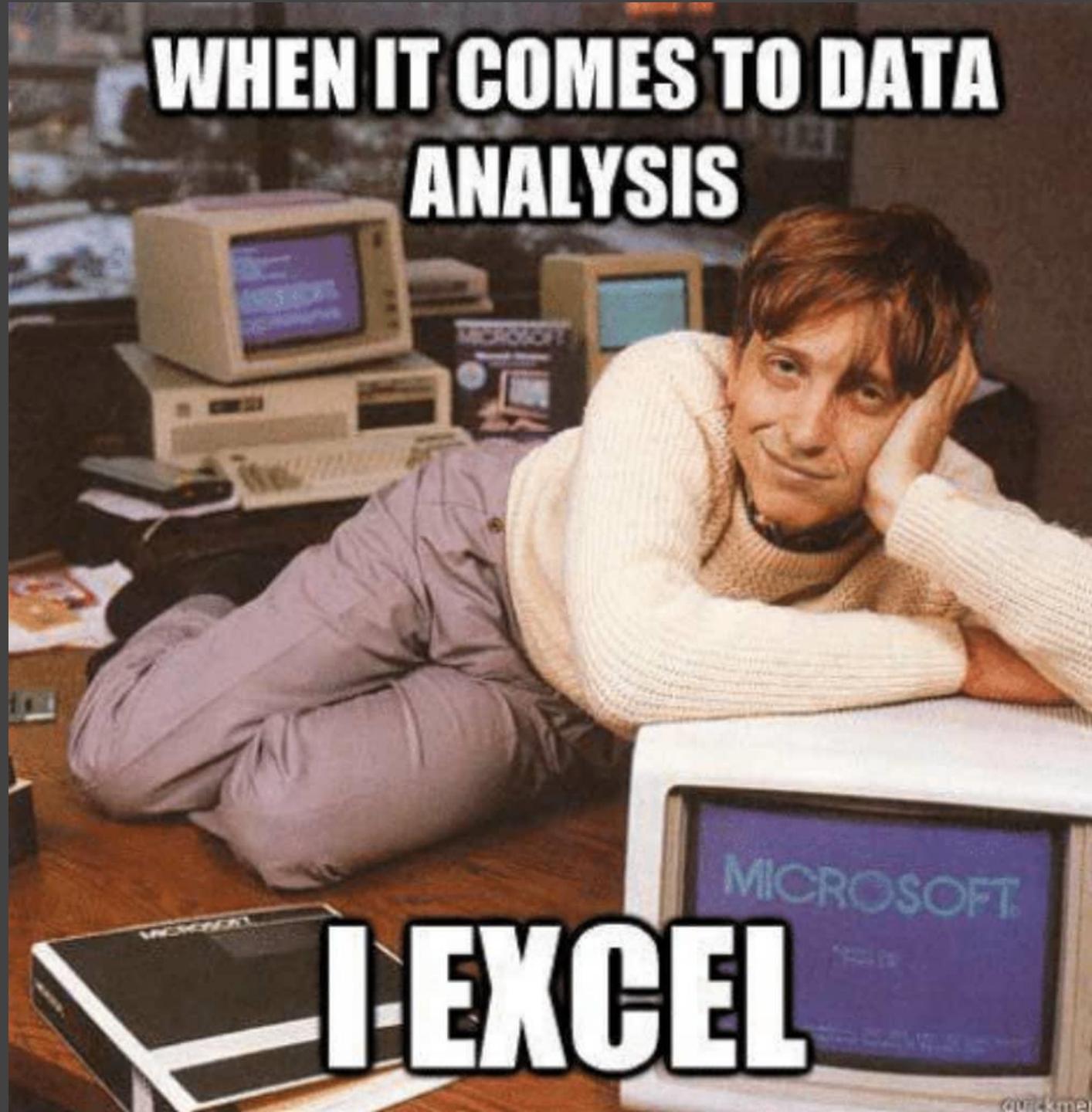
Manageable &  
Cost Efficient

Scalable &  
Performant

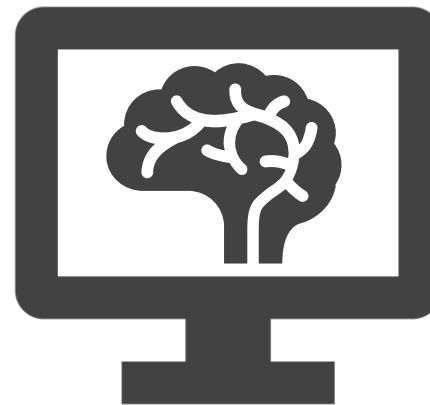
