



Azure

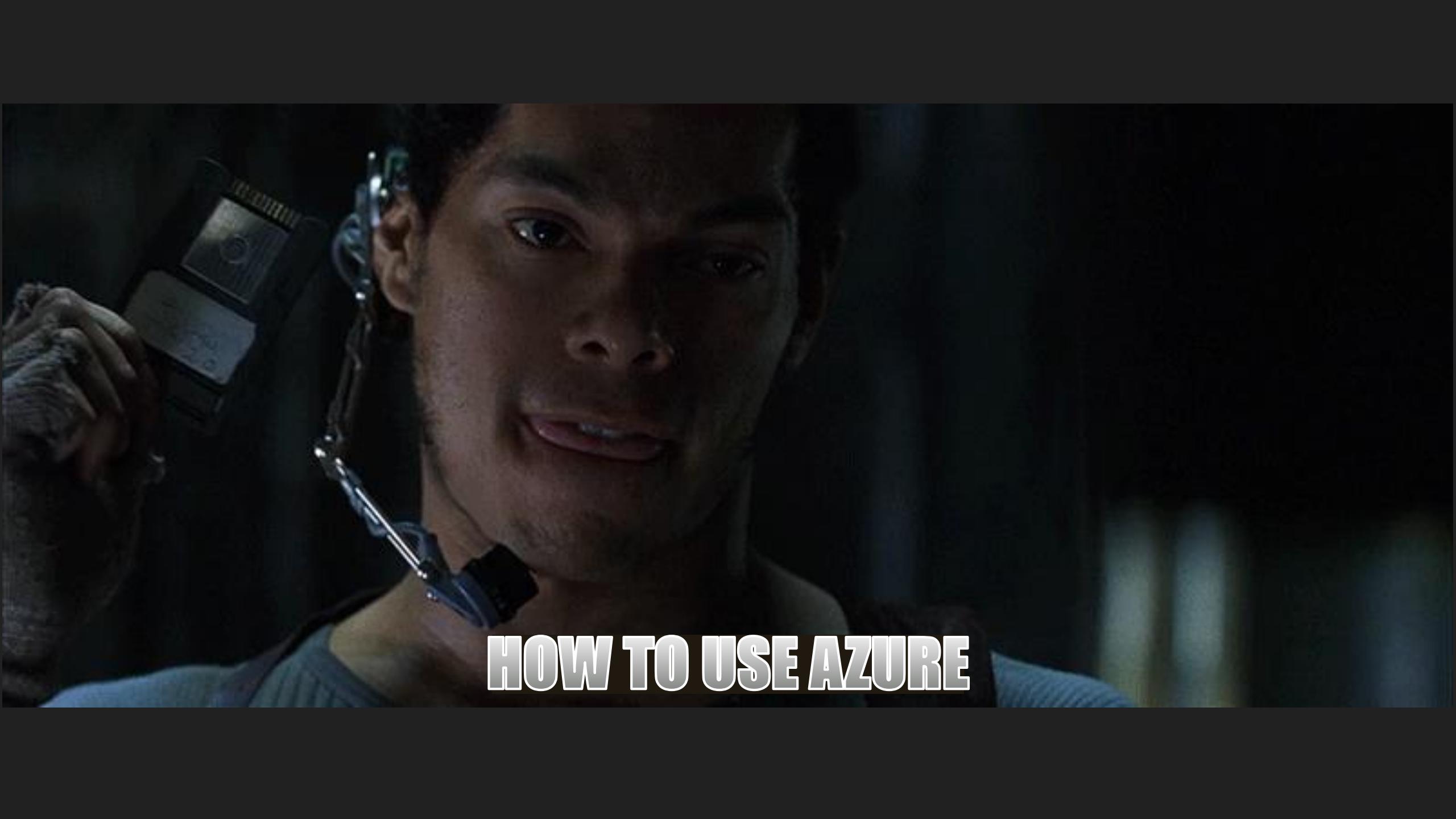
Introduction to the Cloud with Microsoft Azure

Ben Coleman
Ross Smith
Mike Ormond

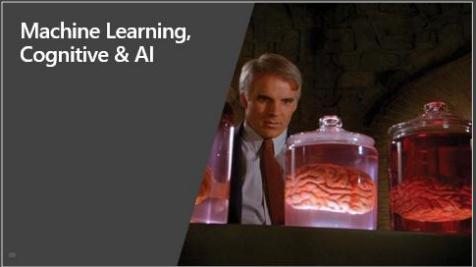
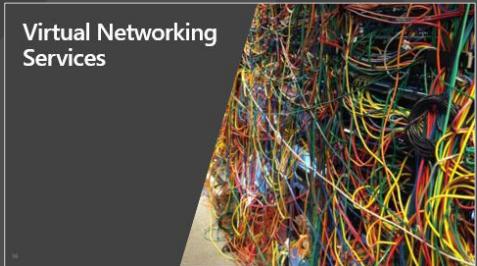
July 2018

Schedule

Time	Agenda
09:00 ~ 10:30	In session
10:30 ~ 11:00	Break (EBS Foyer)
11:00 ~ 12:30	In session
12:30 ~ 13:30	Lunch (EBS Foyer)
13:30 ~ 15:00	In session
15:00 ~ 15:30	Break (EBS Foyer)
15:30 ~ 17:00	In session

A close-up photograph of a woman with dark skin and short hair, looking slightly to her left with a neutral expression. She is wearing a dark t-shirt. A device with a small screen and a stylus is attached to her right ear. The background is dark and out of focus.

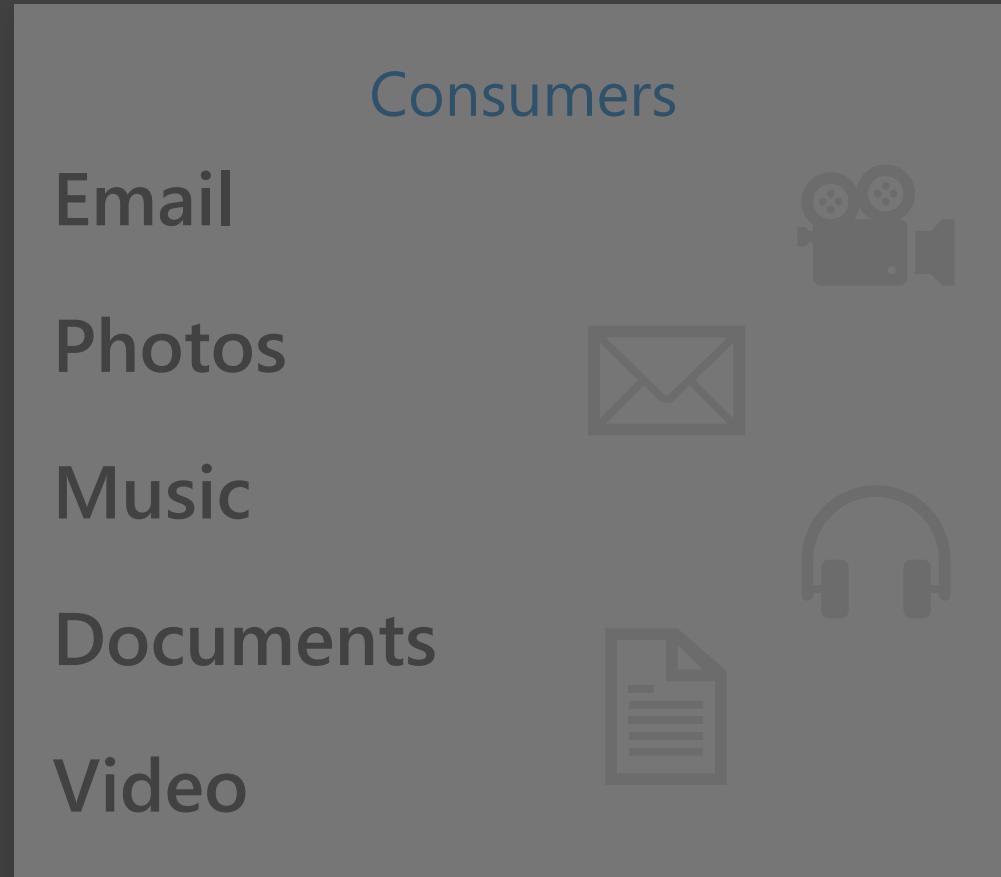
HOW TO USE AZURE



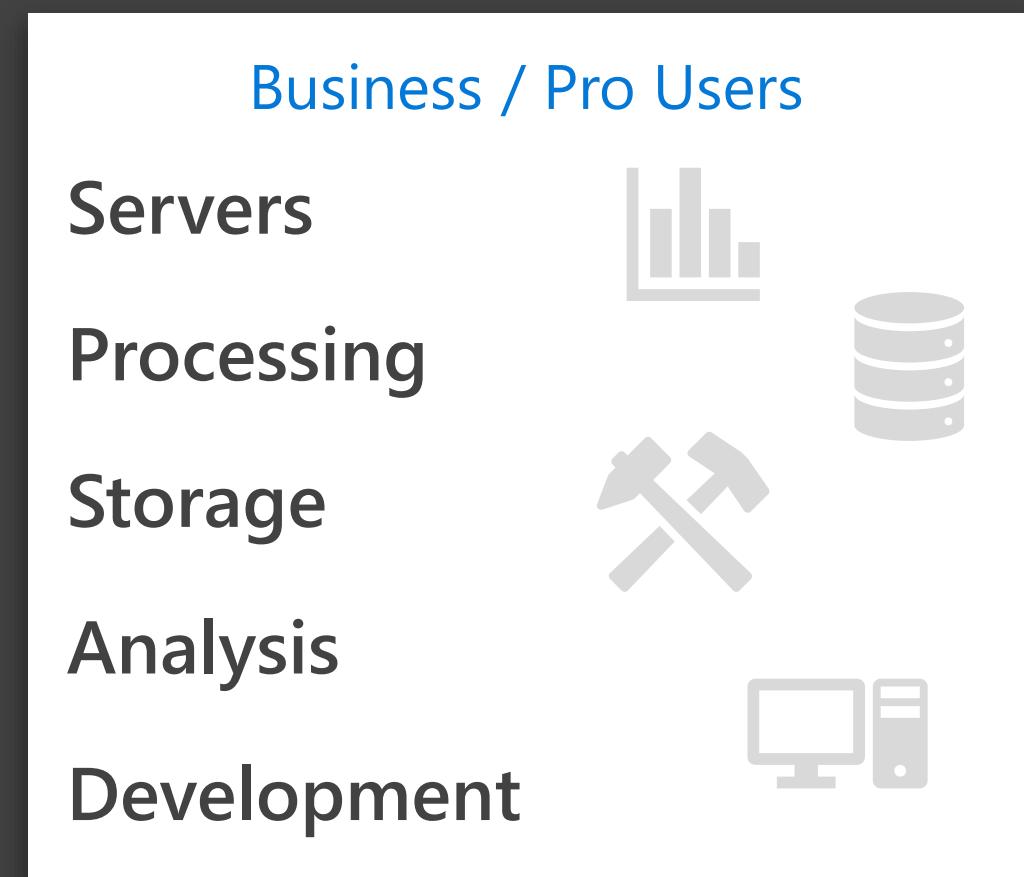
Introduction to Azure



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

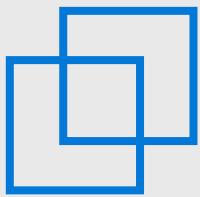
Presenter: Dan Baker

@azuredan





Productive



Hybrid



Intelligent

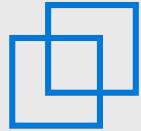


Trusted

Azure. Cloud for all.



Productive



Hybrid



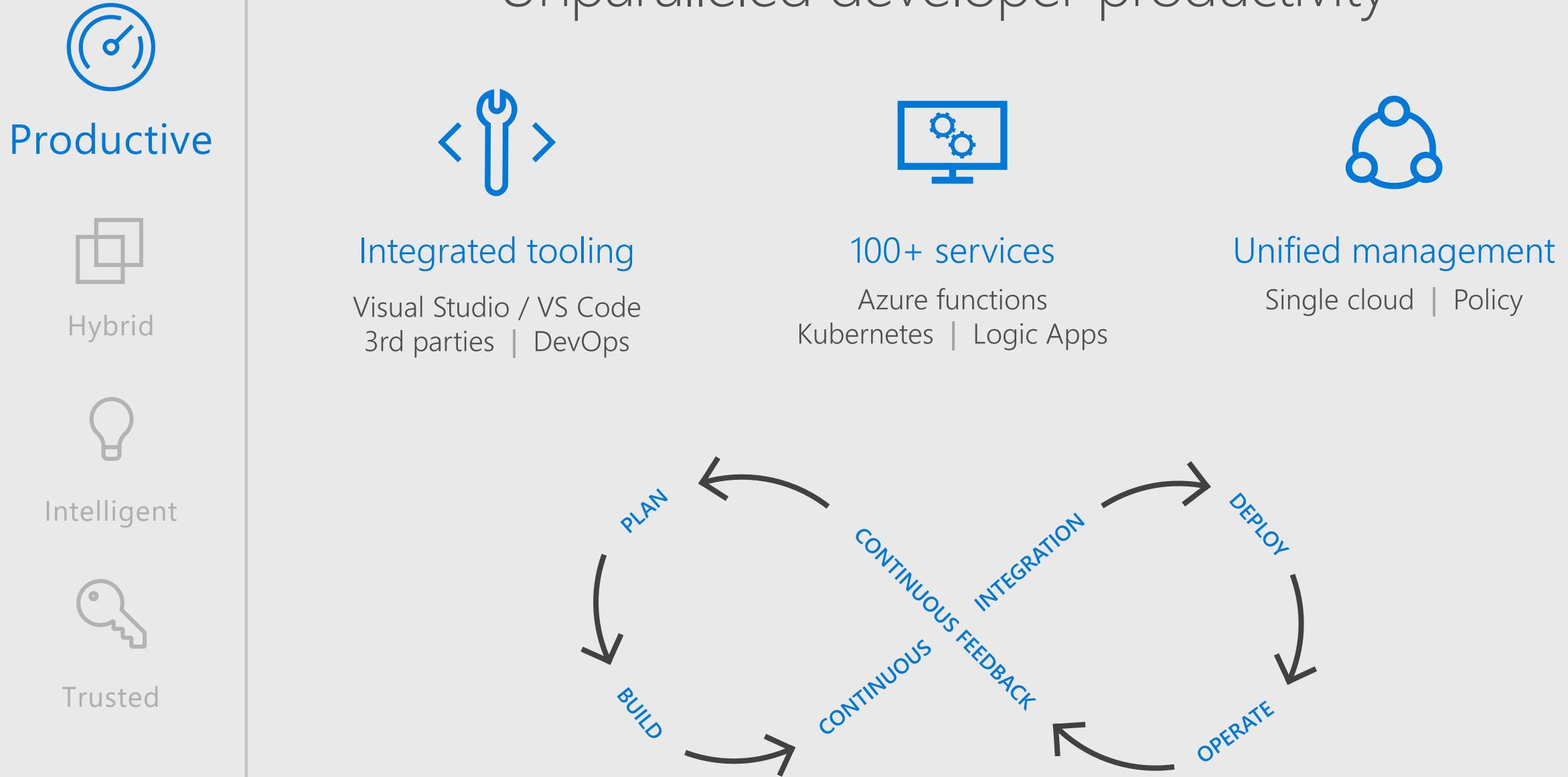
Intelligent



Trusted



Unparalleled developer productivity



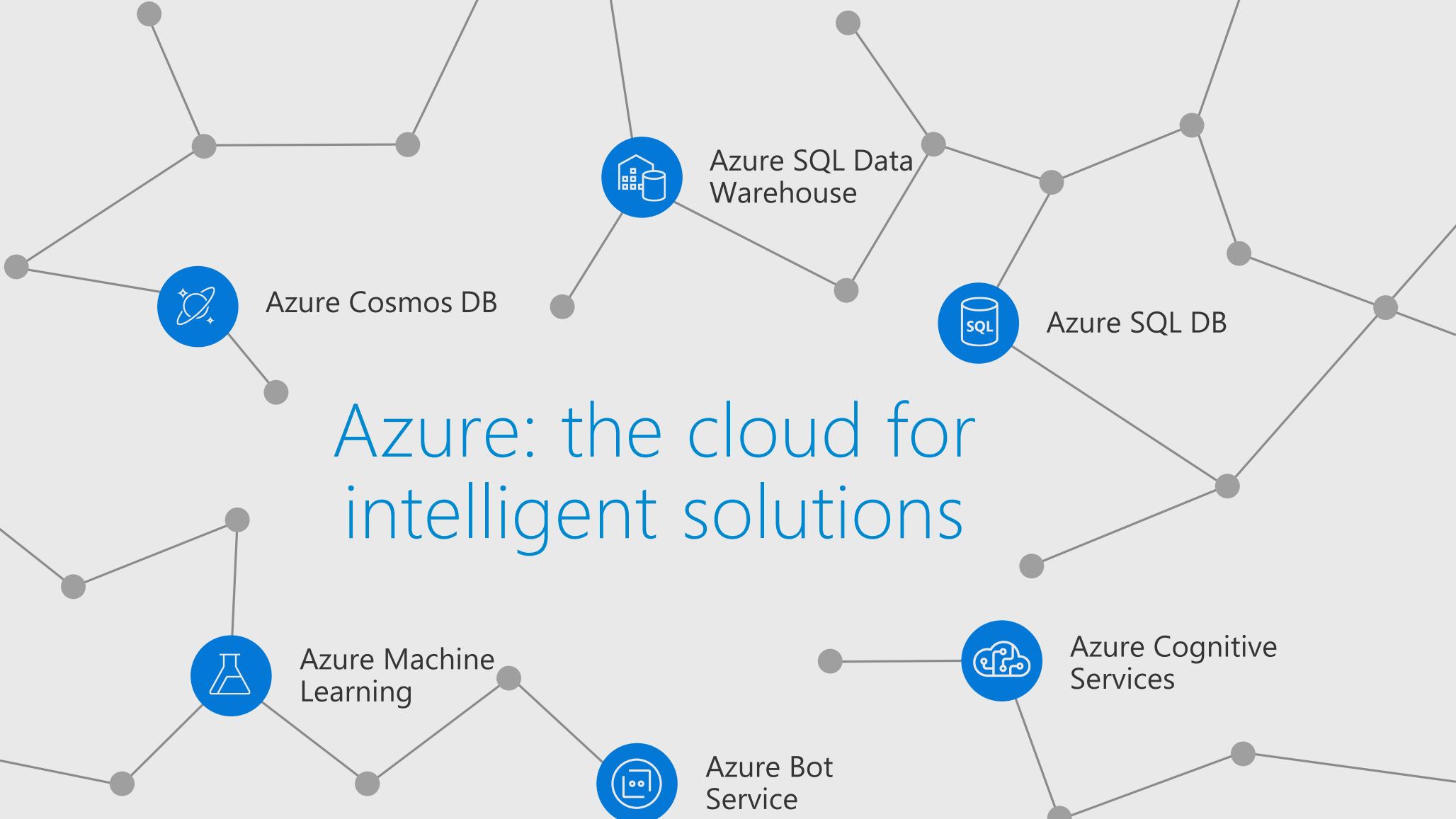
Productive

Hybrid

Intelligent

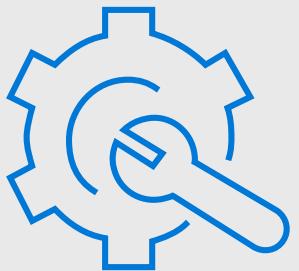
Trusted

Azure: the cloud for intelligent solutions



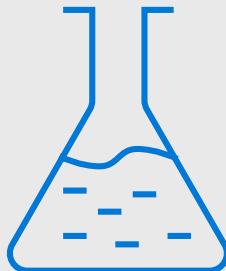


Comprehensive deep learning, machine learning as a service



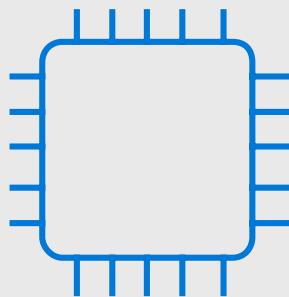
Customizable services

ML Services, Tensor, Caffe



Tools

Bots, Cognitive, ML



Infrastructure and compute

CPU, GPU, FPGA

Azure



Productive



Hybrid



Intelligent



Trusted

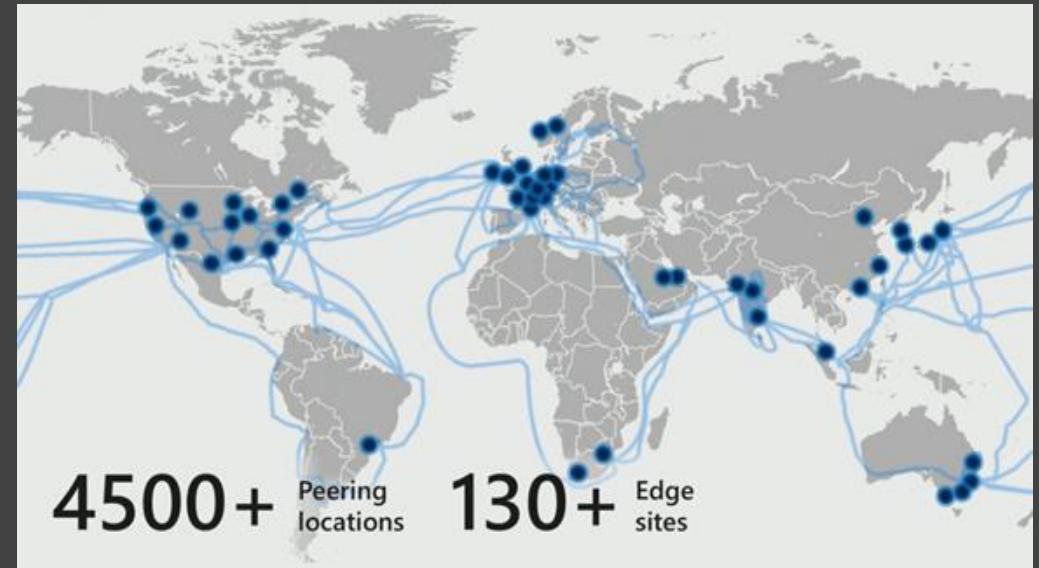


54 Azure
regions

Why Microsoft wants to put data centers at the bottom of the ocean

Frederic Lardinois @fredericl / Jun 8, 2018

Comment



33,000 miles of cable
around the world



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



Security & Management

- Security Center
- Portal
- Azure Active Directory
- Azure AD B2C
- Multi-Factor Authentication
- Automation
- Scheduler
- Key Vault
- Store/ Marketplace
- Azure Monitor