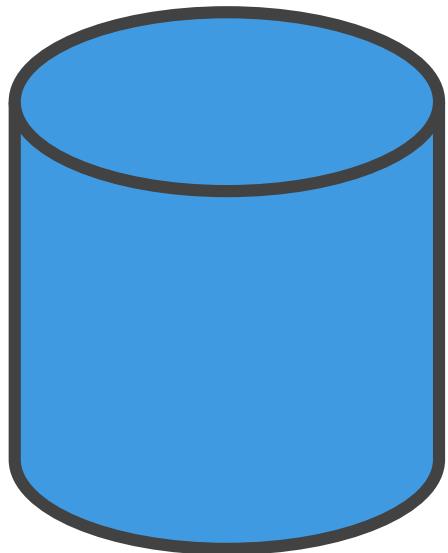
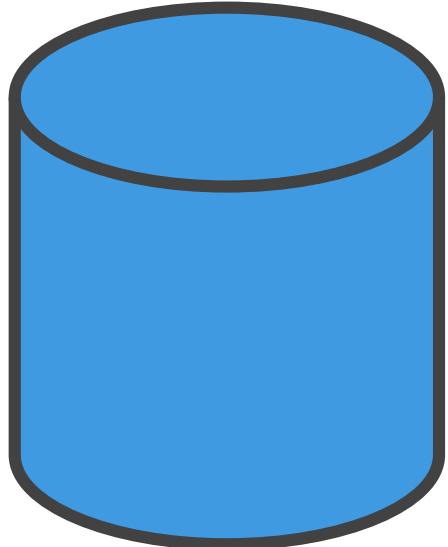
Secure &  
Compliant