Platform Services

Media & CDN



Integration



Compute Services



Application Platform



Developer Services



Data



Intelligence



Analytics & IoT



Hybrid Cloud

- Azure AD Health Monitoring
- AD Privileged Identity Management
- Domain Services
- Backup
- Operational Analytics
- Import/Export
- Azure Site Recovery
- StorSimple

Compute



Storage



Networking

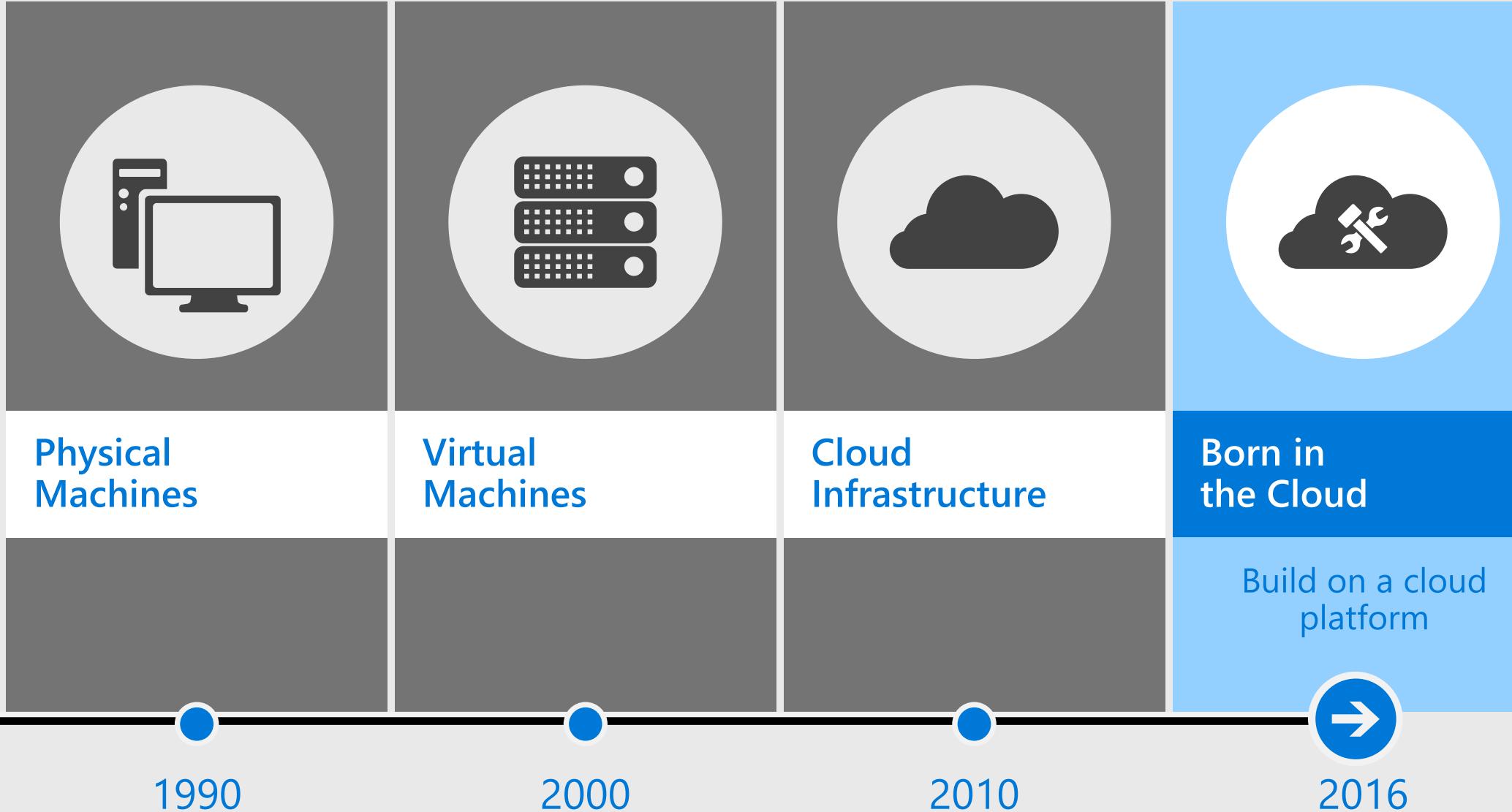


Datacenter Infrastructure (54 Regions, 200+ datacenters)



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

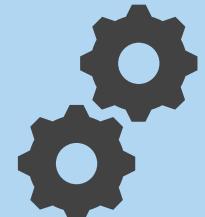
Infrastructure As A Service

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

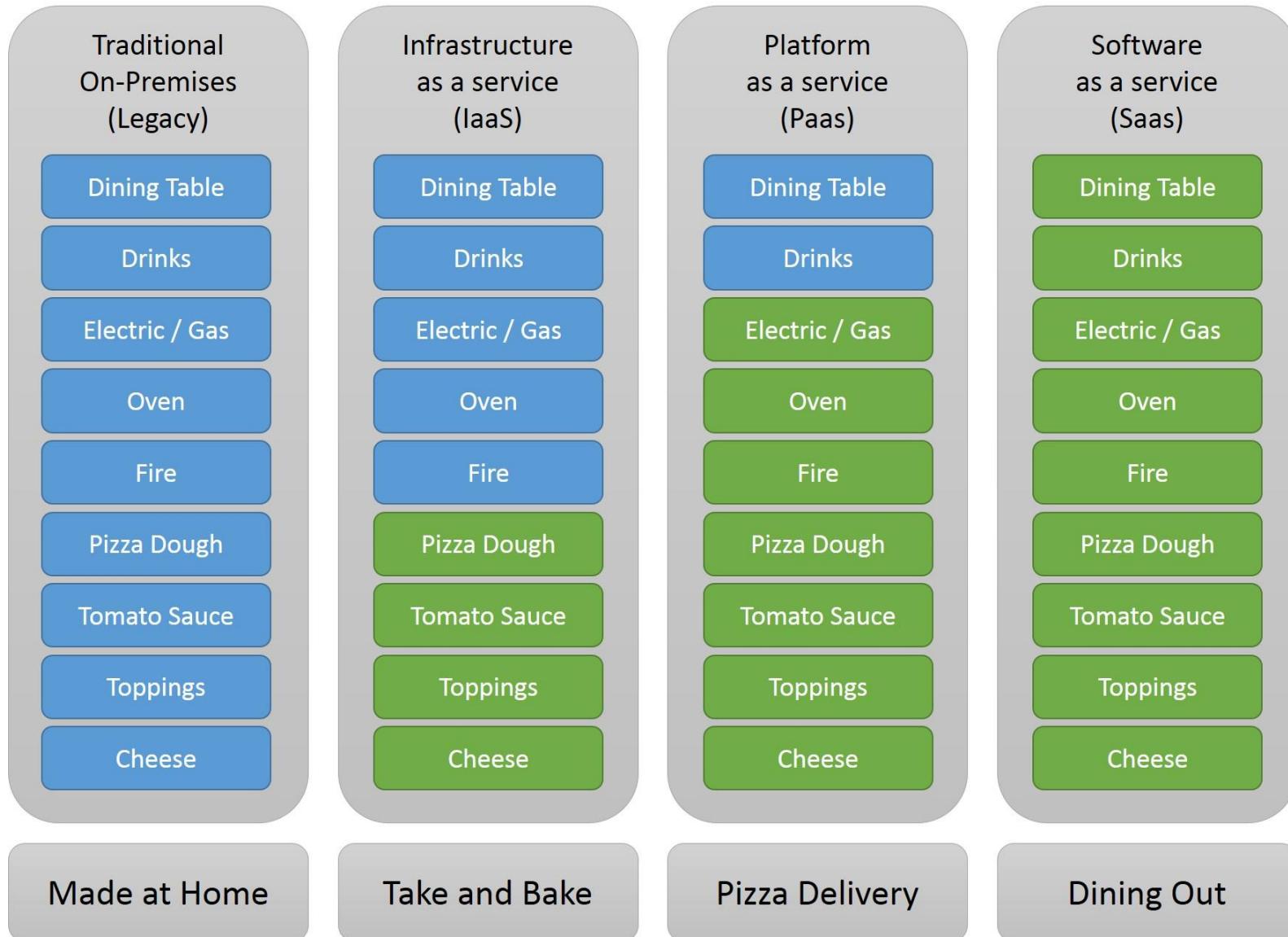
Building blocks, create your own solution or apps from scratch-

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



Applications



App frameworks & tools

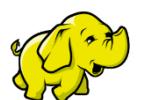


nodeJS



eclipse

Databases & middleware



redis



cloudera



mongoDB



Couchbase

Infrastructure



SUSE



ORACLE LINUX



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

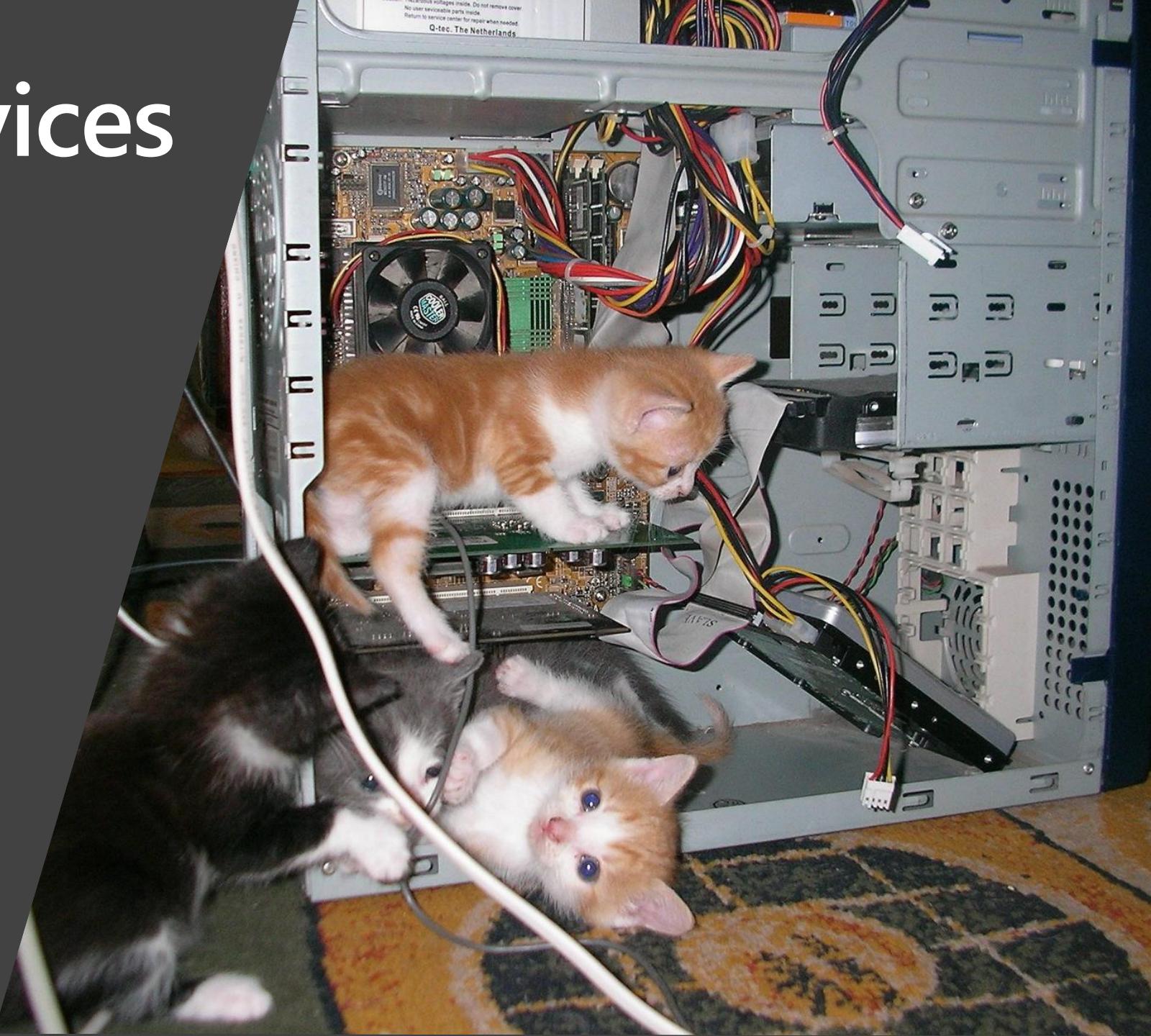
Create a Azure Resource Group

Explore the Azure Marketplace

aka.ms/azure-day

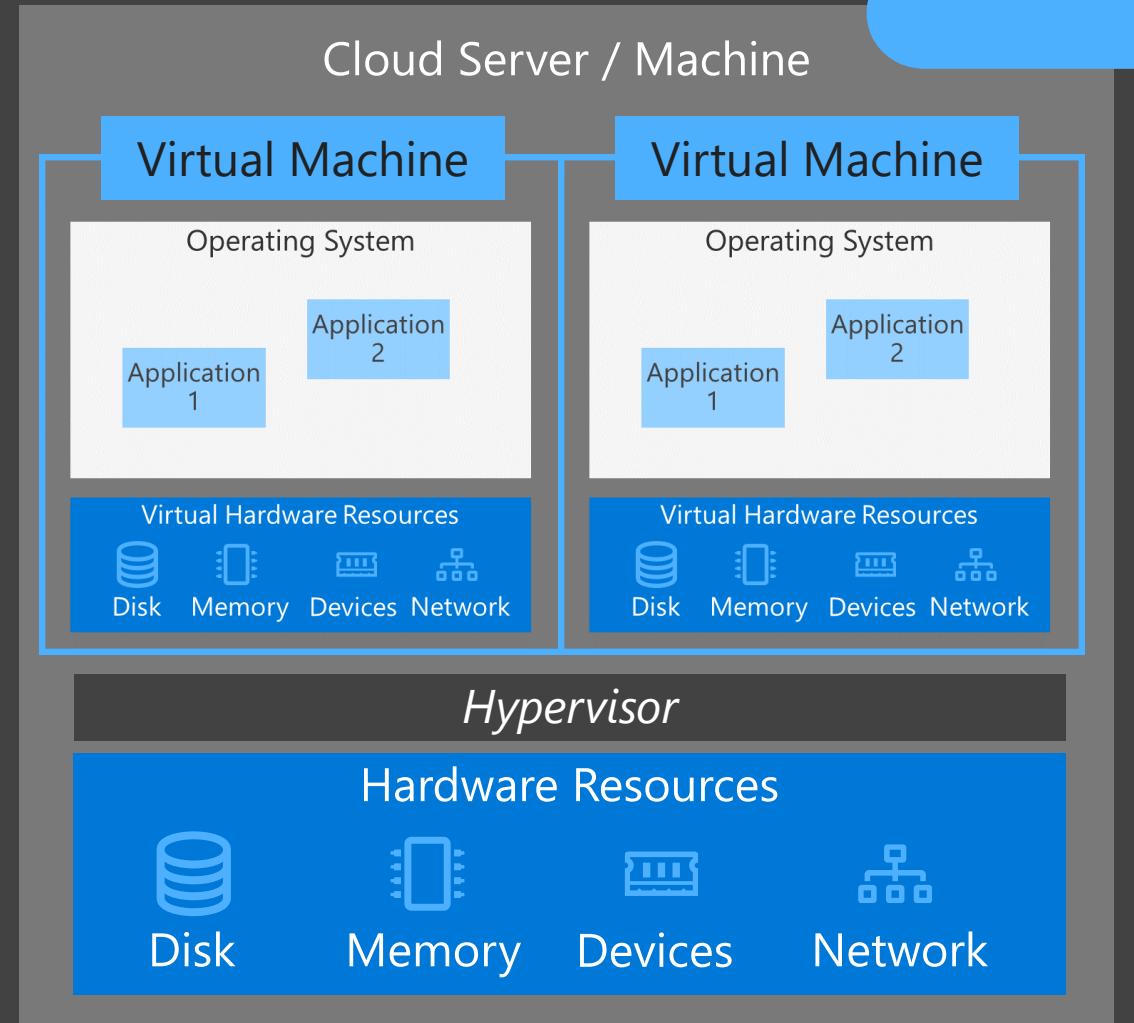
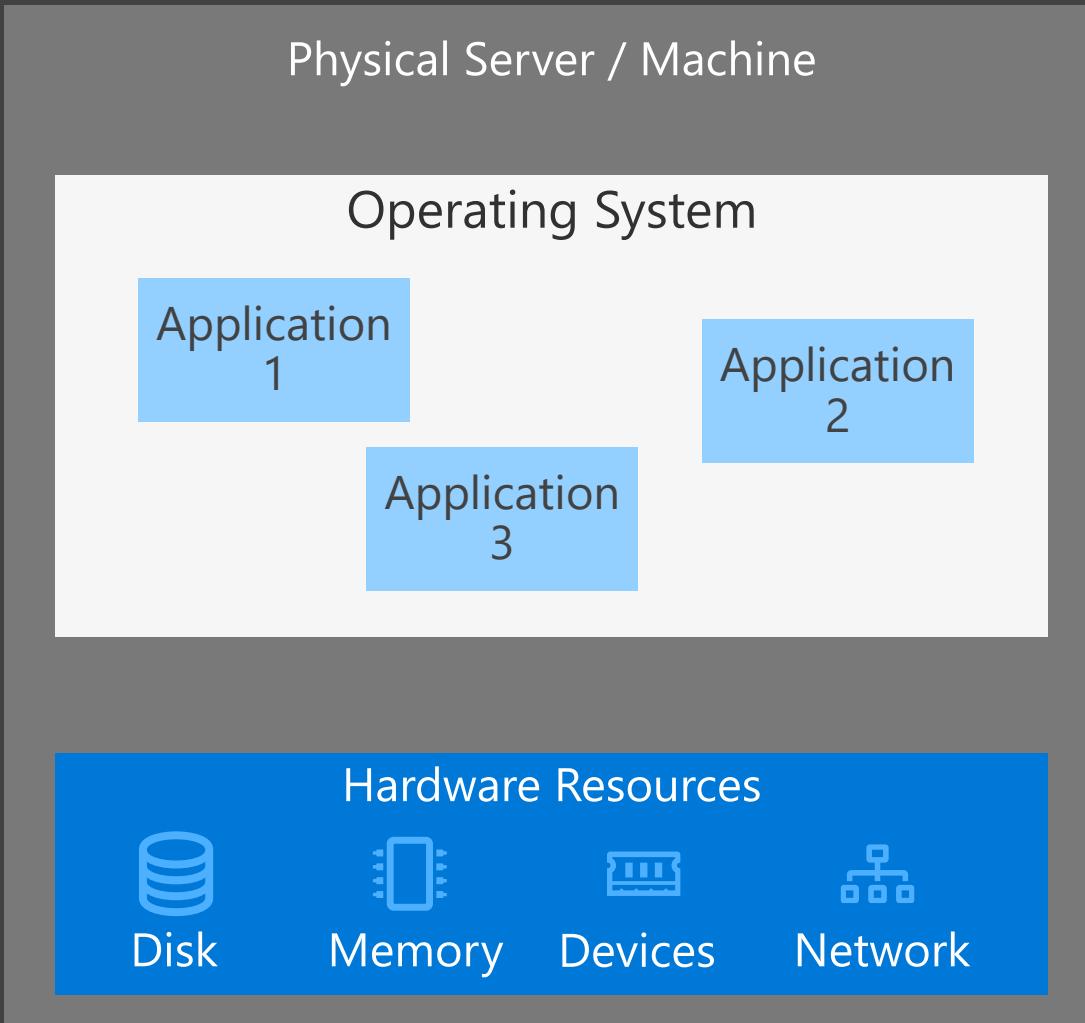


Compute Services

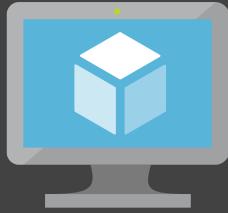


Machine Virtualization – The Basics

What is a Virtual Machine (VM)?



Virtual Machines



Windows & Linux

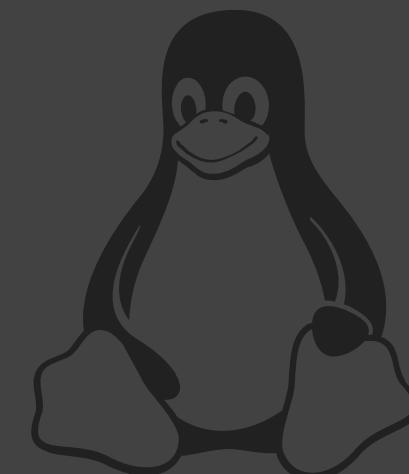
Source images - marketplace or custom

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



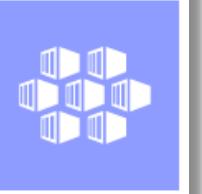
SQL Server 2017 Enterprise

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...

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

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



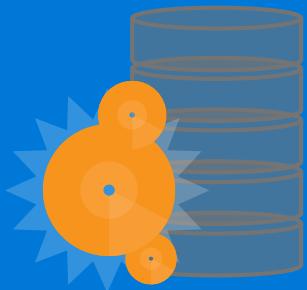
General
Purpose VMs



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

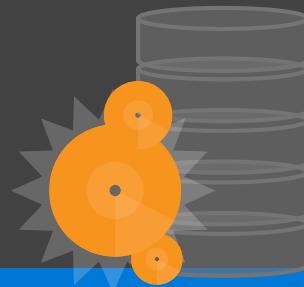
210 ACU/core

Large VMs for large
databases requiring fast
Storage

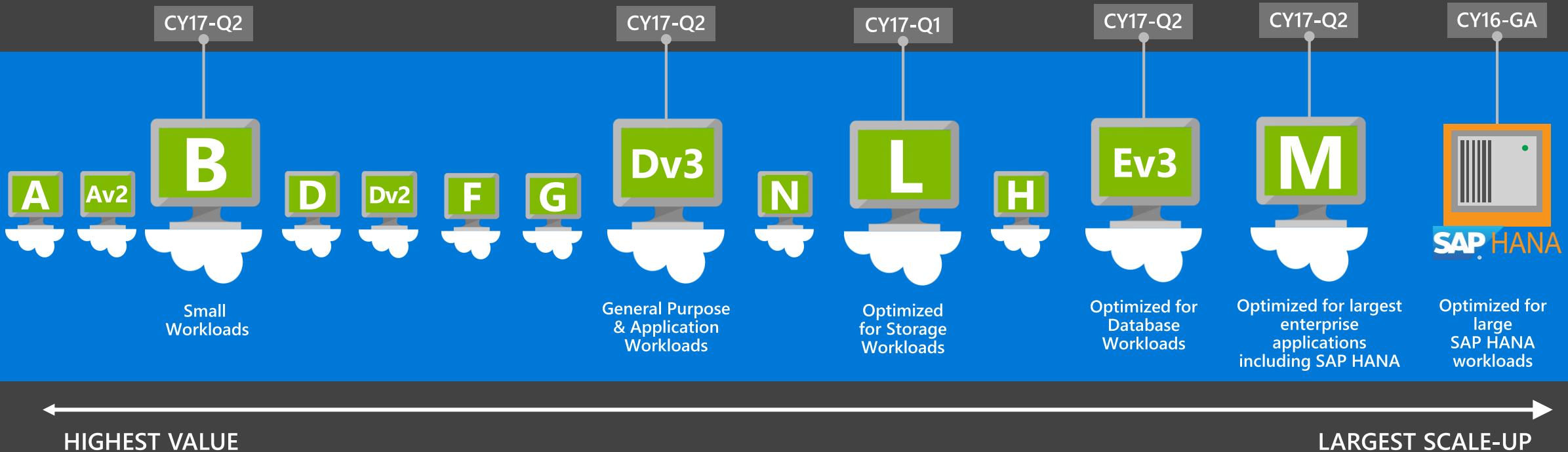
Intel Haswell processor
with 0.5TB RAM

180 ACU/core

New compute size options



New compute size options



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

Autoscale i

Enabled Disabled

Autoscale minimum number of VMs i

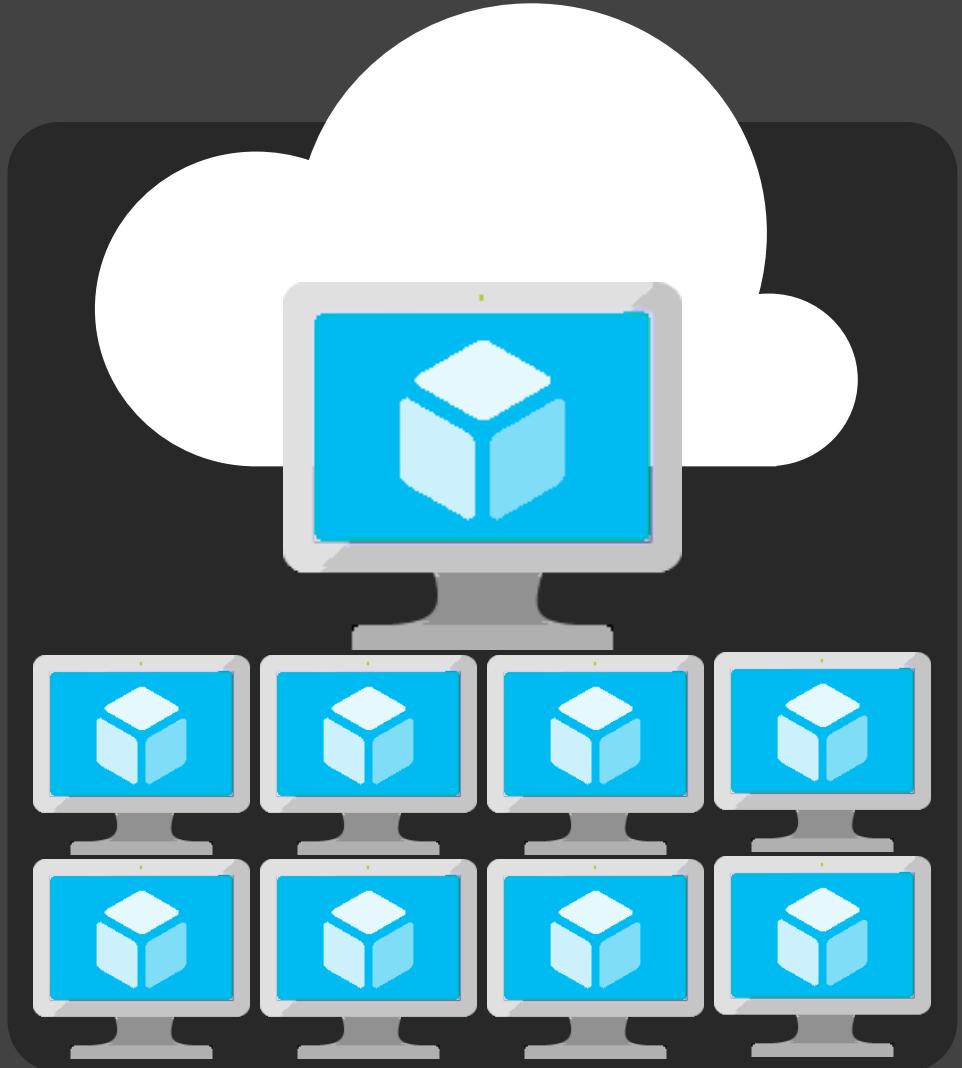
Autoscale maximum number of VMs i

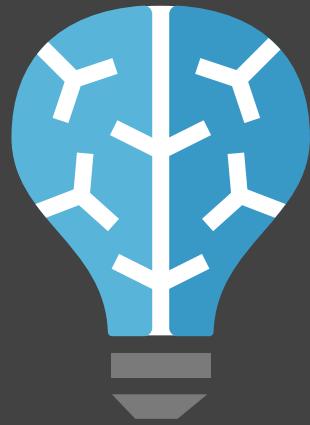
Scale out CPU percentage threshold i

Number of VMs to increase by on scale out i

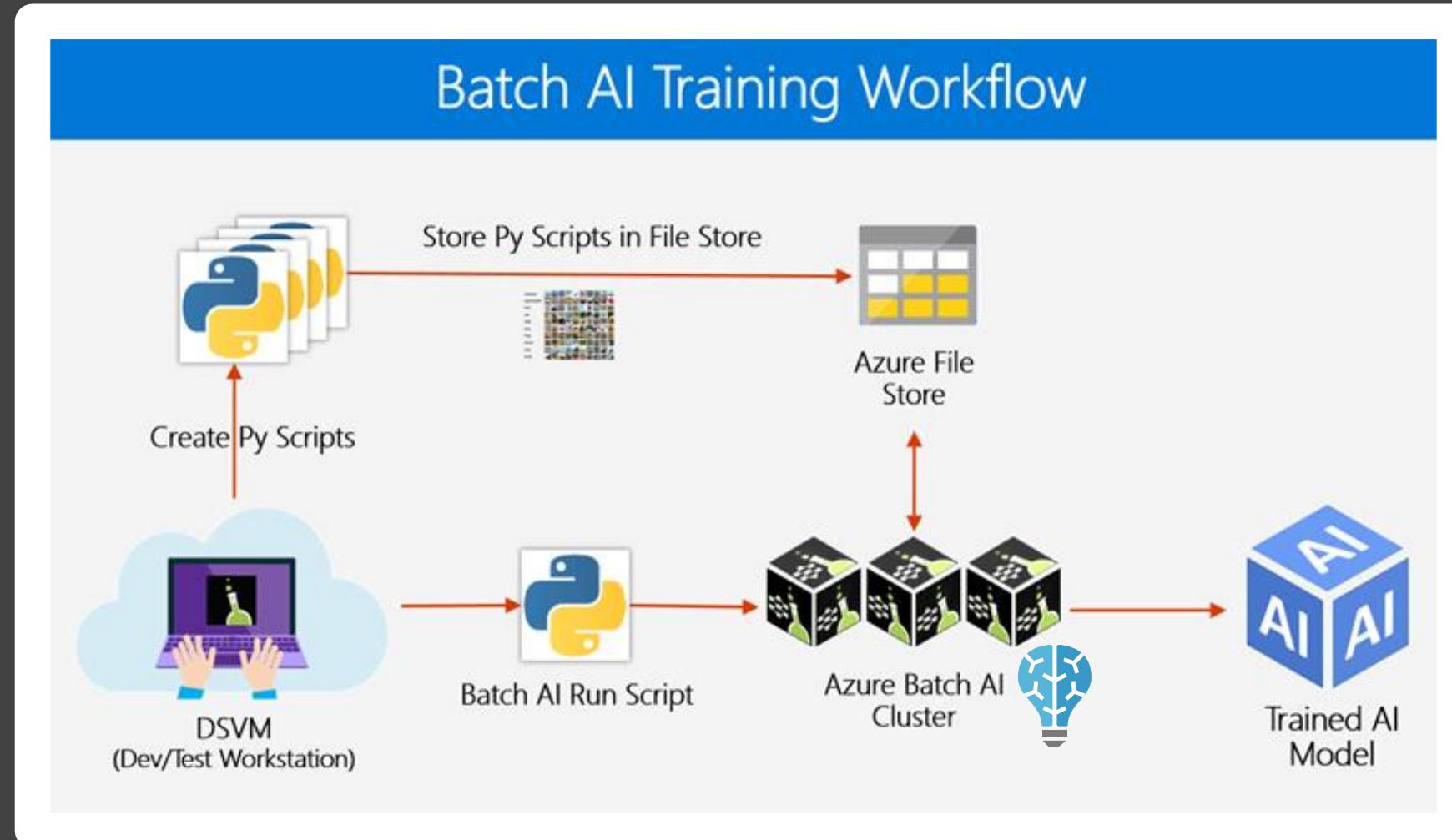
Scale in CPU percentage threshold i

Number of VMs to decrease by on scale in i





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



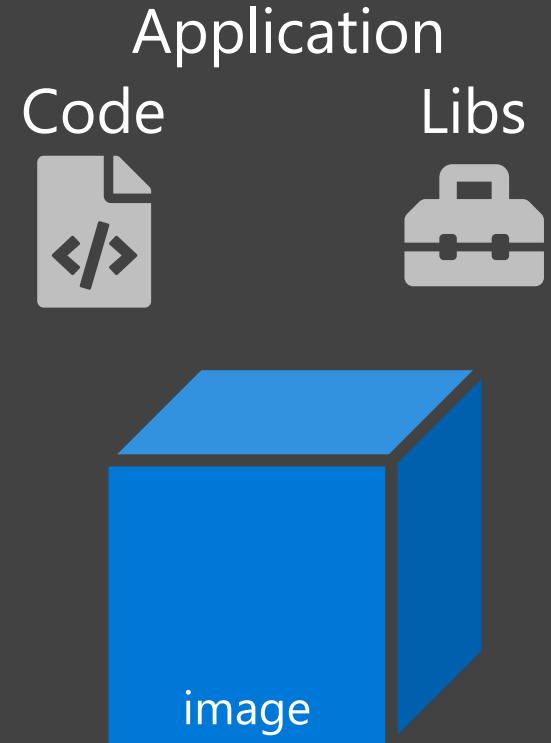
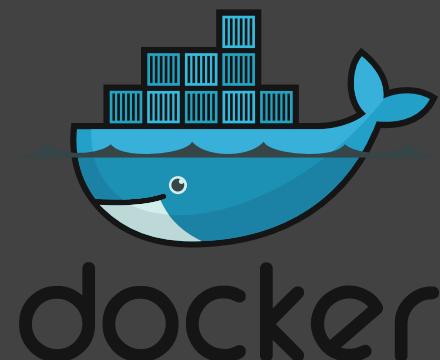
What Are Containers?

A lightweight, stand-alone bundle that includes everything needed to run your application

Optimized for fast deployment & updating

Easy to distribute

Run anywhere



containers

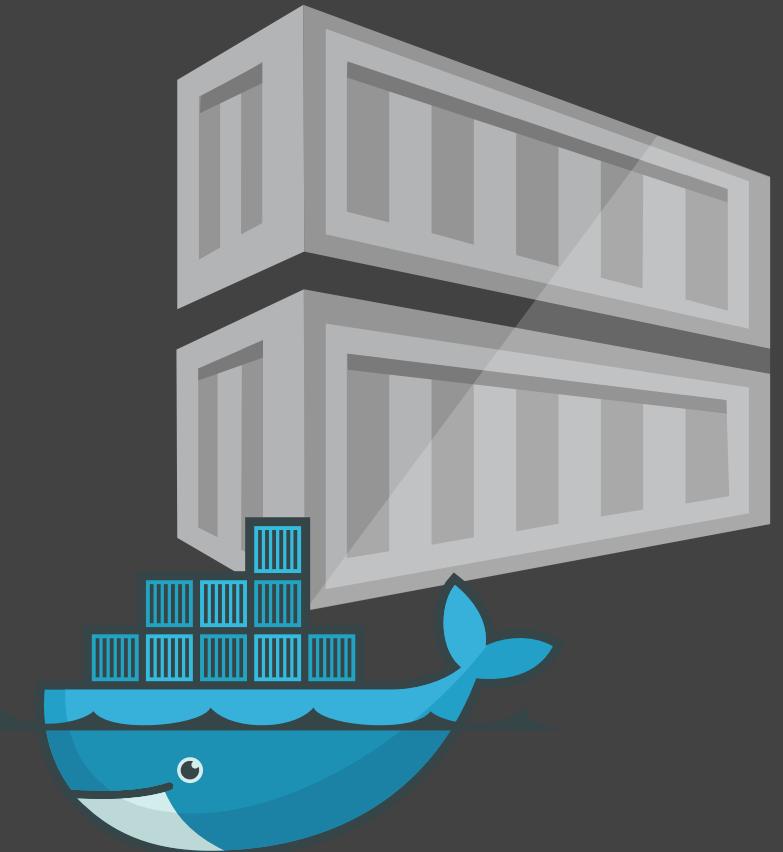
Run Containers Easily

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

Create in seconds with a single command/click

No need for provisioning of virtual machines

Per second billing



Run Containers At Scale

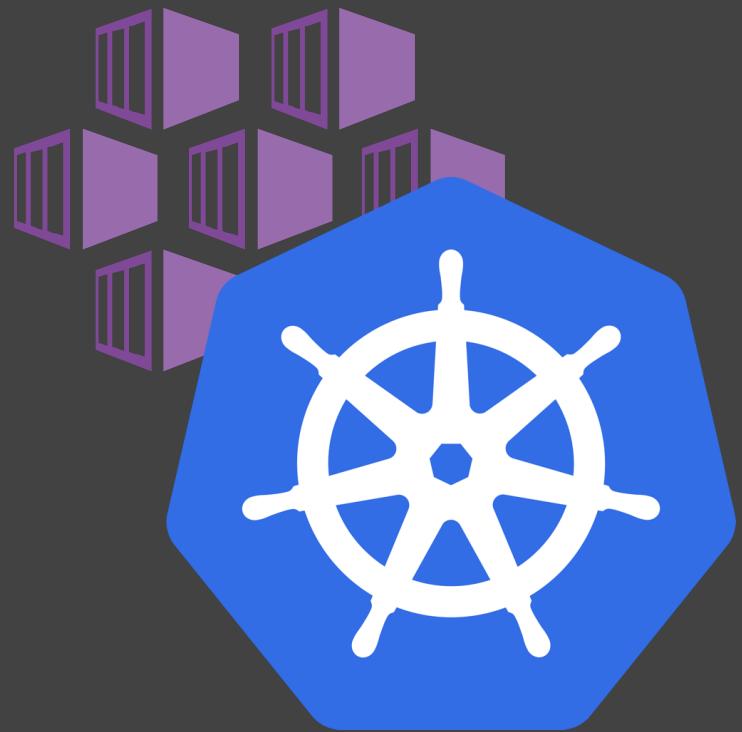
Kubernetes is an open-source system for automating deployment, scaling, and management of containerized applications.