Durable &  
Available

# Data Platform & Analytics



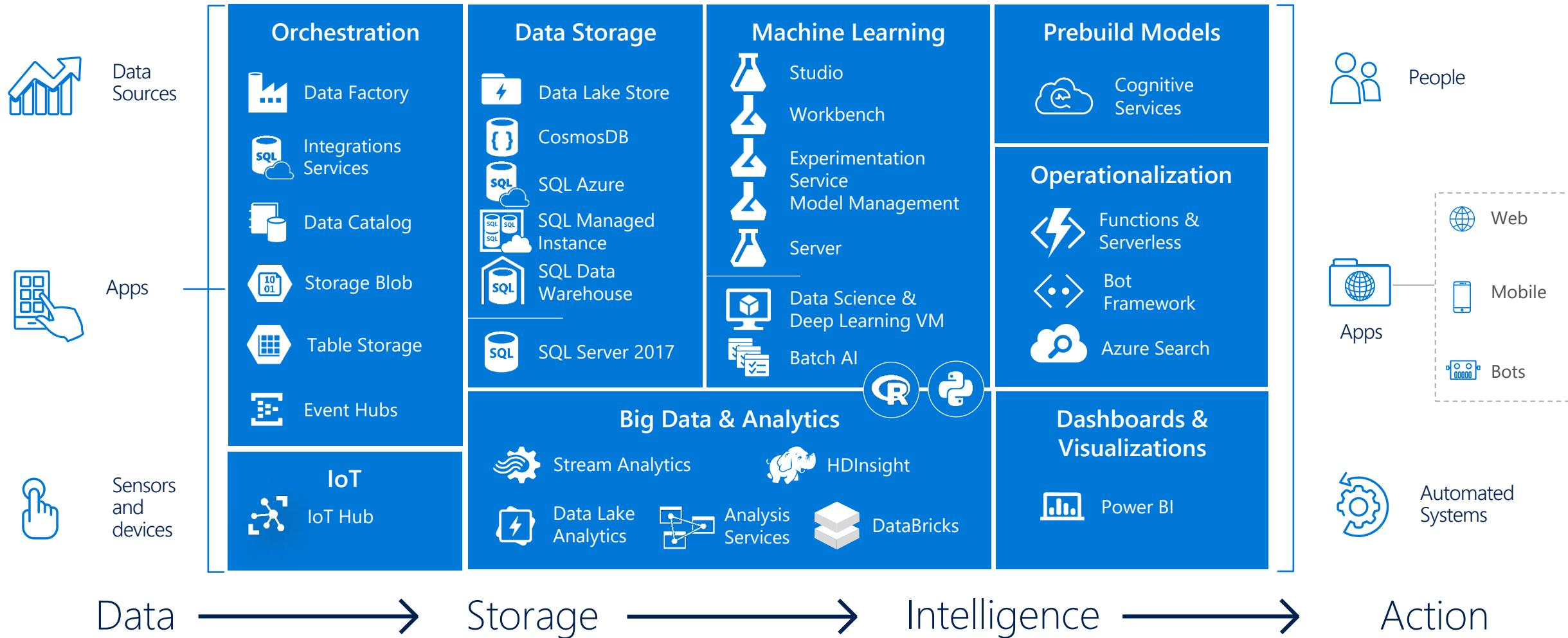
# DATA IS IMPORTANT



Data gives us new  
**ways of knowing** and  
new **things to know.**

Data makes **software**  
**smarter** through AI. It  
is **how machines know.**

# Industry-leading Data & AI technologies



# Azure Relational Database Platform

Power BI, App Services, Data Factory, Analytics, ML,  
Cognitive, Bot...

**SQL Server**



**MySQL**



**Postgres**



Database  
Services  
Platform

Intelligent: Advisors, Tuning, Monitoring

Flexible: On-demand scaling, Resource governance

Trusted: HA/DR, Backup/Restore, Security, Audit, Isolation

Azure Compute & Storage

# Azure SQL Database

Fully managed database-as-a-service that lets you focus on your business



## Fully managed



PaaS database that is always running on the latest stable version of SQL Server Database Engine and patched OS with 99.99% availability.

## Price/performance tiers



Tailor price/performance ratio to your needs with flexible performance tiers that span from affordable \$5/month to powerful 80-core databases.

## Scalability



Easily scale up, scale out, or shard your databases depending on your needs to improve performance of your application.