Use Azure Kubernetes Service (AKS) to run many containers in a robust cluster

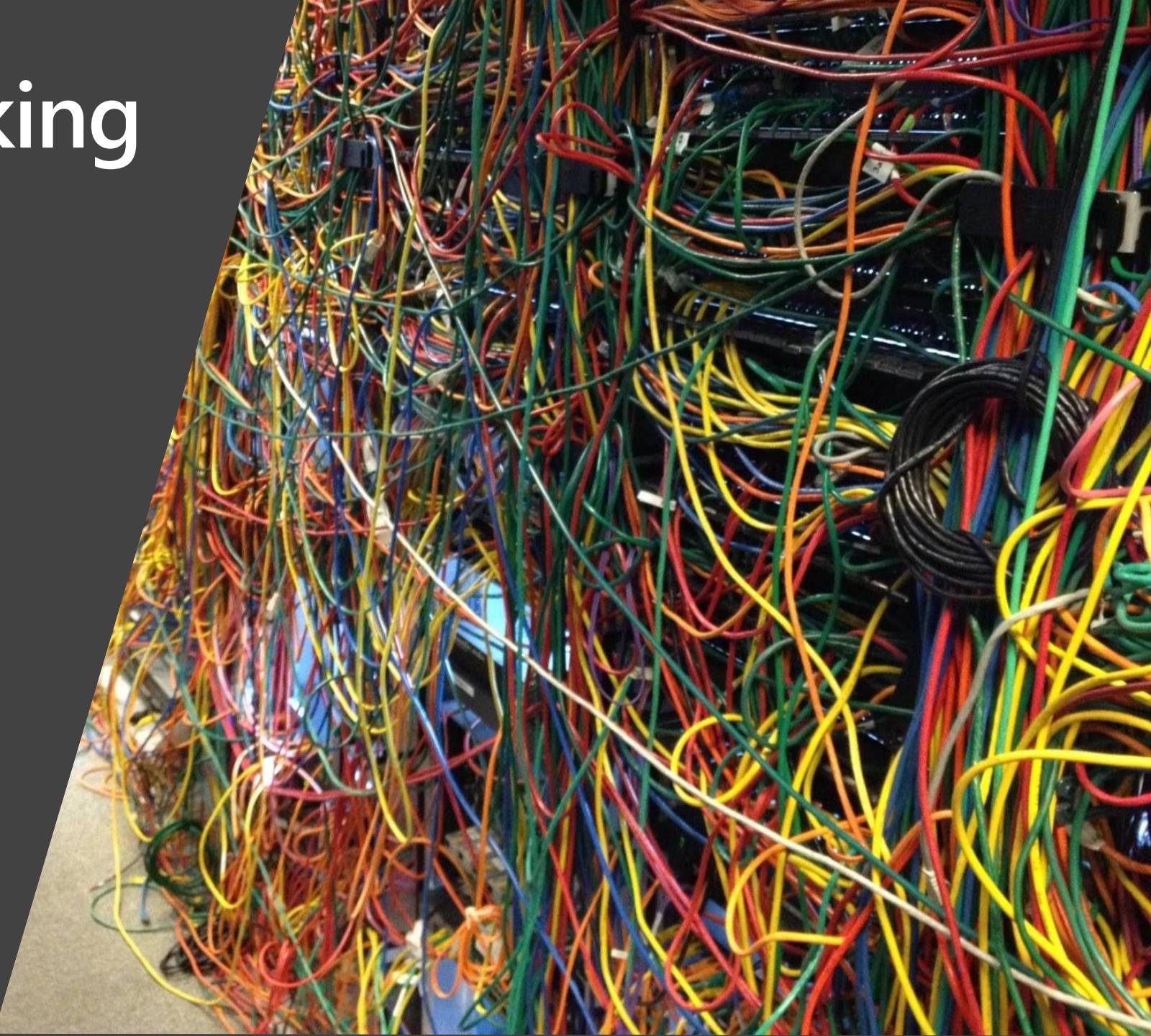
Scale up & down as you need

Run a mix of workloads, e.g. web, APIs, machine learning, models, databases, cache

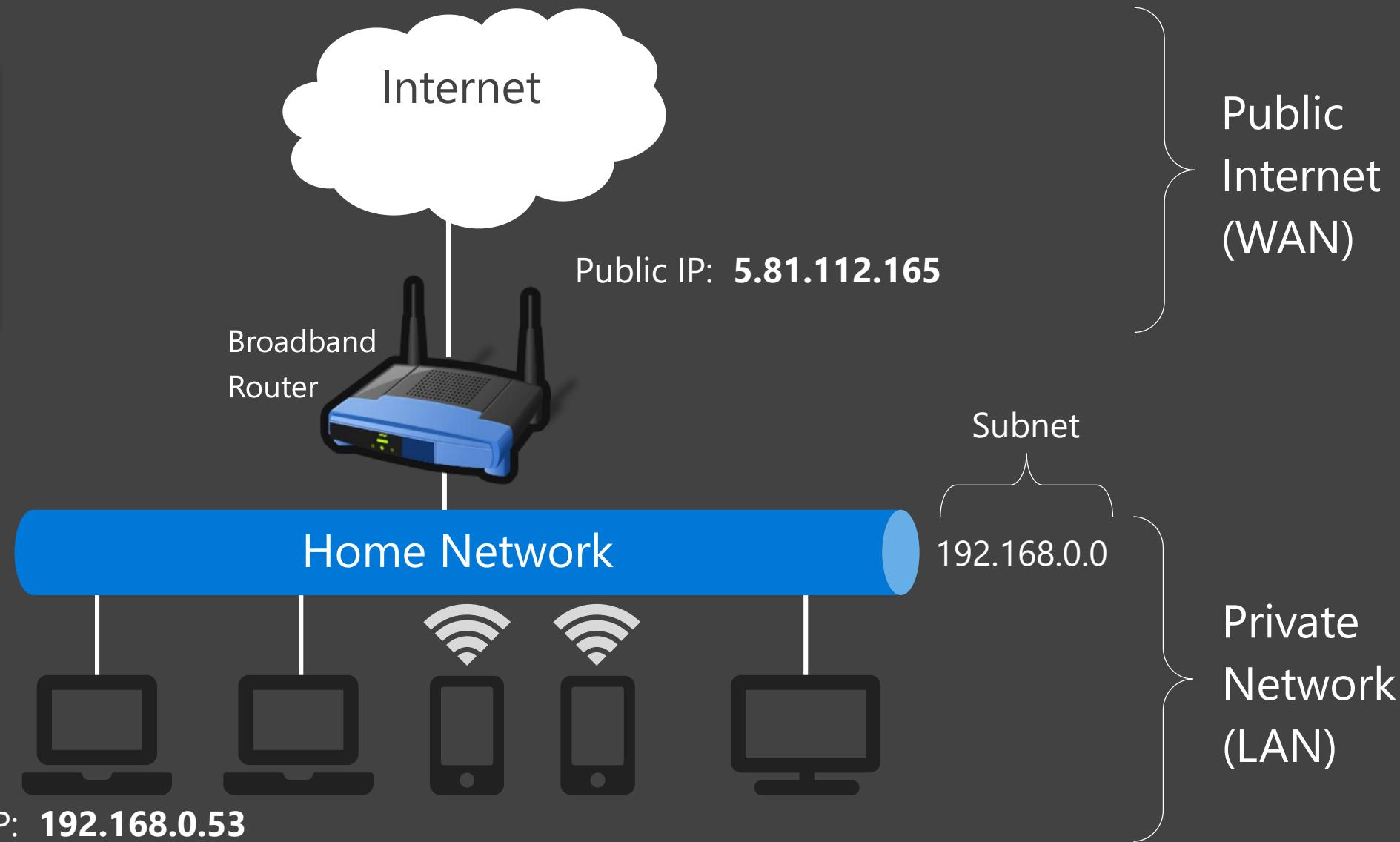
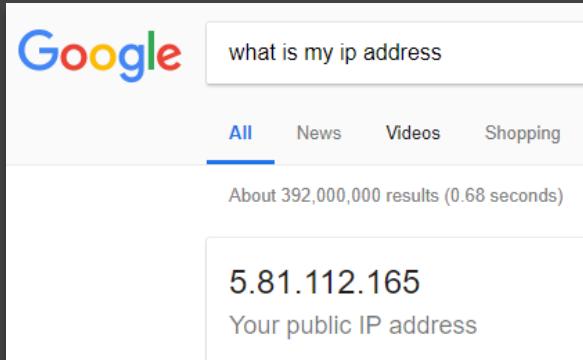
Run off the shelf, e.g. Mongo, Jupyter, Postgres, Python



Virtual Networking Services



Introduction to Networks



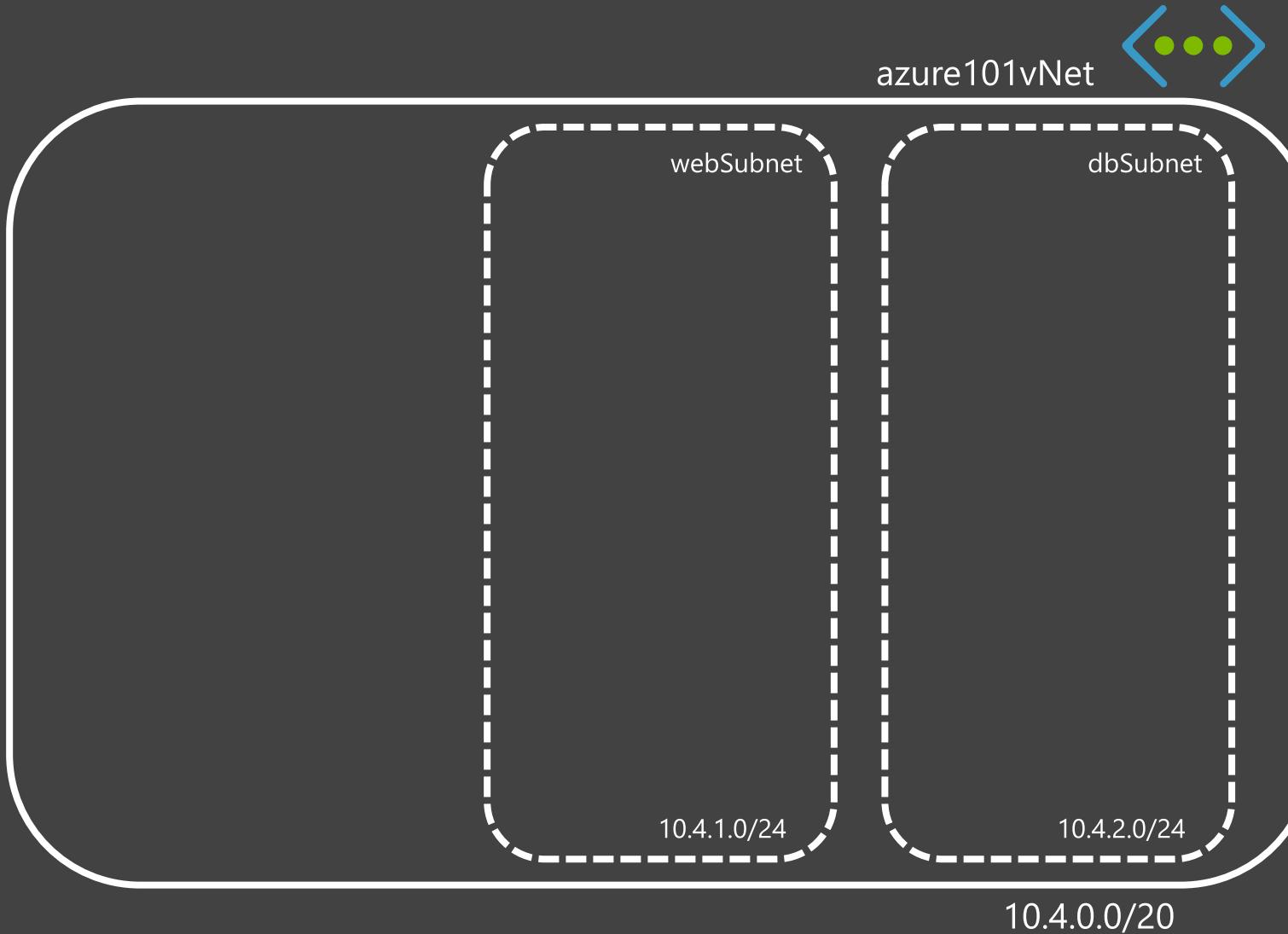
Virtual Network



10.4.0.0/20

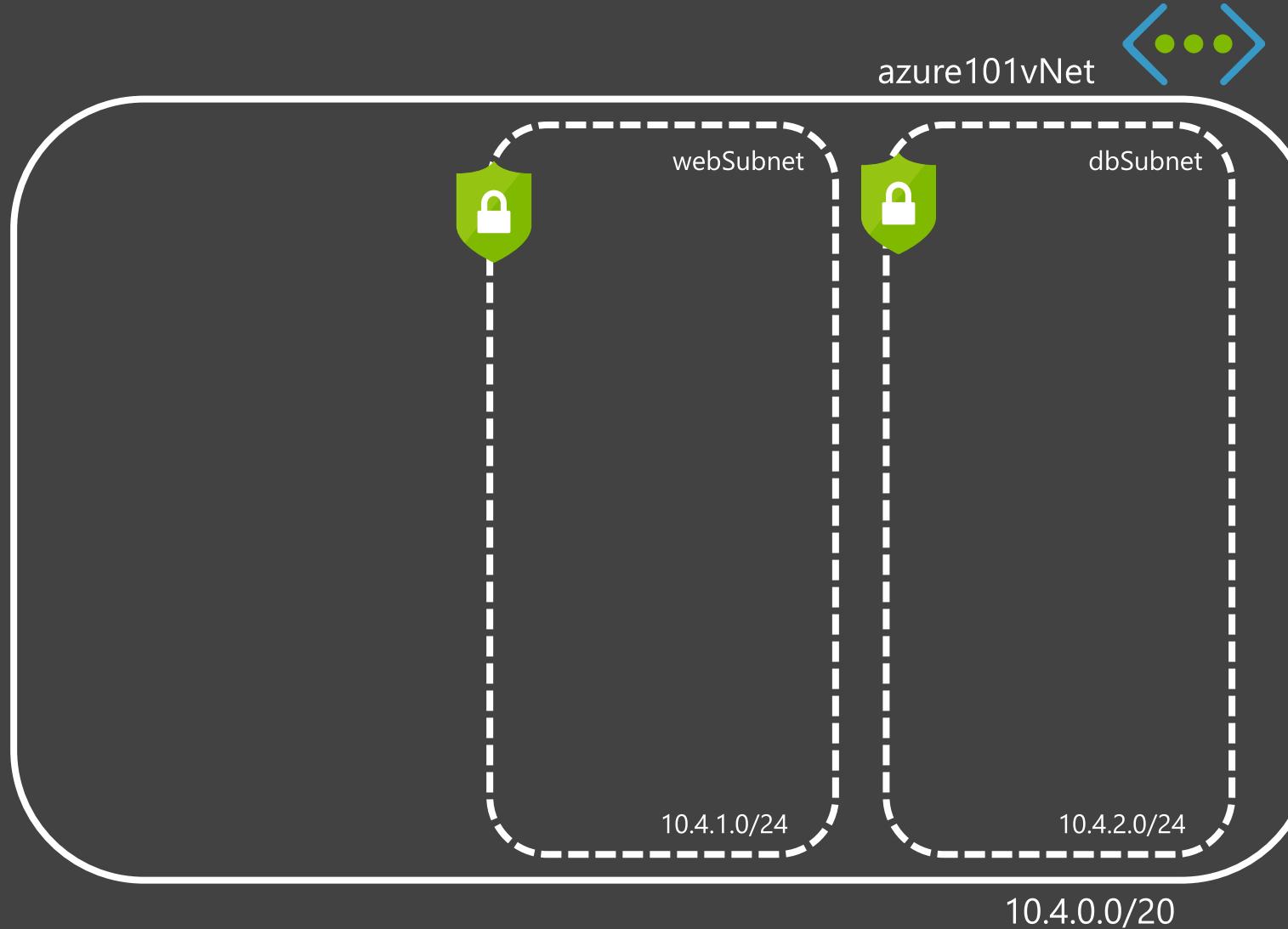
- Private network address space(s)
- Dedicated to the subscription
- Isolated
- CIDR notation

Subnets



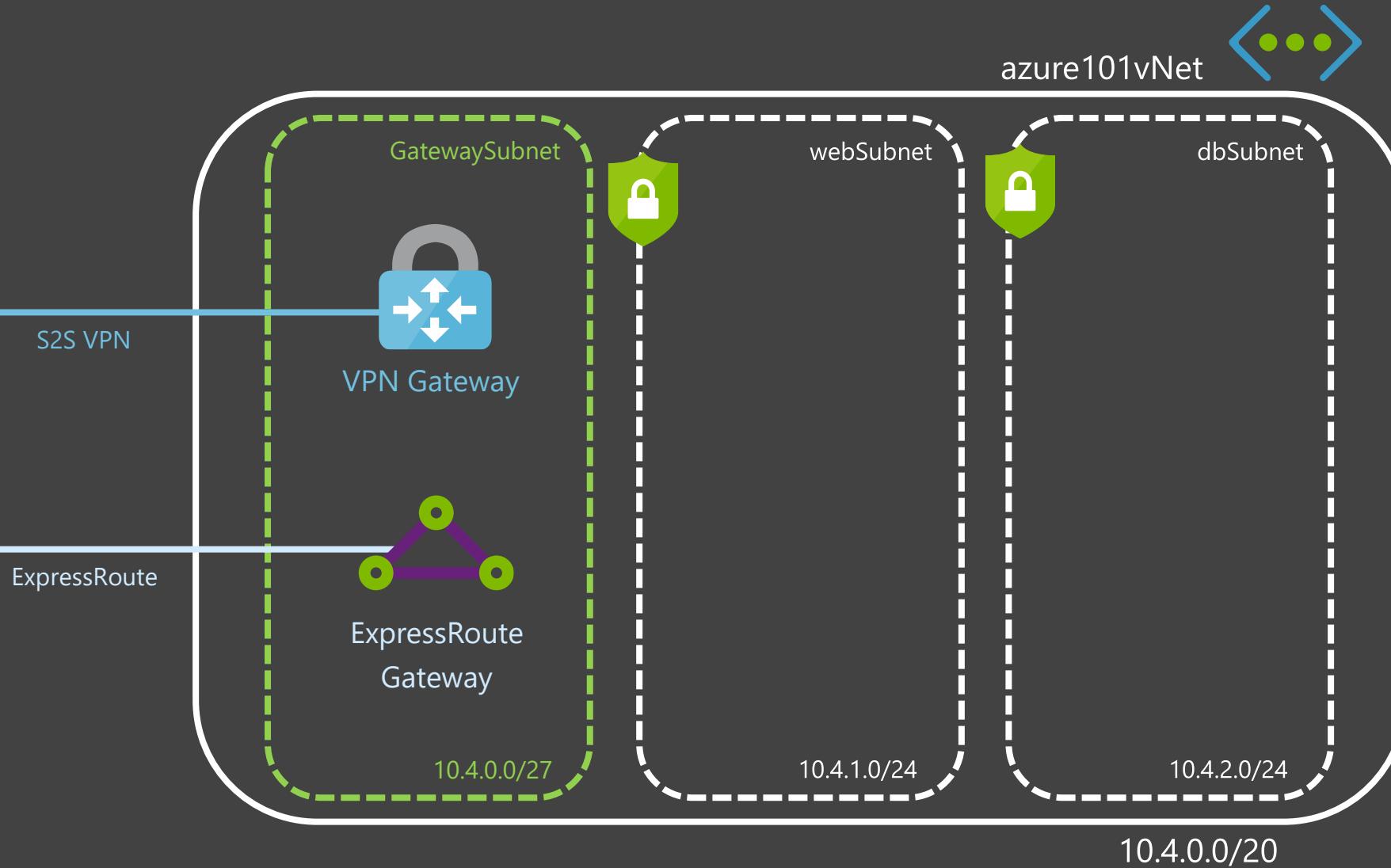
- Subnets within the vNet address space
- Non-overlapping
- Do not need to be contiguous
- Automatic route table between subnets
- Default route out to internet

Network Security Groups



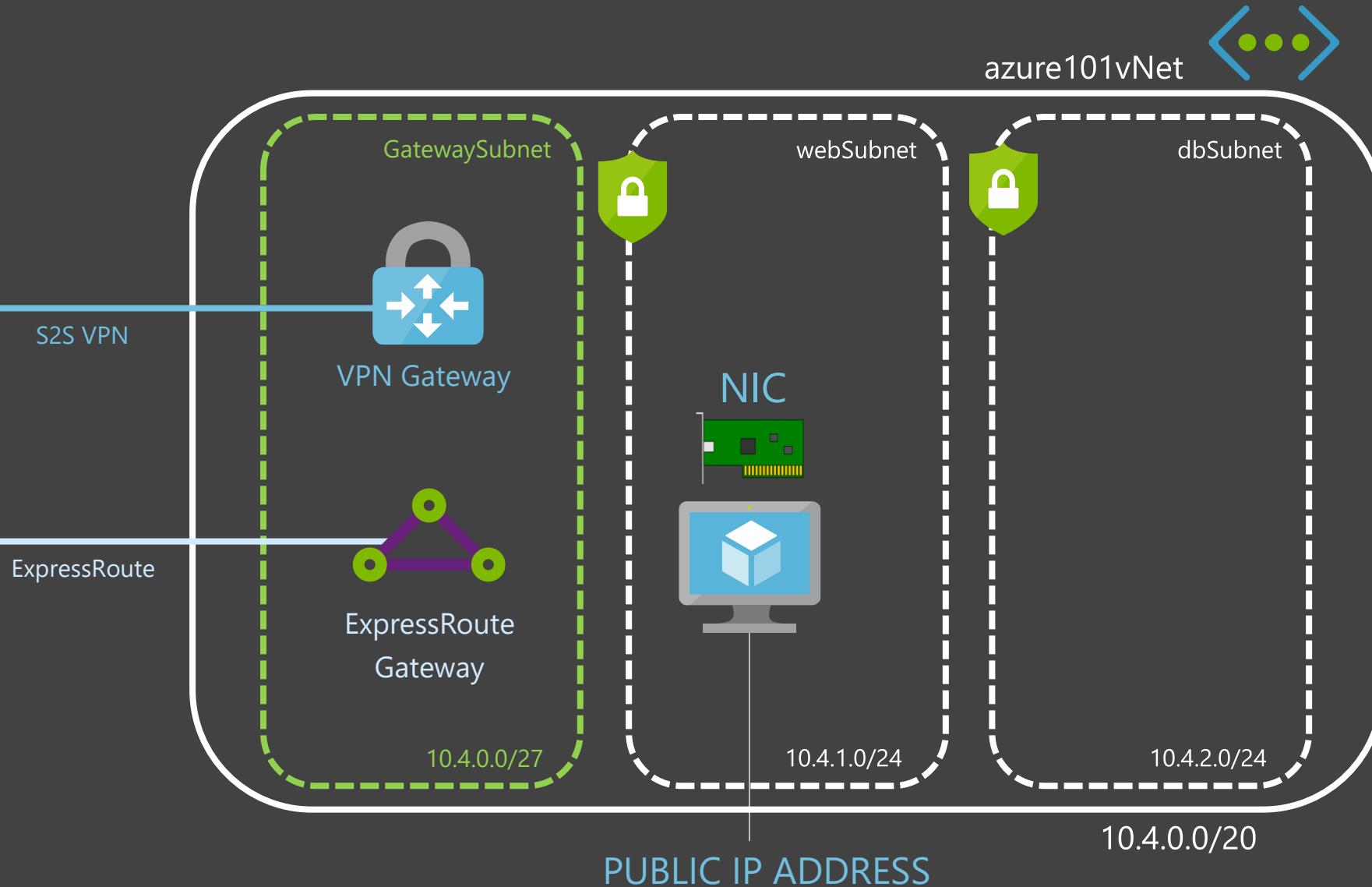
- Layer 4 security rules
- Inbound & outbound
- Tuples – address, port, protocol
- Subnets and NICs
- Defaults
 - Within vNet
 - To the internet
 - Load balancer
 - RDP & SSH

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



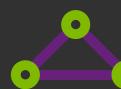
Azure CDN

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

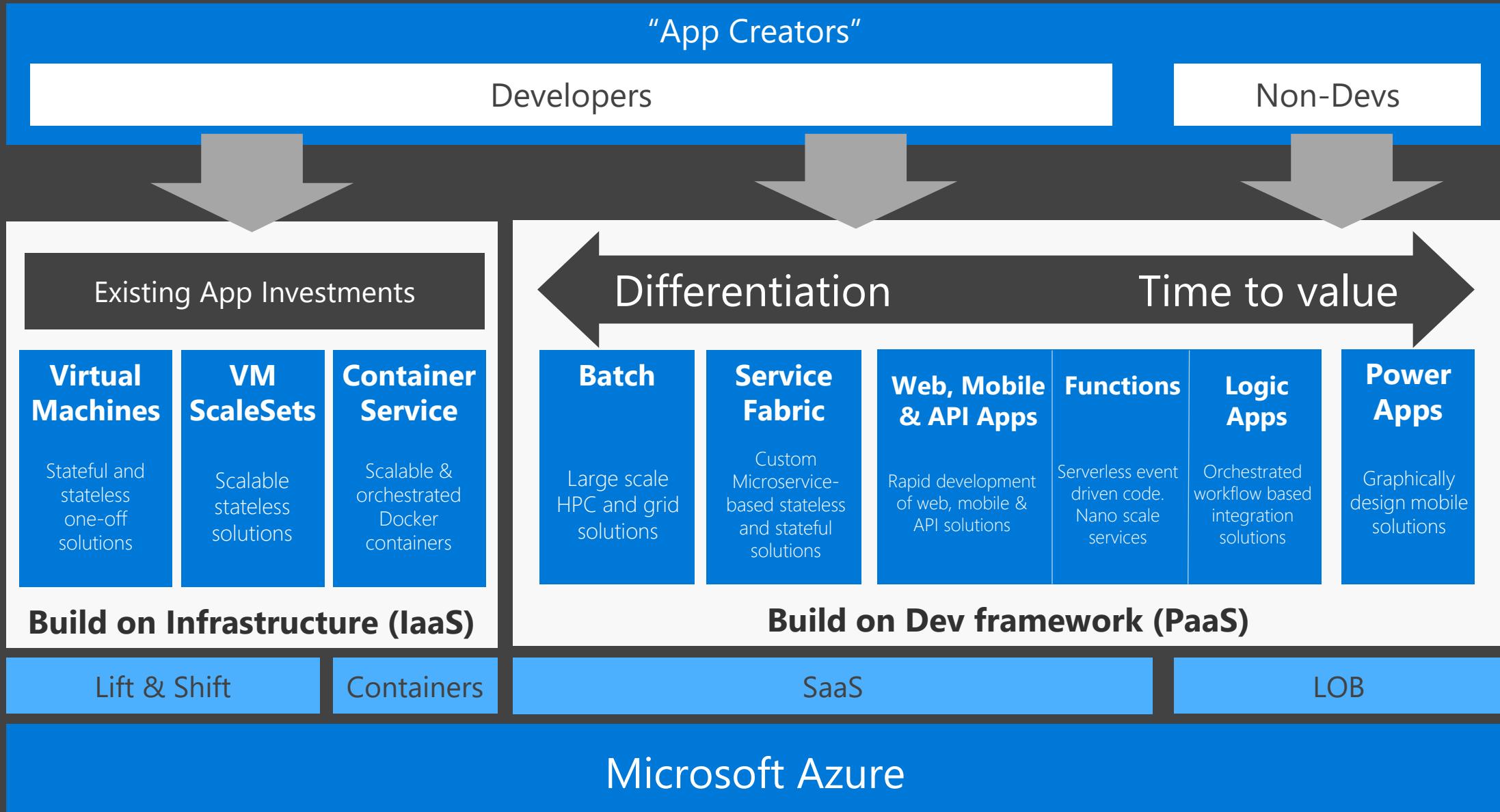
aka.ms/azure-day



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



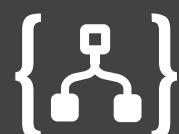
Functions

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



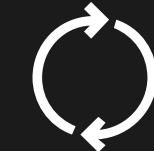
Active Directory
integrated



Secure + compliant



Reduced
operations costs



Backup and
recovery



Testing in
production

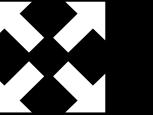


App gallery
marketplace

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

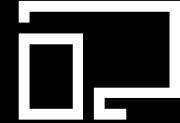


API Apps

API fundamentals

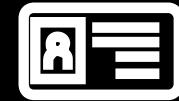


Swagger
API Metadata



CORS enablement

Authentication / Access Control



EasyAuth

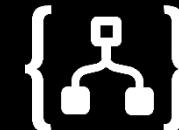


Service Principle
Authentication

API Consumption



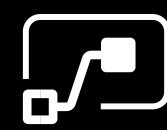
Client SDK
Generation



Logic Apps

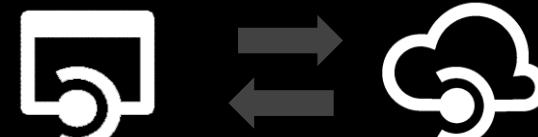


Power Apps



Flow

Integration with API Management



Compute Scaling

Scale Up

– aka Vertical Scaling

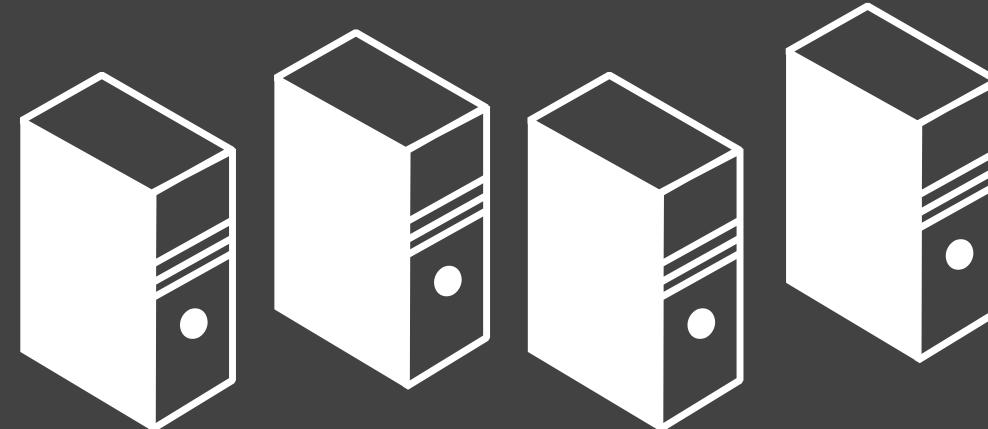
- Increase resource capacity within existing node



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

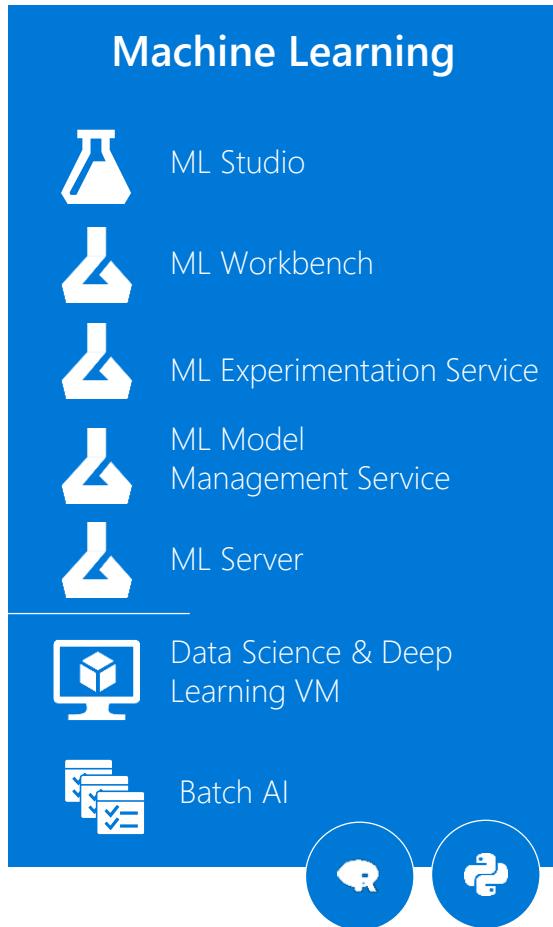
Linux and container support

Machine Learning, Cognitive & AI

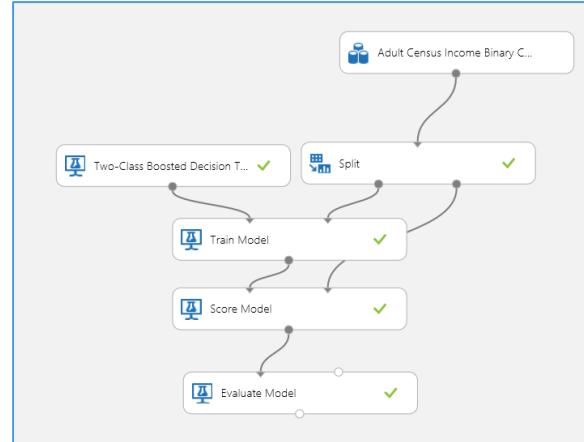




Azure as your Machine Learning Platform



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 the 'BostonWeather' dataset. The dialog includes fields for 'Learning Data' (set to 'Advanced mode'), 'Source Column' (set to 'DATE'), and 'New Column' (set to 'Thursday - 08-03-2020'). Below the dialog is a table of data with columns: DATE, dtc.Column, dtc.REPORTTYPE, dtc.HOURLYID, dtc.HOURLYRate, dtc.HOURLYVol, dtc.HOURLYVol. The table contains 22 rows of data from 2015-01-01 to 2015-01-22.



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

Data Professional

Developer

Prebuilt

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 Server 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

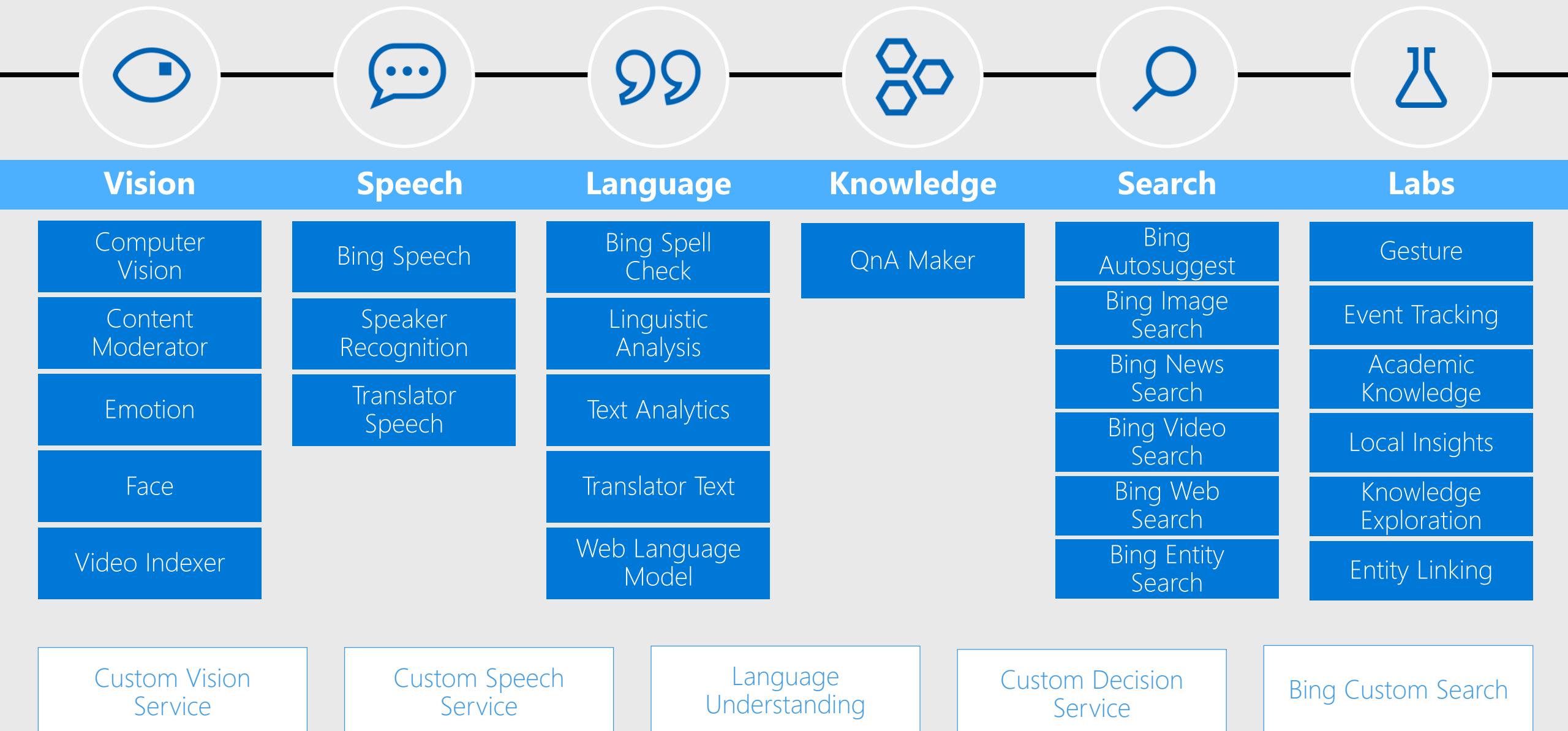
GitHub

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

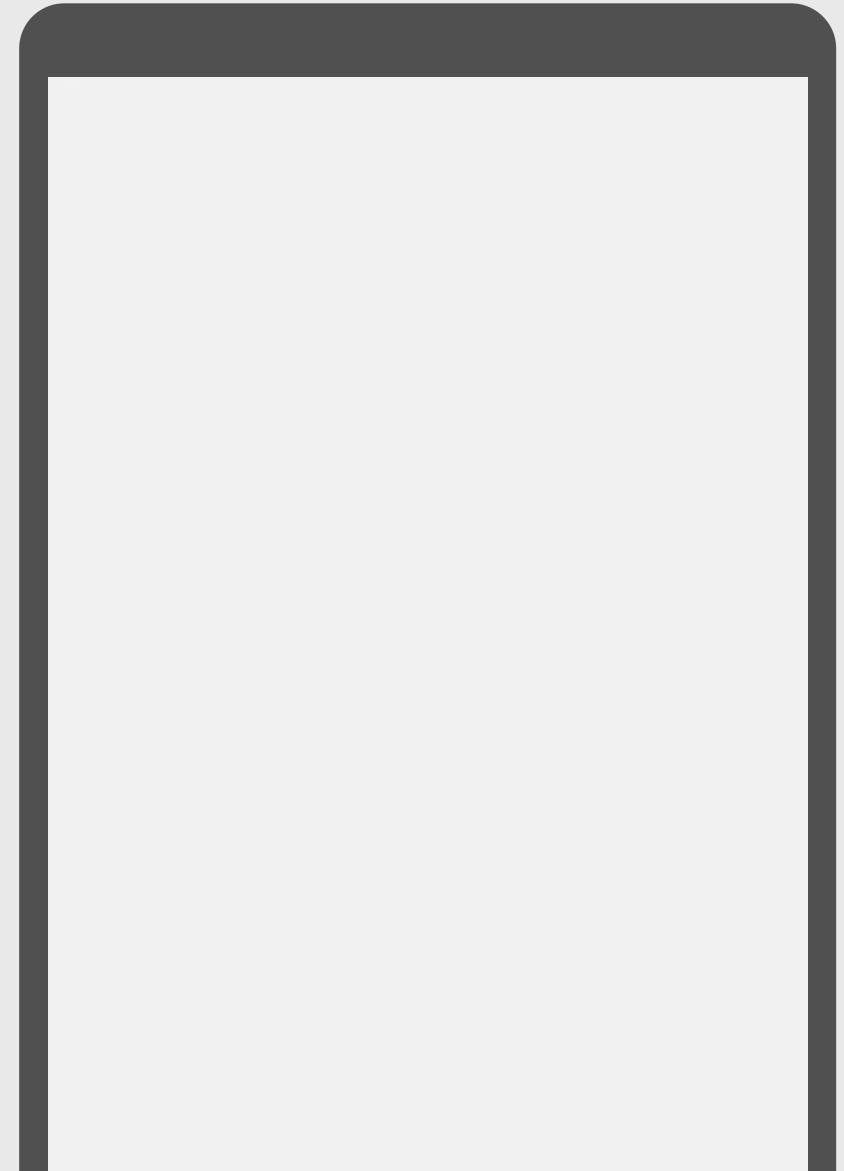
```
;;
"sentiment": {
  "documents": [
    {
      "id": "4c9e2347-63cb-4797-b6b8-6e745992b6fc",
      "score": 0.9542820453643798
    }
  ],
  "errors": []
},
"entities": {
  "documents": [
    {
      "id": "4c9e2347-63cb-4797-b6b8-6e745992b6fc",
      "entities": [
        {
          "name": "Coffee in Seattle",
          "matches": [
            {
              "text": "Seattle"
            }
          ]
        }
      ]
    }
  ]
}
```

Microsoft Bot Framework

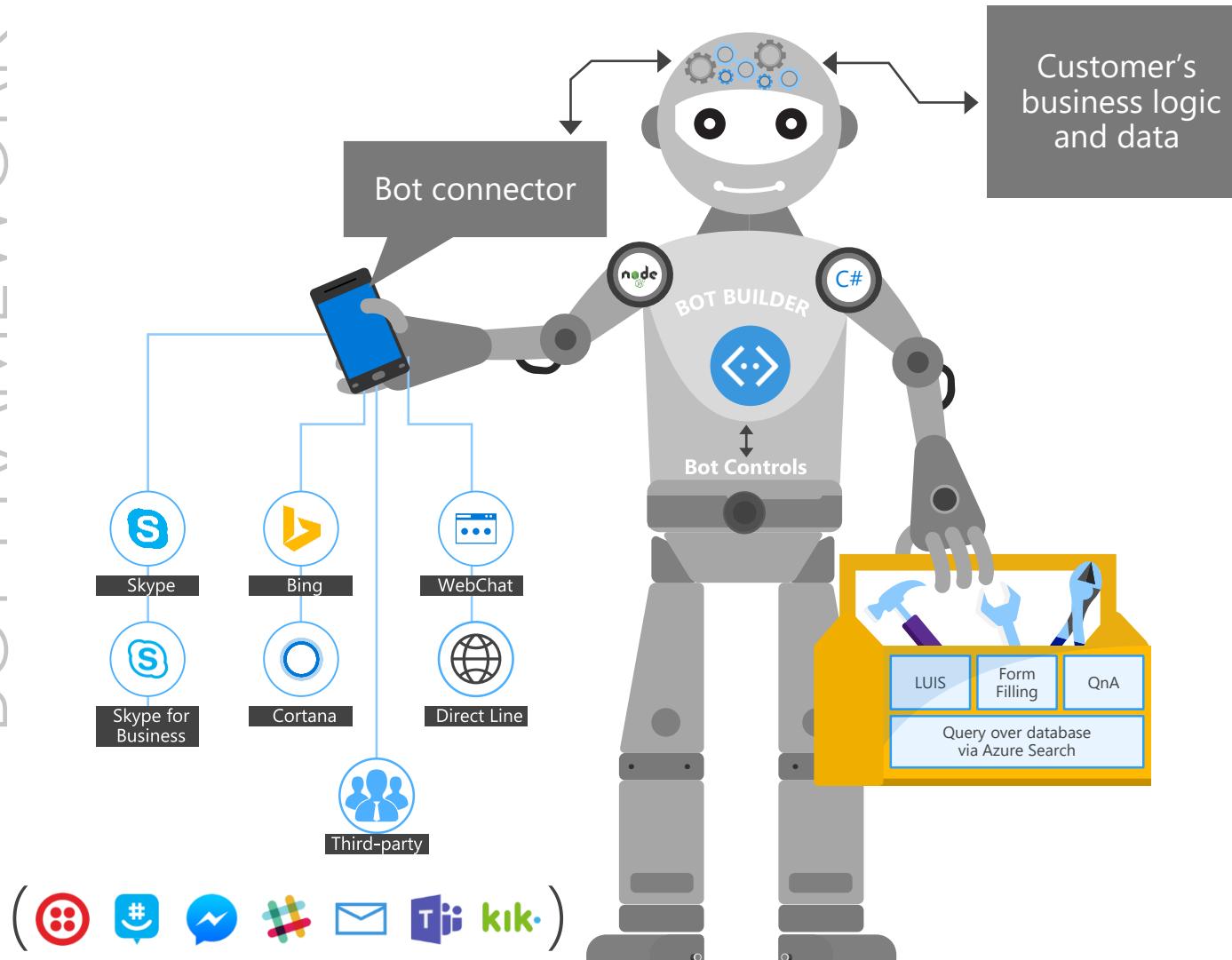
Build a great conversationalist!