## Single Database



Use the Single database hosted in logical servers for your SaaS applications and microservices that need a single database with the predictable performances.

## Elastic pools



SQL Database elastic pools are a simple, cost-effective solution for managing and scaling multiple databases that have varying and unpredictable usage demands.

## Managed Instance



Use the Managed Instance to easily migrate your on-premises databases to the fully managed Azure PaaS database service with minimal or no database code changes.

## Business continuity



Built-in High-availability, automated backups, and geo-replication, will prevent maintenance operations, infrastructure or hardware failures from stopping your business.

## Advanced security



Secure your database with Azure AD authentication, Virtual Networks, Firewalls, Always Encrypted connections. Identify threats and vulnerabilities with built-in security.

## Built-in intelligence

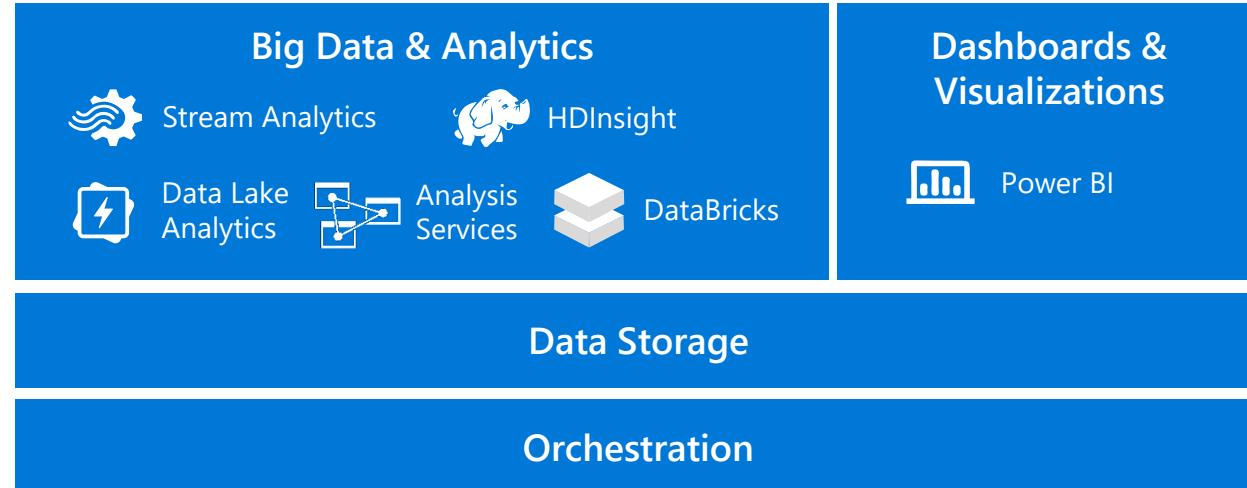
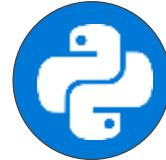


Built-in intelligence helps you dramatically reduce the costs of running and managing databases and maximizes both performance and security of your application.

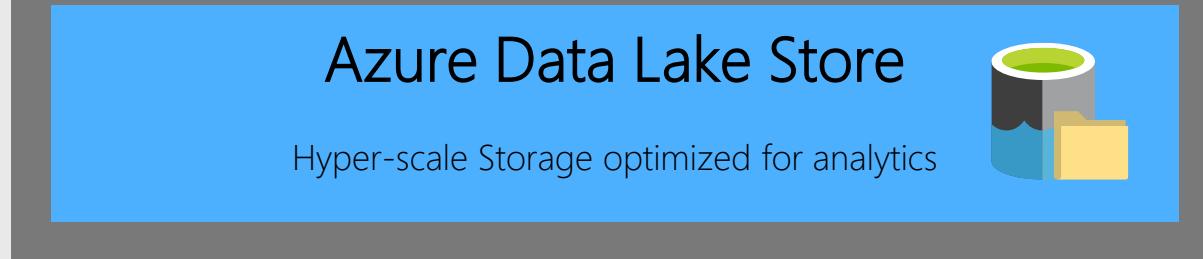
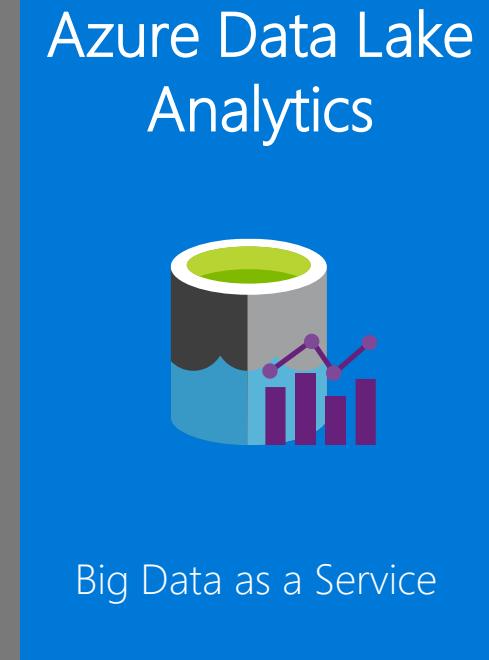
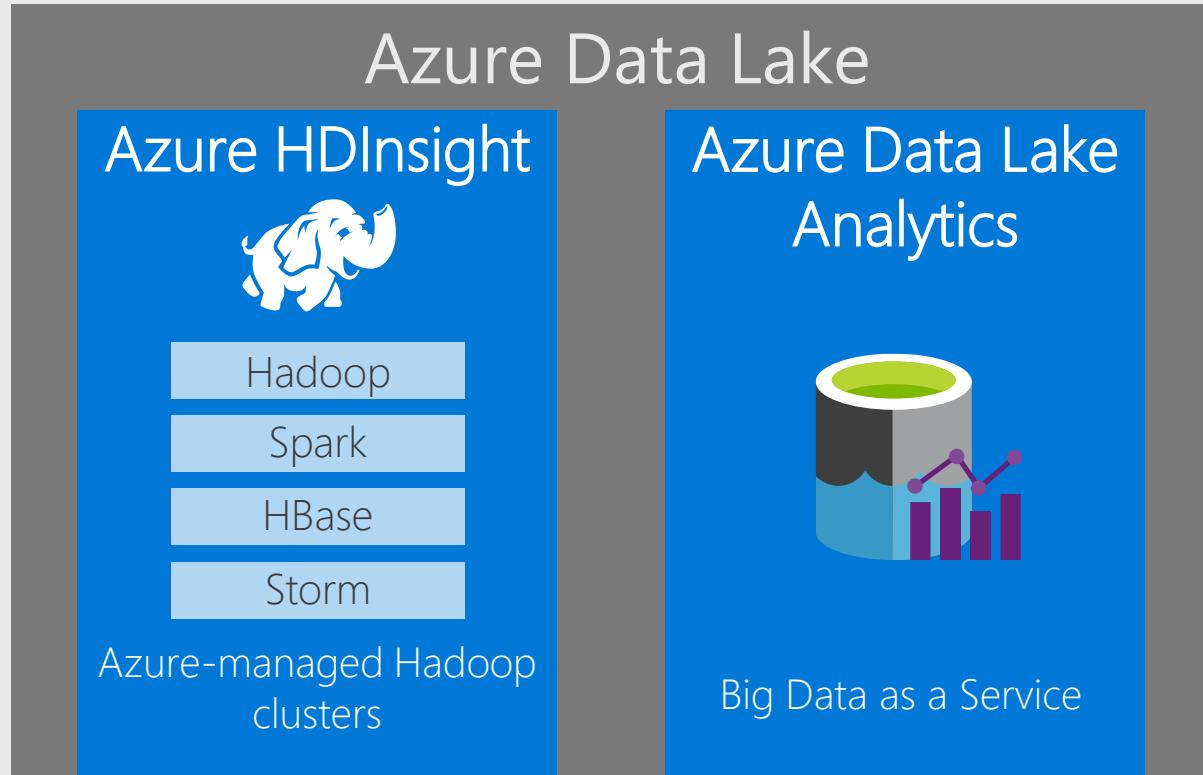