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.



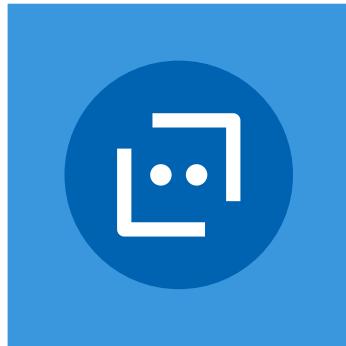
Cognitive Services

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

Get Started!

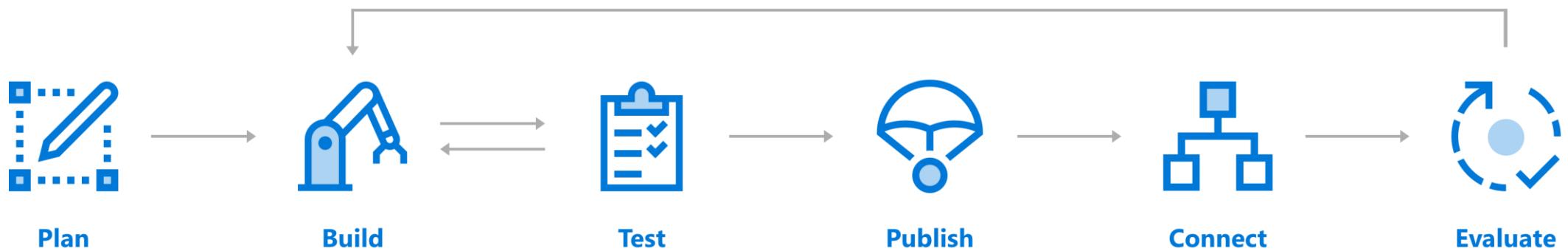
dev.botframework.com

AZURE BOT SERVICE



Accelerated development

Azure Bot Service speeds up development by providing an integrated environment that's purpose-built for bot development with the Microsoft Bot Framework connectors and BotBuilder SDKs.