# Azure as your Analytics Platform

- SQL Estate
- Familiar Tooling
- Self Serve BI
- Big Data
- OSS & Apache Stack
- Advanced analytics in R & Python
- Real Time
- On Demand & PaaS
- Dashboards & Visualisation

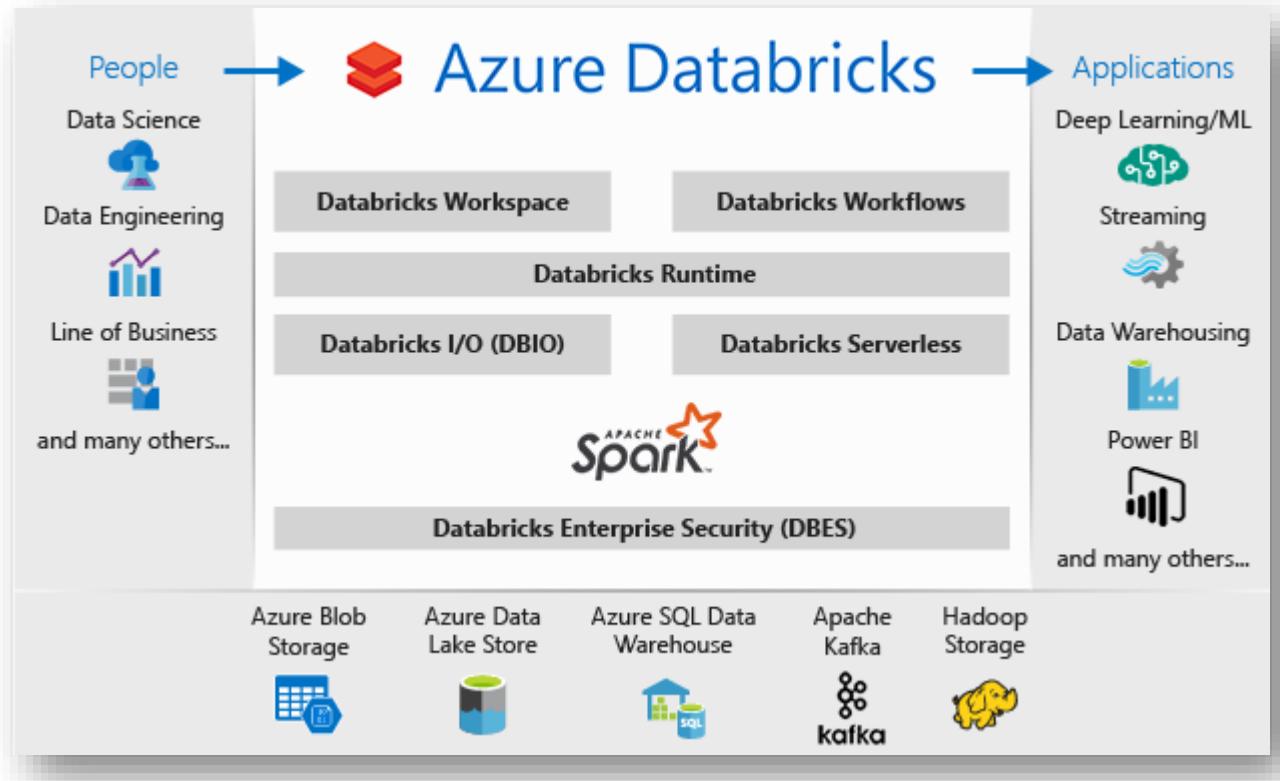


# Big Data / Hadoop in Azure





# The Azure Analytics Platform: Databricks preview



Spark Analytics Platform as a Service



Azure & PowerBI



Single click deploy



Databricks Notebooks



Enterprise Security



Scale



# Azure Cosmos DB

The first globally distributed, multi-model database service



GEO-  
DISTRIBUTED



MULTI MODEL,  
MULTI API



SCALE TO  
ANY NEED



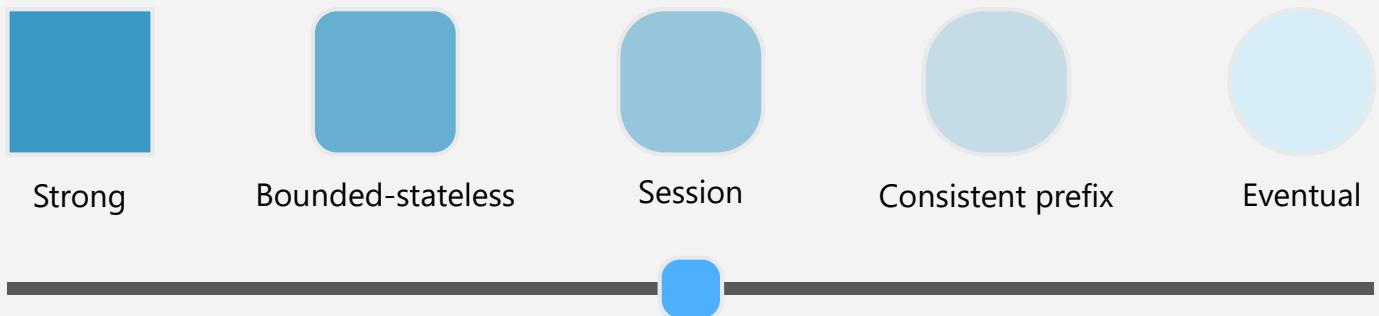
COMPREHENSIVE  
SLAS

# Introducing Azure Cosmos DB

A globally distributed, massively scalable, multi-model database service

## Choice of consistency

Choose from five defined consistency levels for low latency and high availability



# Introducing Azure Cosmos DB

A globally distributed, massively scalable, multi-model database service

Multi-model +  
multi API

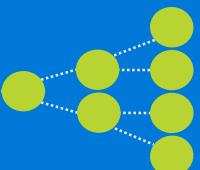
Key-Value



Tabular



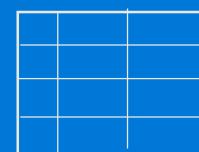
Documents



Graph



Relational



Cosmos DB offers a multitude of APIs to access and query data including, SQL and various popular OSS APIs.

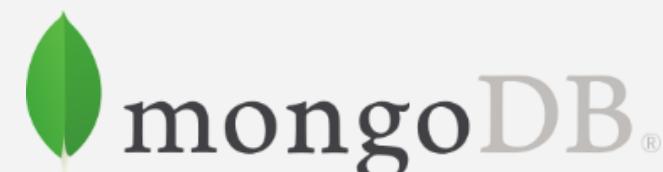


*cassandra*



Table  
API

**SQL**

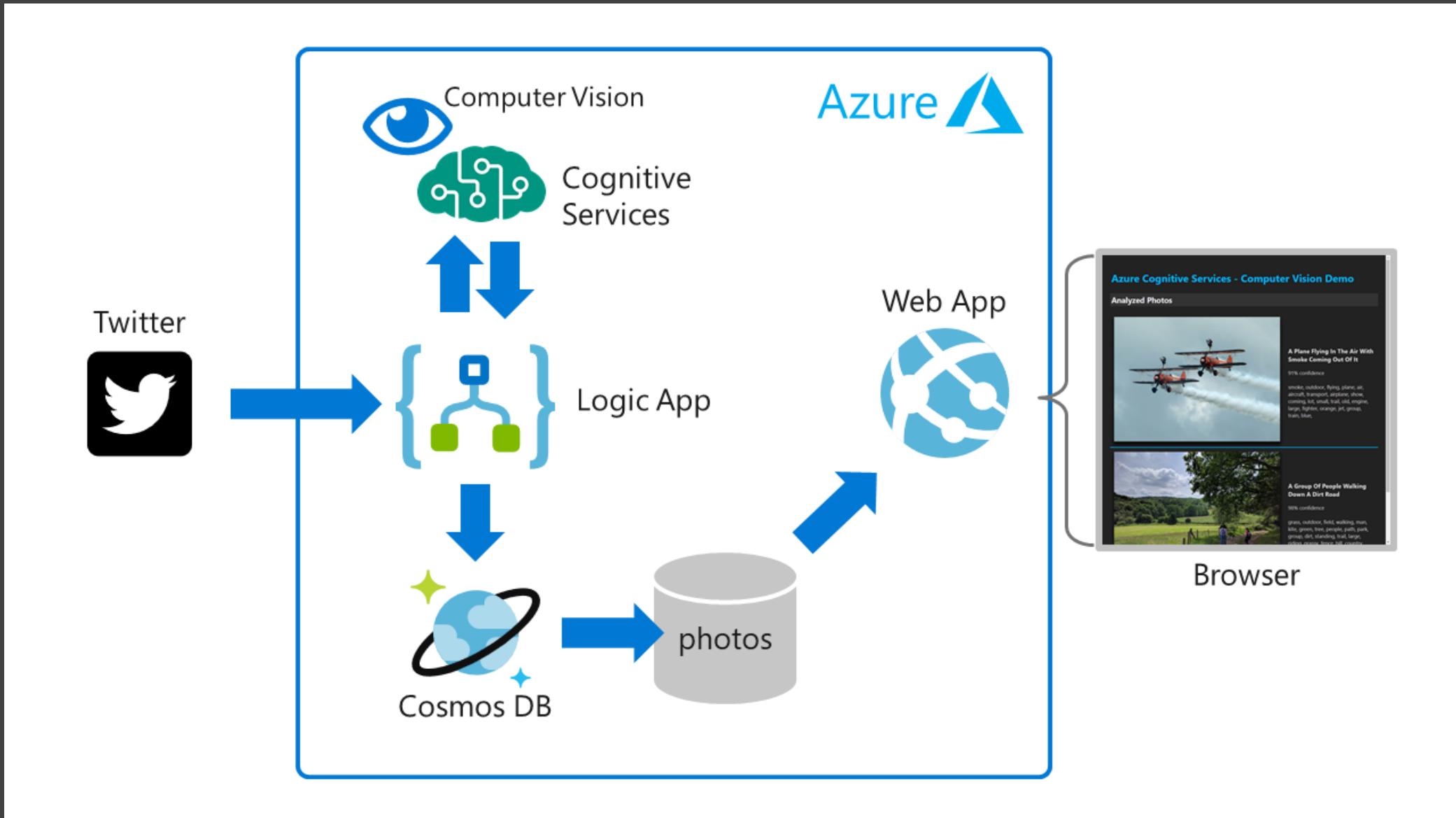


# Hands On Exercise 5

Building A  
Complete App in  
Azure



# Hands On Exercise 5 – Serverless App



# Hands On Exercise 5 – Serverless App

1. Create a new resource group
2. Create a Computer Vision API account
3. Create a new Cosmos DB account
4. Create a database and collection in Cosmos DB
5. Create a Logic App
6. Connect Logic App to Twitter
7. Connect Logic App to Cosmos DB
8. Test and verify
9. Create a new Web App
10. Connect Web App to Cosmos DB
11. View results :)

[aka.ms/azure-day](http://aka.ms/azure-day)



# Wrap Up

4





## Tools

Developer Tools

DevOps

Portal +  
Scripting



## Advanced workloads

Web + Mobile

Identity

Internet of Things

Data + Analytics

Microservices

Artificial Intelligence

Containers

Cognitive Services

Serverless

High Performance Computing



## Core infrastructure

Security

Management

Compute

Storage

Networking



[aka.ms/azure-day](https://aka.ms/azure-day)





Microsoft