99

<https://www.luis.ai>

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 Cai  
  "topScoringIntent": {  
    "intent": "BookFlight",  
    "score": 0.9887482  
  },  
  "intents": [  
    {  
      "intent": "BookFlight",  
      "score": 0.9887482  
    },
```

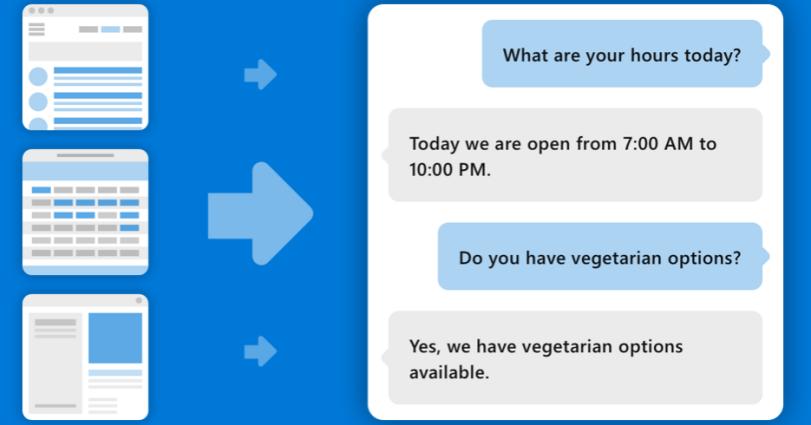
GET STARTED NOW!

<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 >](#)



Easily customise your own state-of-the-art computer vision models for your unique use case. Just upload a few labelled images and let **Custom Vision Service** do the hard work

Upload Images

Upload your own labelled images, or use Custom Vision Service to quickly tag any unlabelled images.



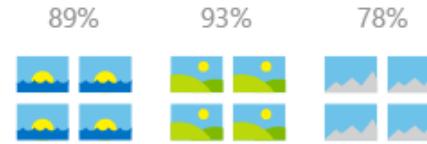
Train

Use your labelled images to teach Custom Vision Service the concepts you want it to learn.



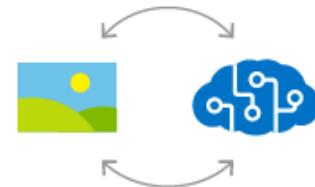
Evaluate

Use simple REST API calls to quickly tag images with your new custom computer vision model, or simply export the model to device to run real-time image understanding.



Active learning

Images evaluated through your custom vision model become part of a feedback loop you can use to keep improving your classifier.



<https://customvision.ai>

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



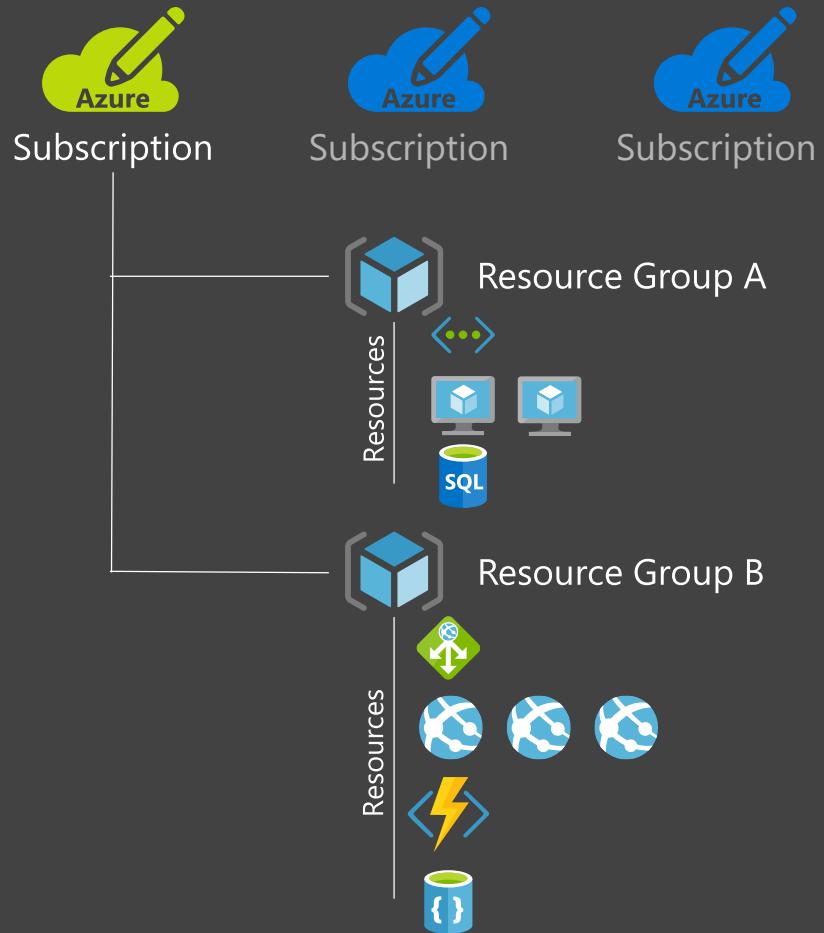
Management, Automation & Monitoring

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



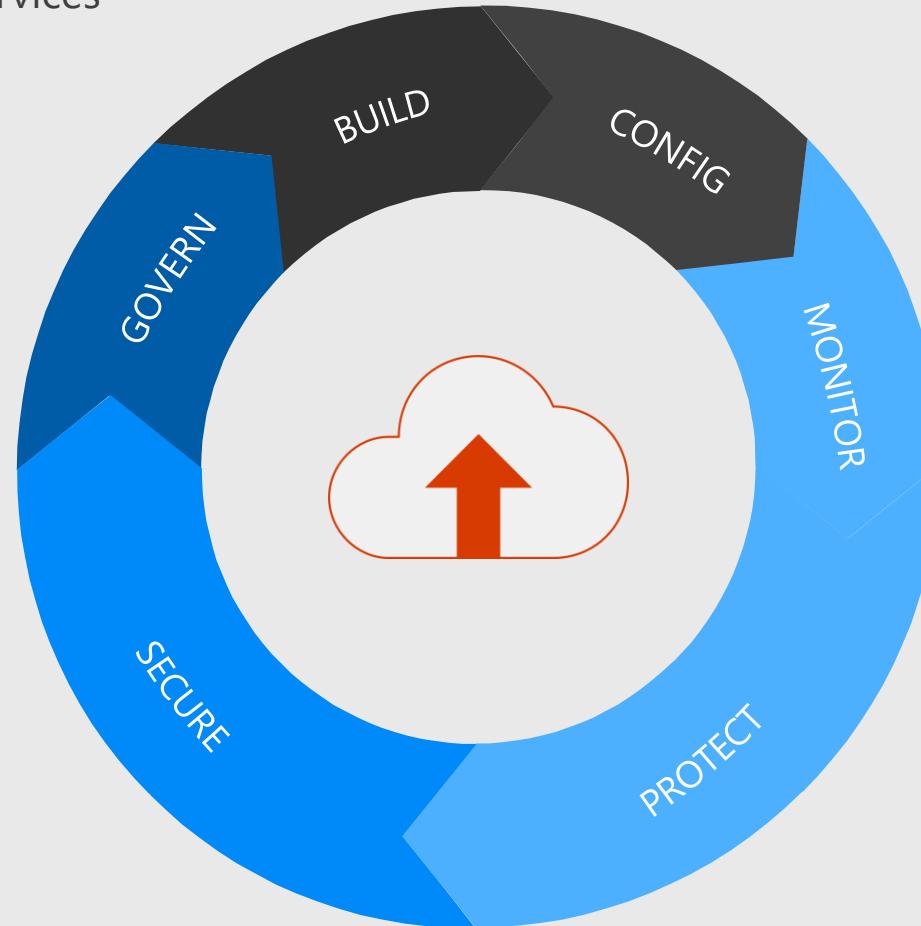
Govern

- 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

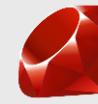
- Azure Backup
- Azure Site Recovery

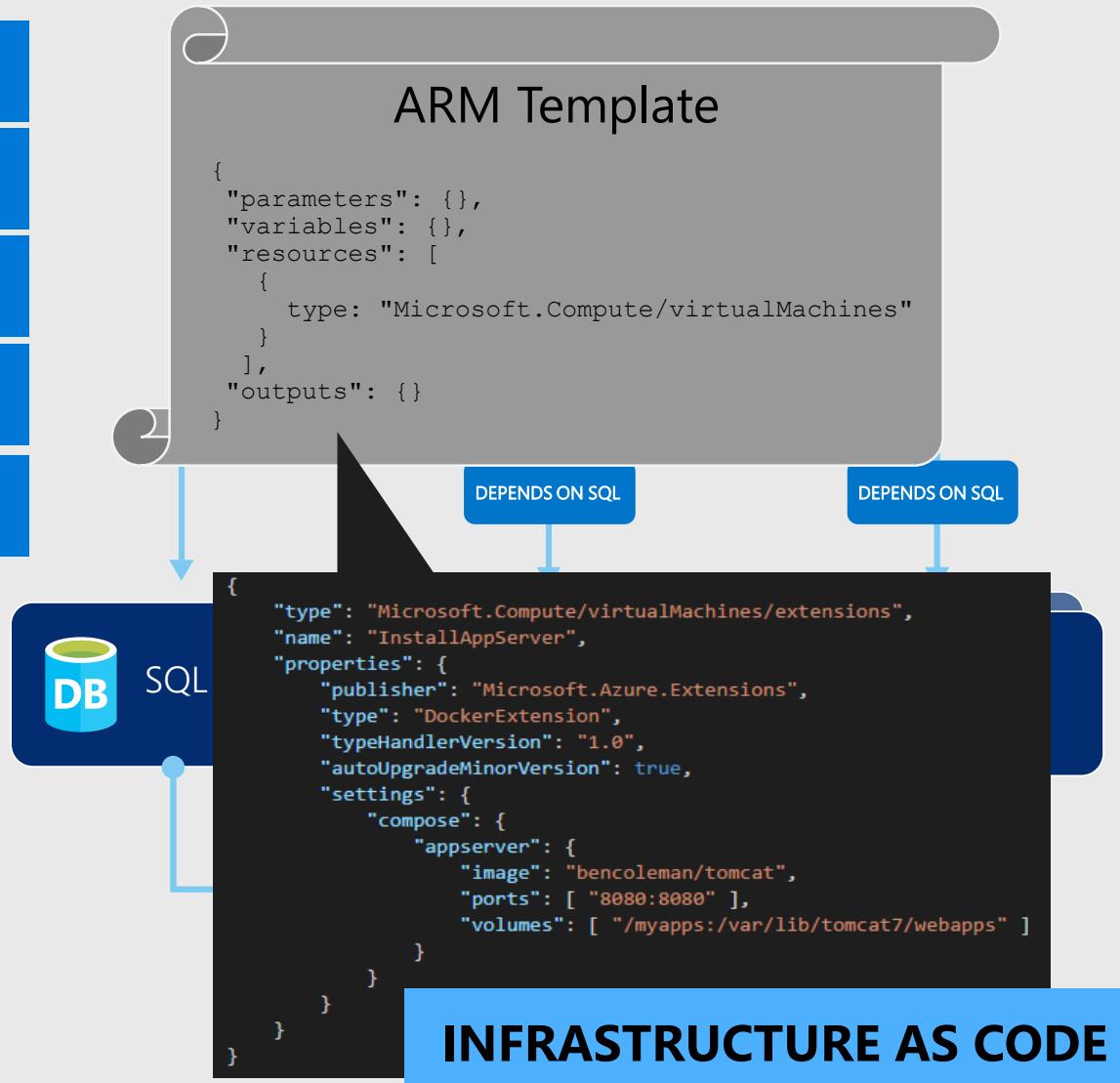


AZURE RESOURCE MANAGER

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

 
Cross platform CLIs & PowerShell

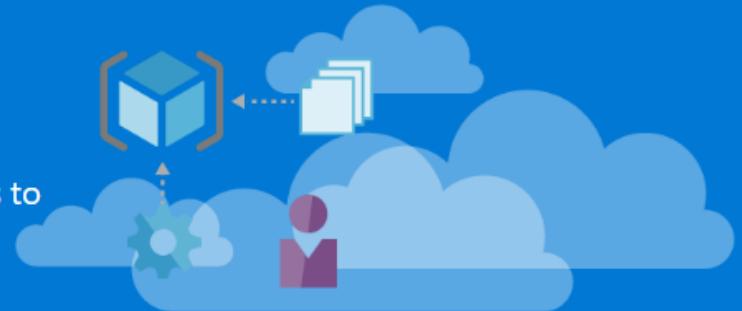
  
SDKs



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.



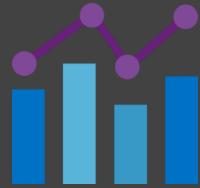
by Sreedhar Pelluru,
Last updated: 11/10/2016

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



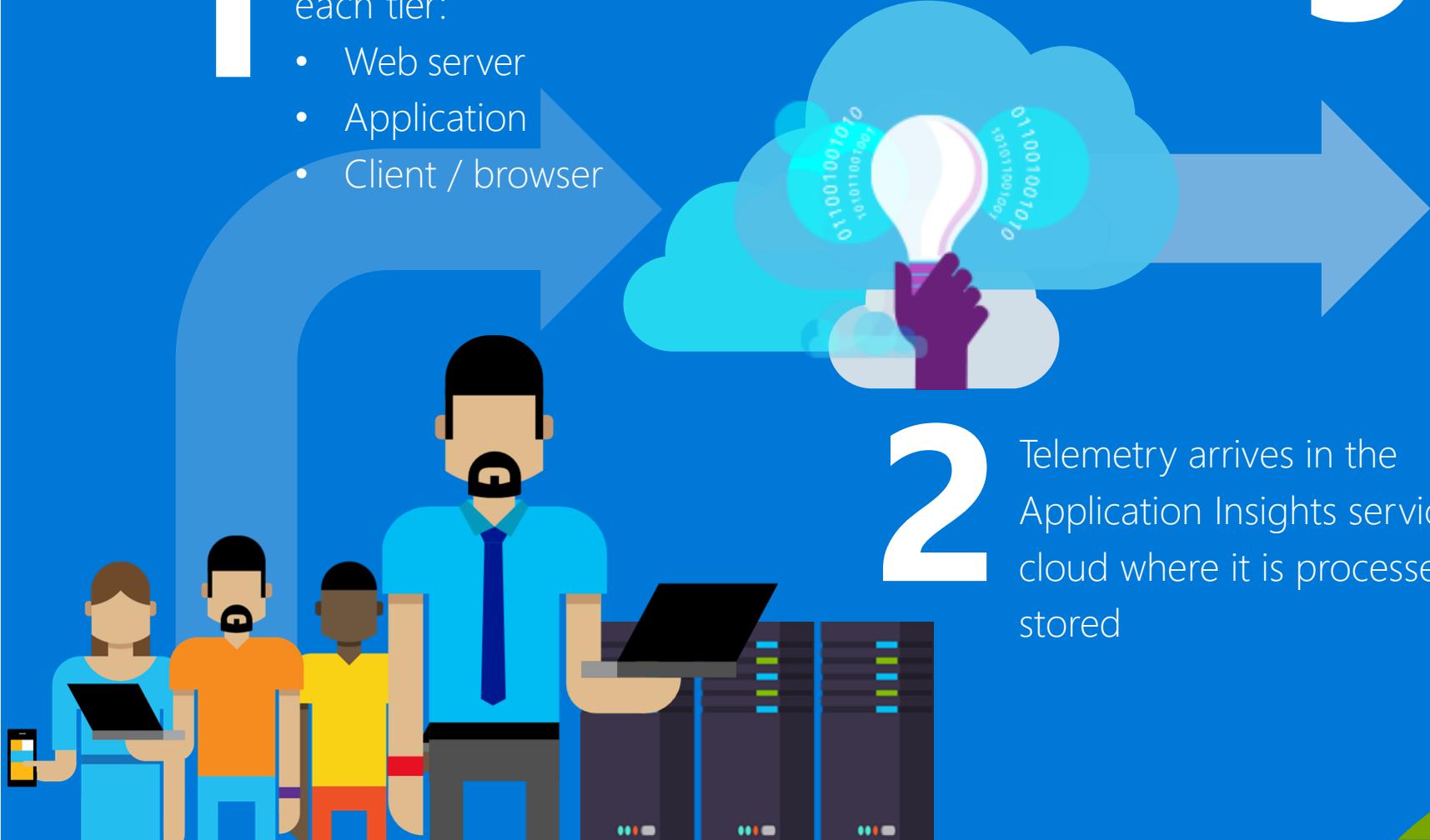
Azure Monitor

Application Insights

1

Telemetry is collected at each tier:

- Web server
- Application
- Client / browser

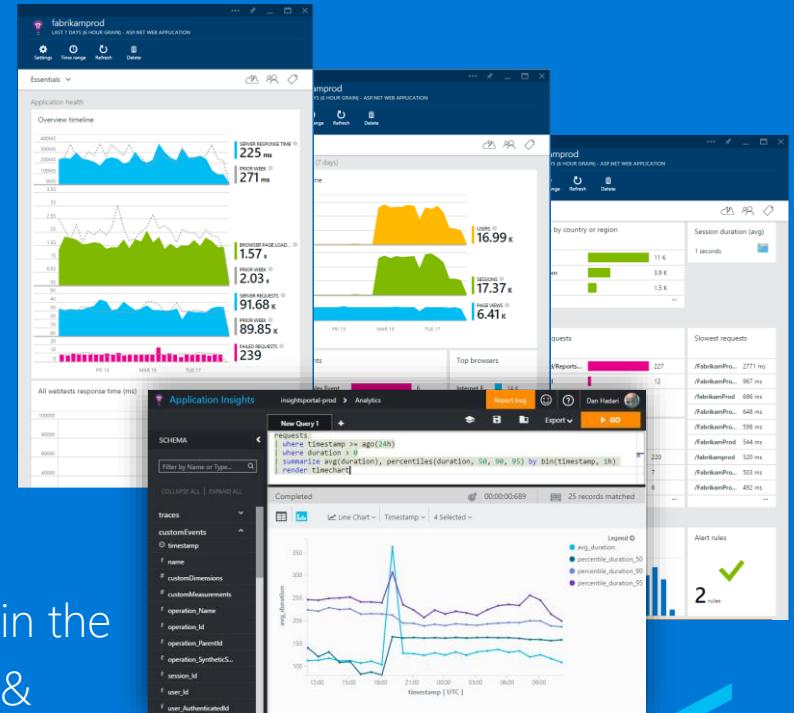


2

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

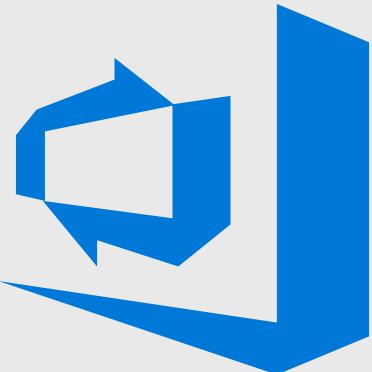
3

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



Introducing DevOps Projects

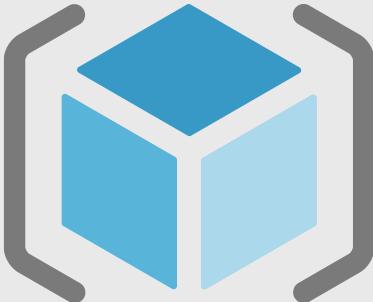
Team Services



Azure



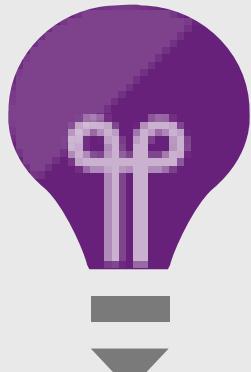
Deployment



Platform

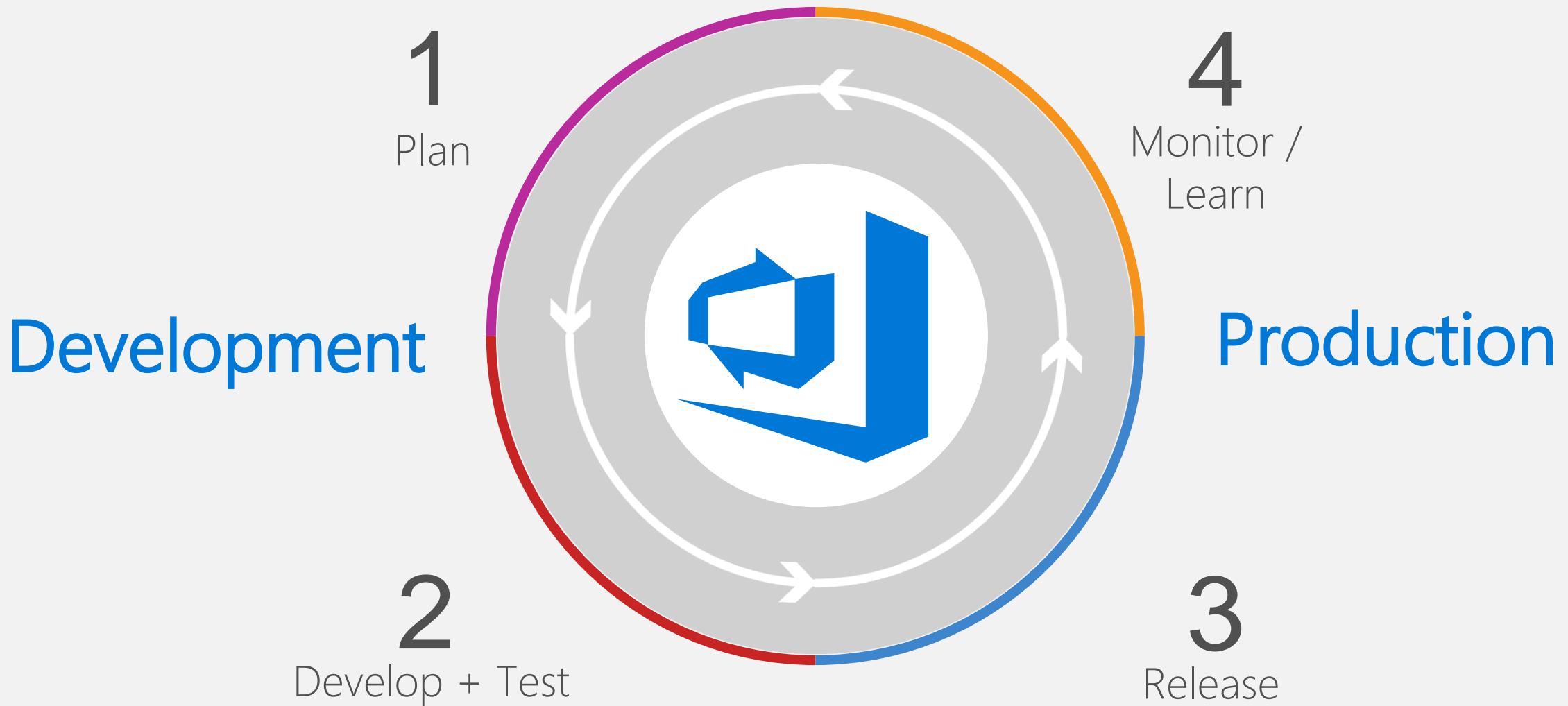


Monitor



"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

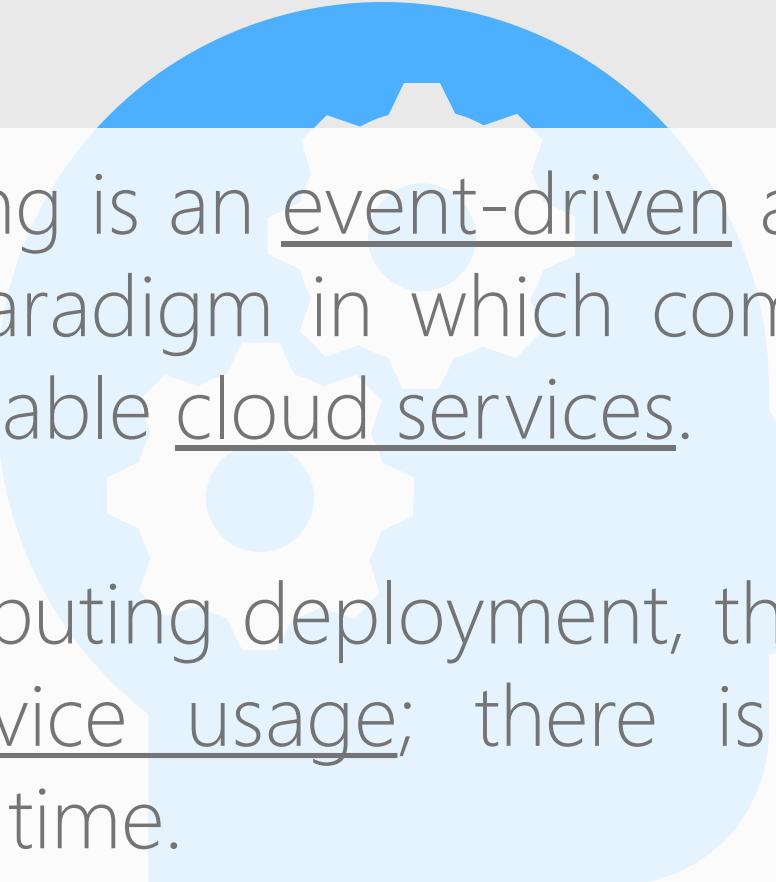
The screenshot shows the Jenkins Marketplace interface. At the top, there's a search bar with the text "Jenkins AWS Chef Terraform" and a magnifying glass icon. Below the search bar are filters: "Showing: Build and release", "Hosted On: Any", "Price: Any", and "Sort By: Relevance". The main area displays 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



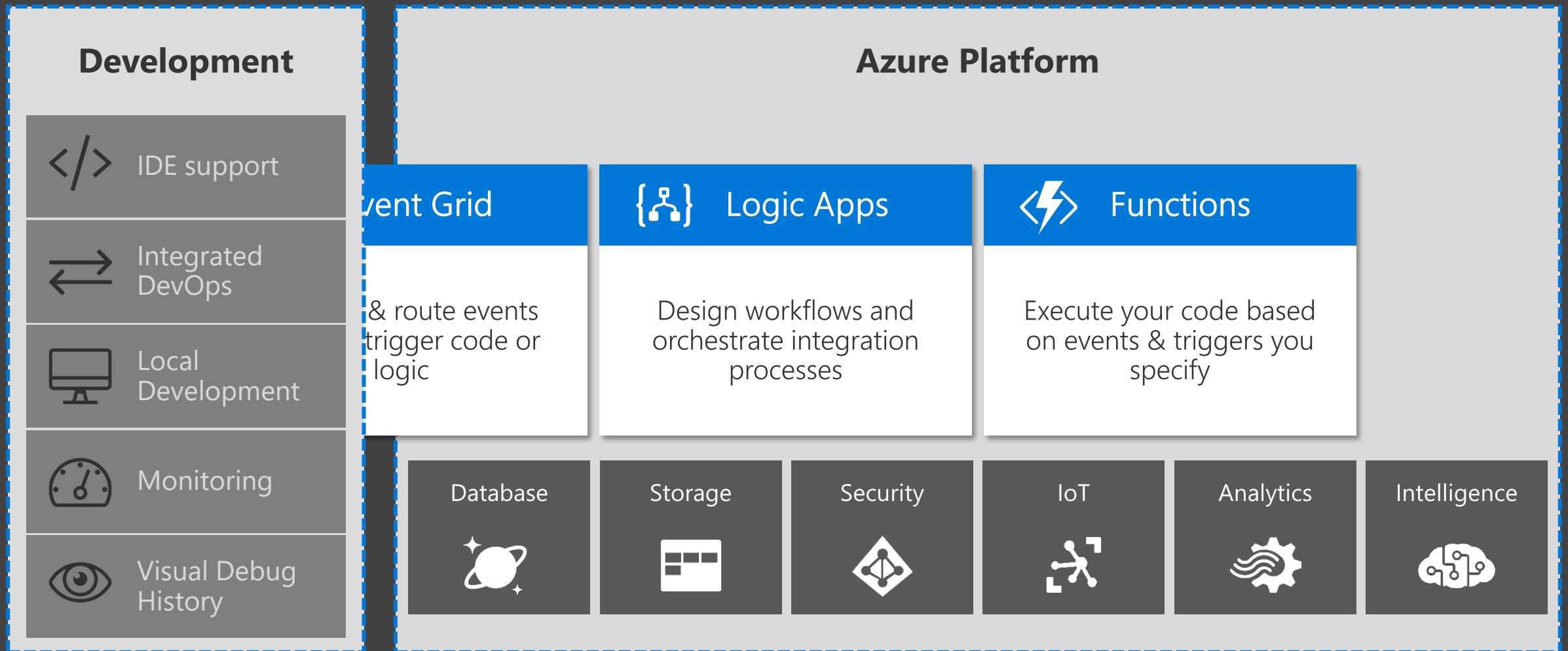
Serverless Computing



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

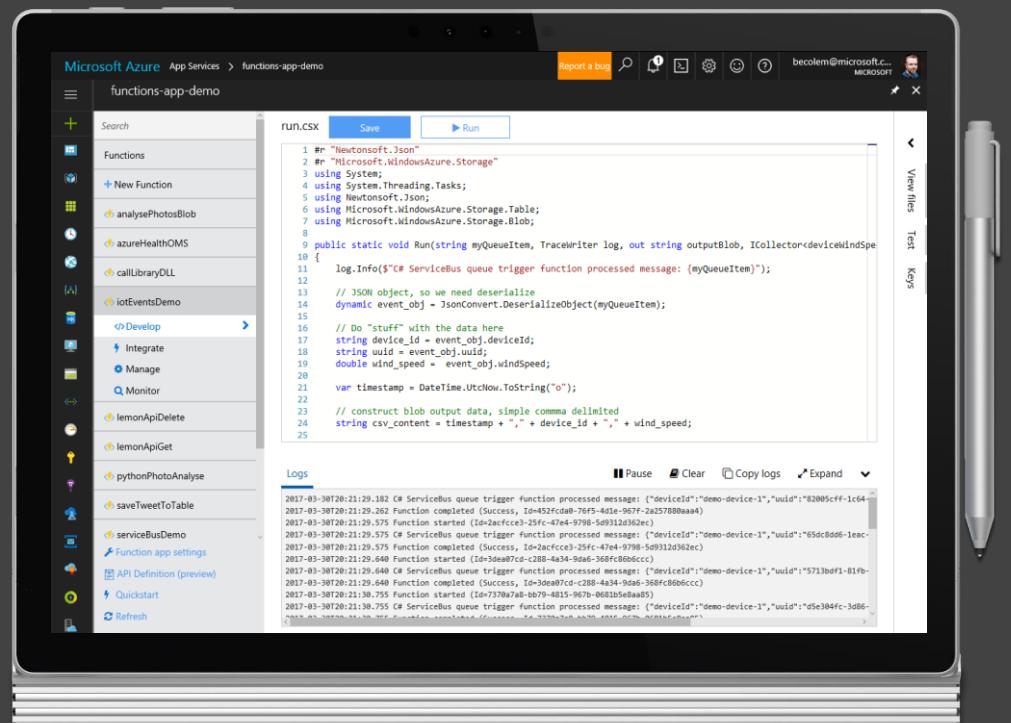
In a serverless computing deployment, the cloud customer only pays for service usage; there is never any cost associated with idle time.

Serverless application platform components



Code

Events + data



Azure Functions

Serverless compute

aka - Function as a Service (FaaS)

Trigger on events & external services / feeds

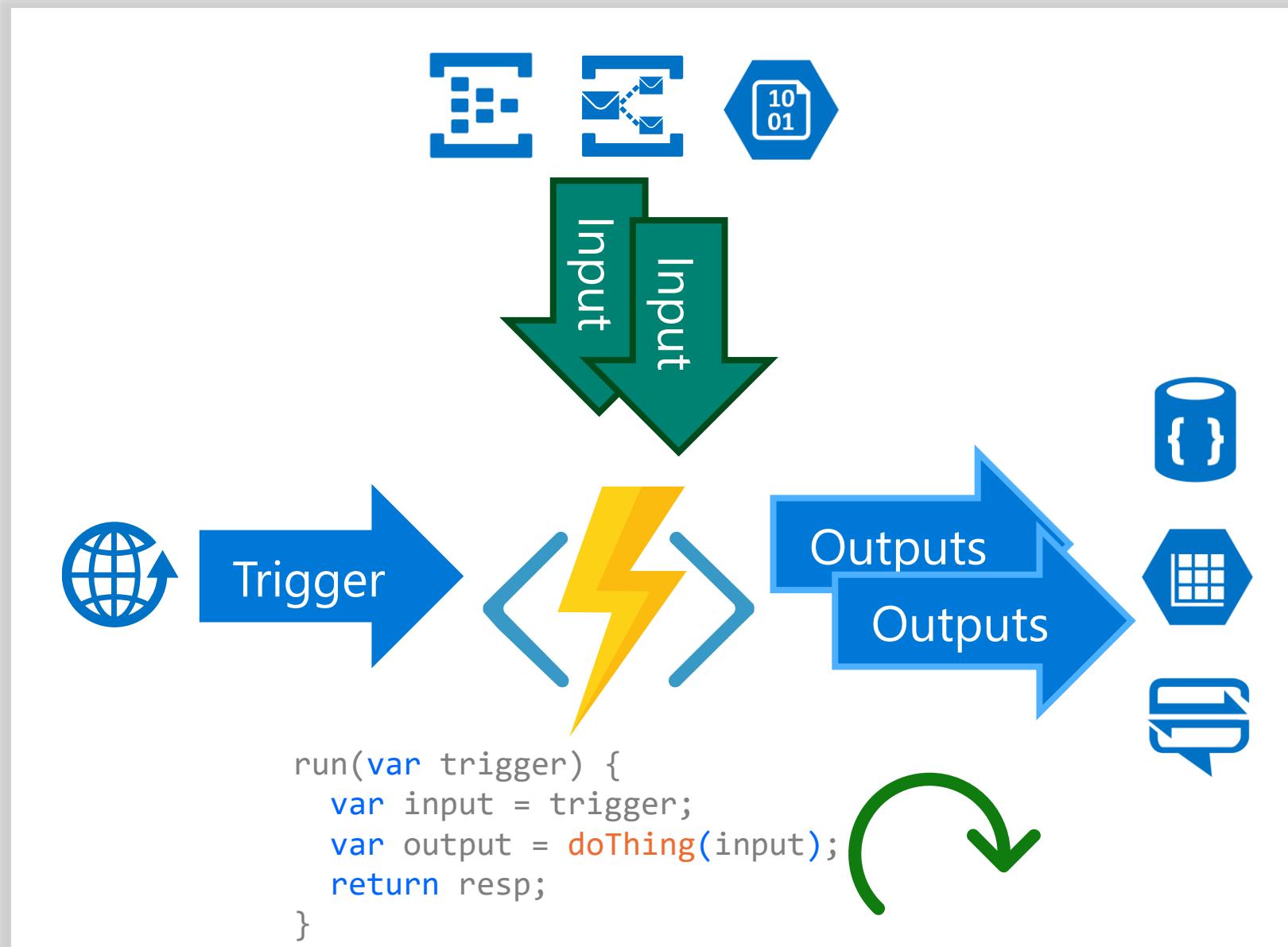
Pay only per execution

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 tools integrated into a browser window. The left sidebar lists function apps: functions-app-demo, analysePhotosBlob, azureHealthOMS, callLibraryDLL, iotEventsDemo, lemonApiDelete, lemonApiGet, pythonPhotoAnalyse, saveTweetToTable, serviceBusDemo, Proxies (preview), and simple-api. The 'saveTweetToTable' function is selected. The main area contains a code editor with C# code for saving tweets to a table, a 'Logs' panel showing execution logs, and a 'Test' interface for running the function with various parameters.

Code Editor (run.csx):

```
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 }
```

Logs:

```
2017-04-06T07:35:46.435 ### New tweet received: 64352437
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)
```

Test Interface:

- 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)

Language Support



C#



F#



Java
Script

Fully Supported Languages



Power
Shell



Python



PHP

Preview / Experimental Languages



Bash



Batch

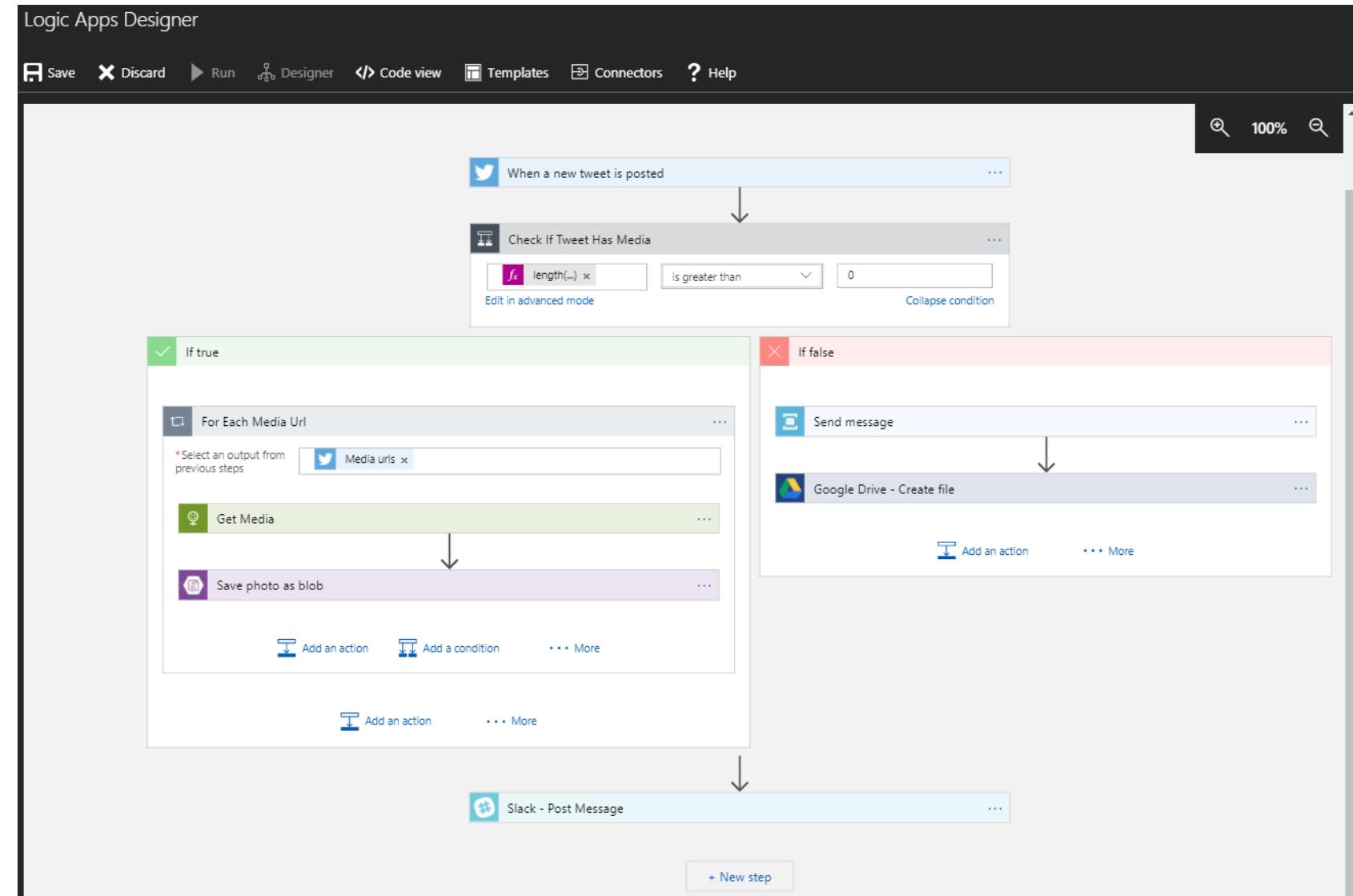


Java

{ } 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	 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

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



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

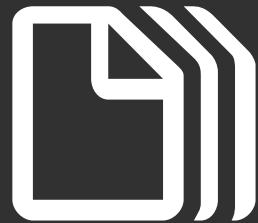
Built on a unified Distributed Storage System

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

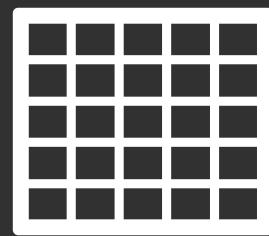
Messaging



Queues

Reliable storage and delivery of messages for an application

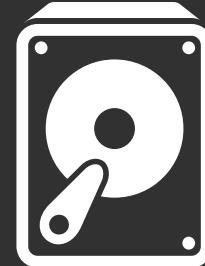
NoSQL



Tables

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

File share

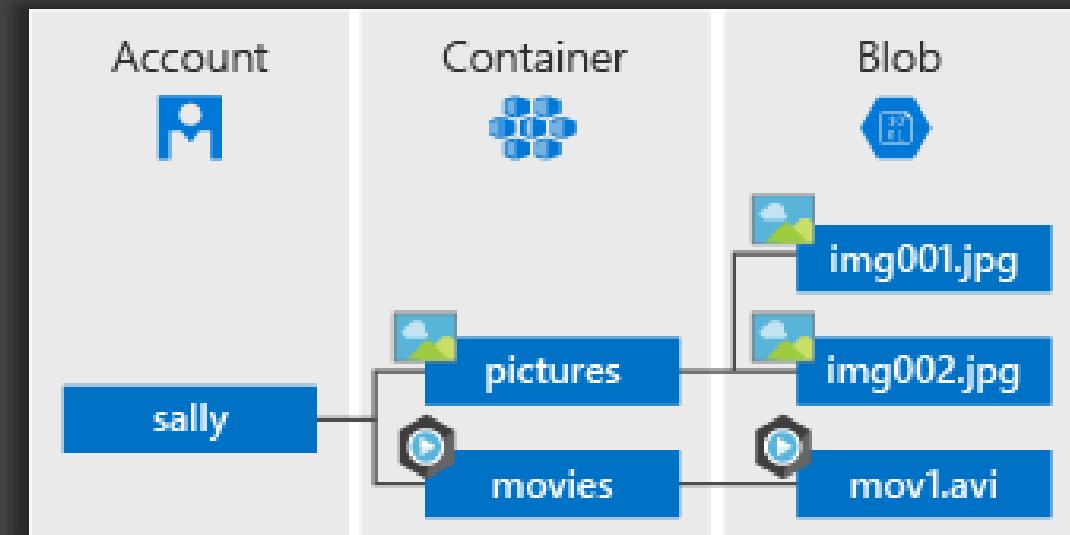


Azure Files

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
<https://bcmisc.blob.core.windows.net/stuff/kittens.jpg>
- 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



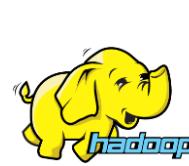
Data Aggregation



Presentation



Azure HDInsight



Azure Blob Storage

Open &
Interoperable

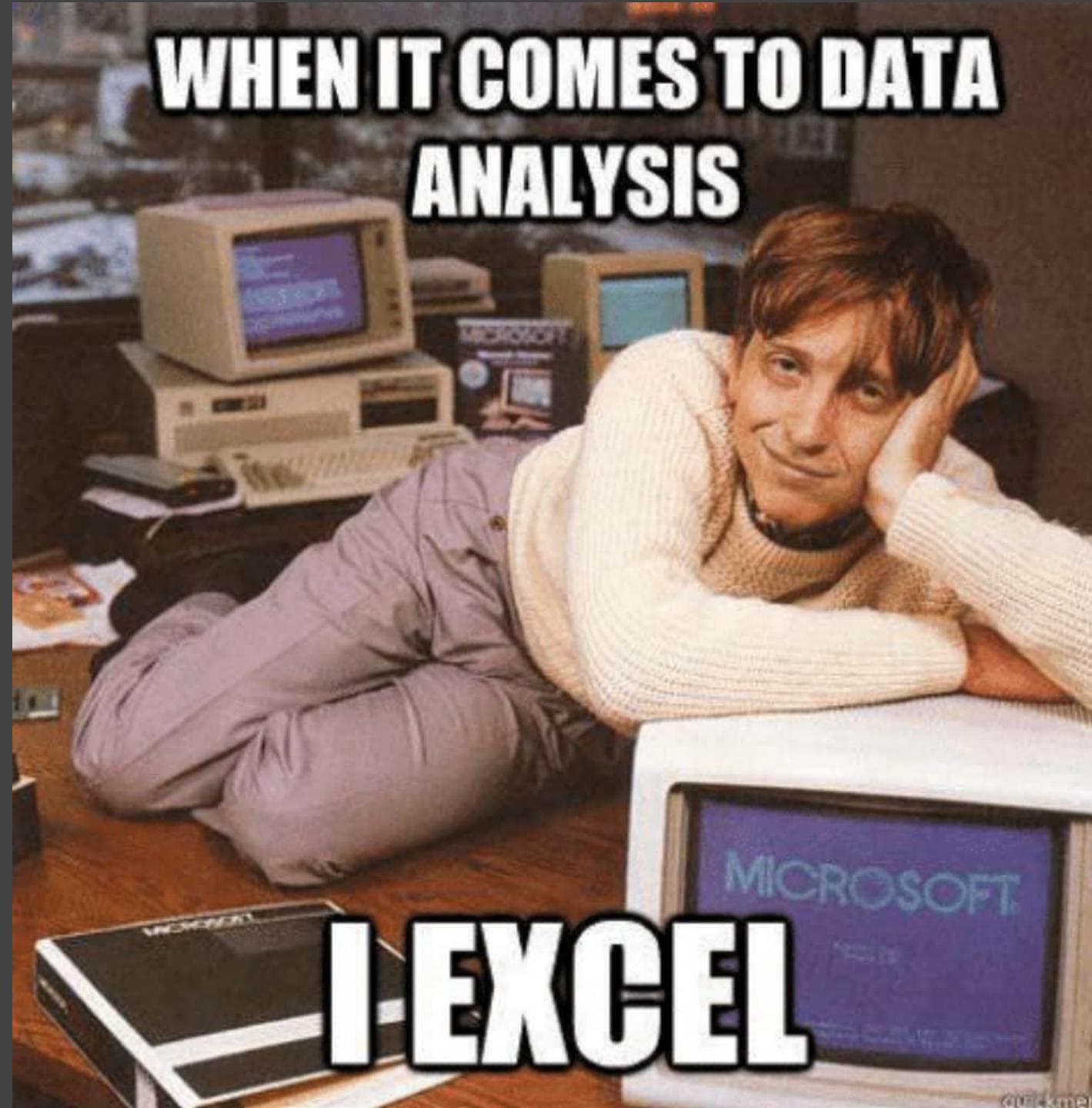
Manageable &
Cost Efficient

Scalable &
Performant

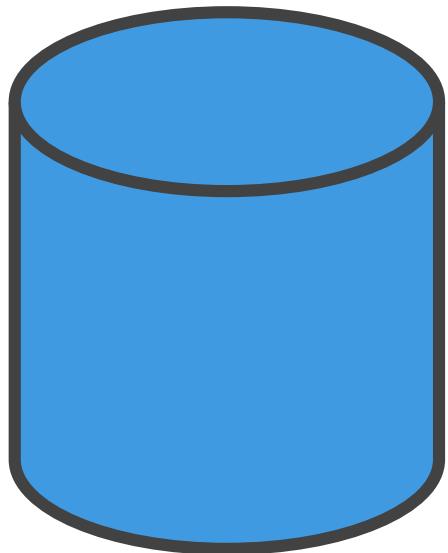
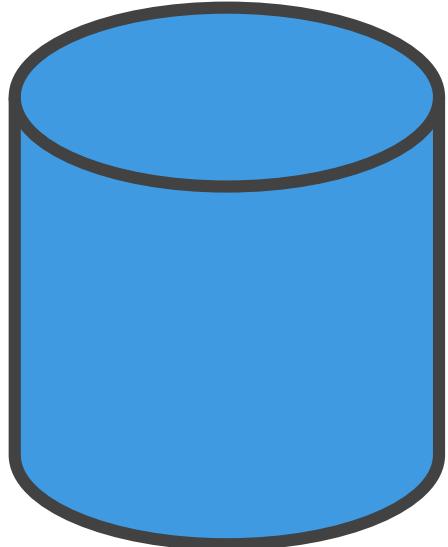
Secure &
Compliant

Durable &
Available

Data Platform & Analytics



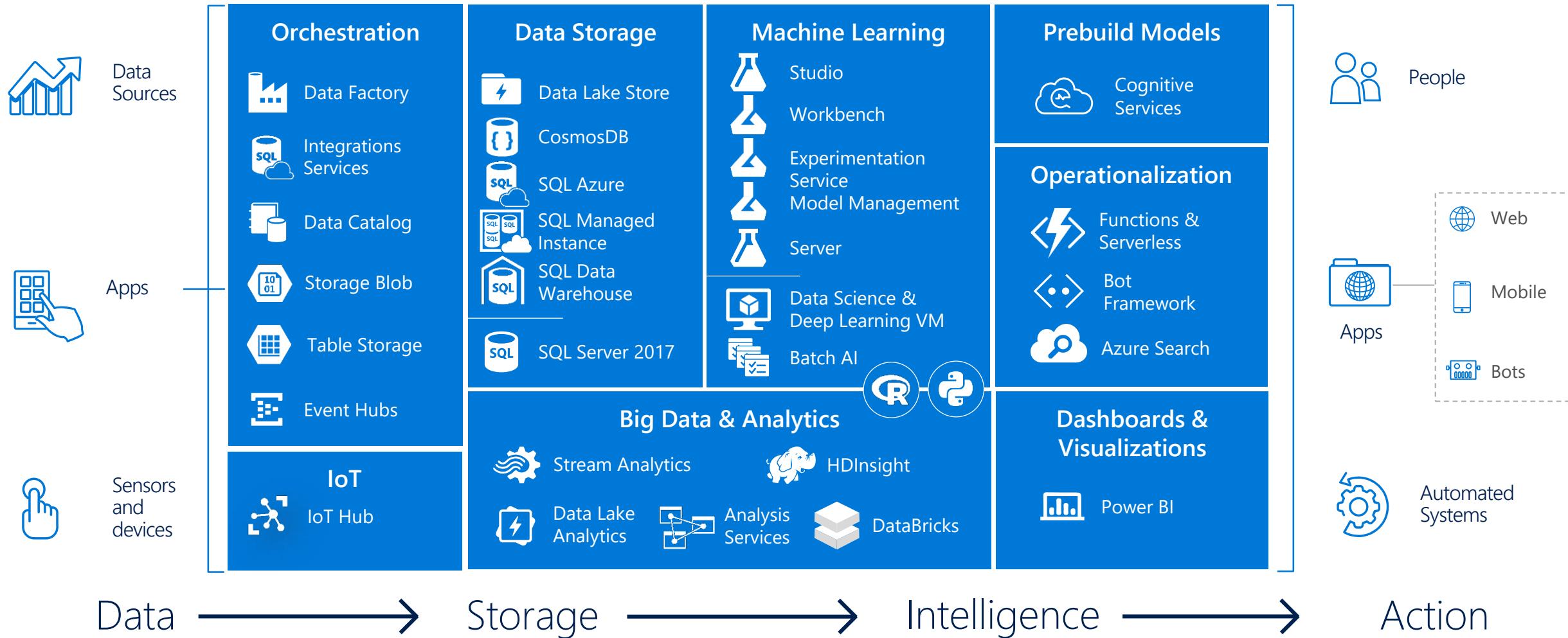
DATA IS IMPORTANT



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

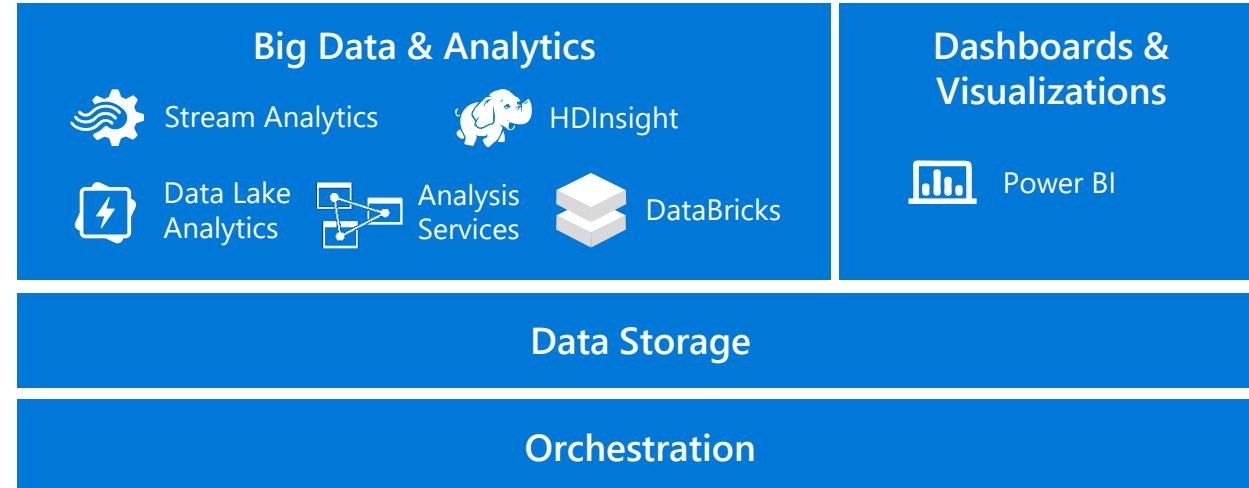
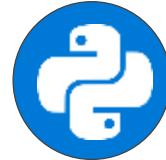


Built-in intelligence helps you dramatically reduce the costs of running and managing databases and maximizes both performance and security of your application.

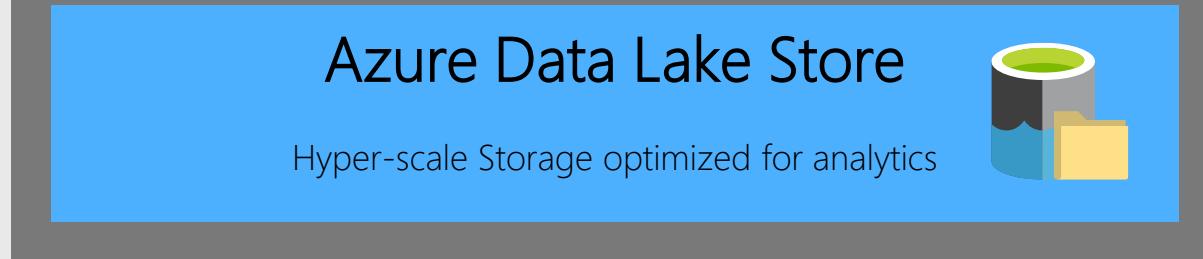
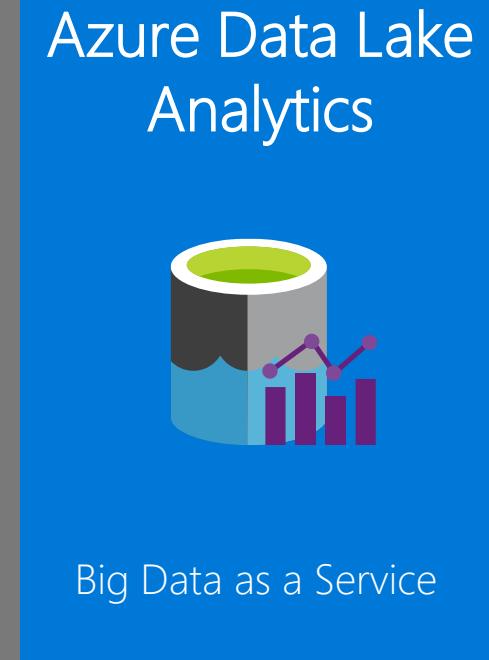
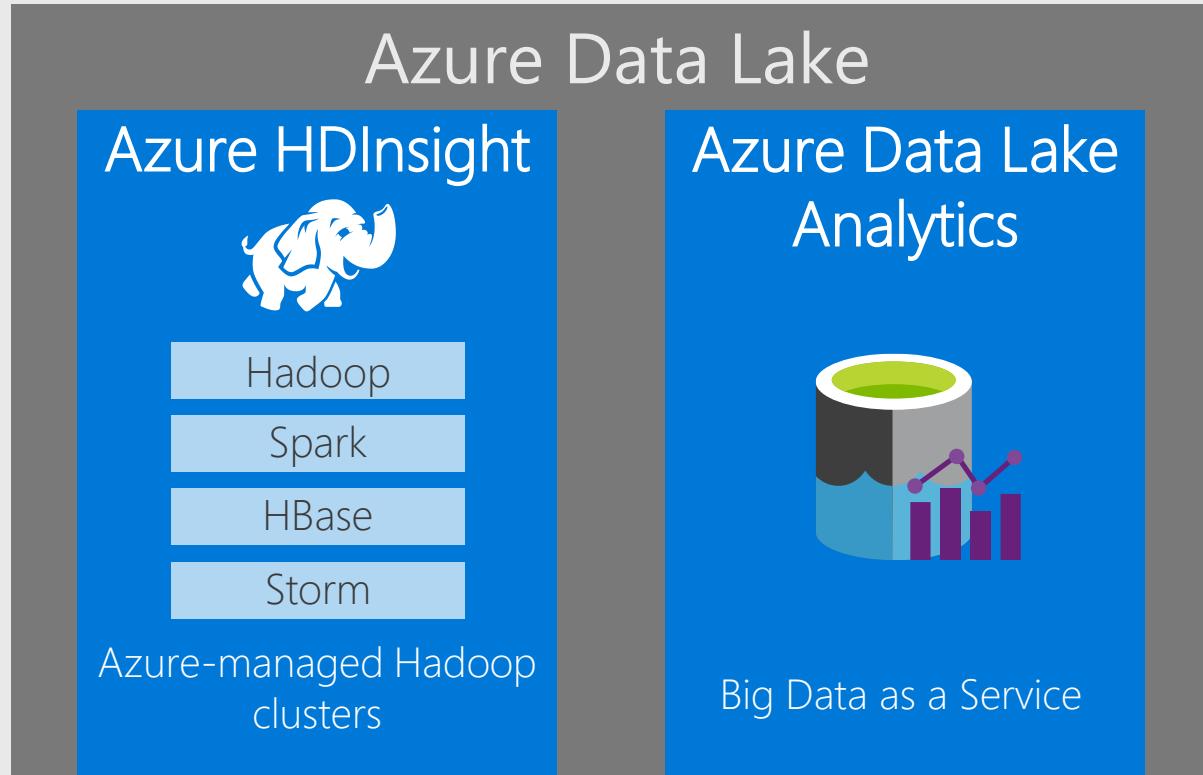


Azure as your Analytics Platform

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

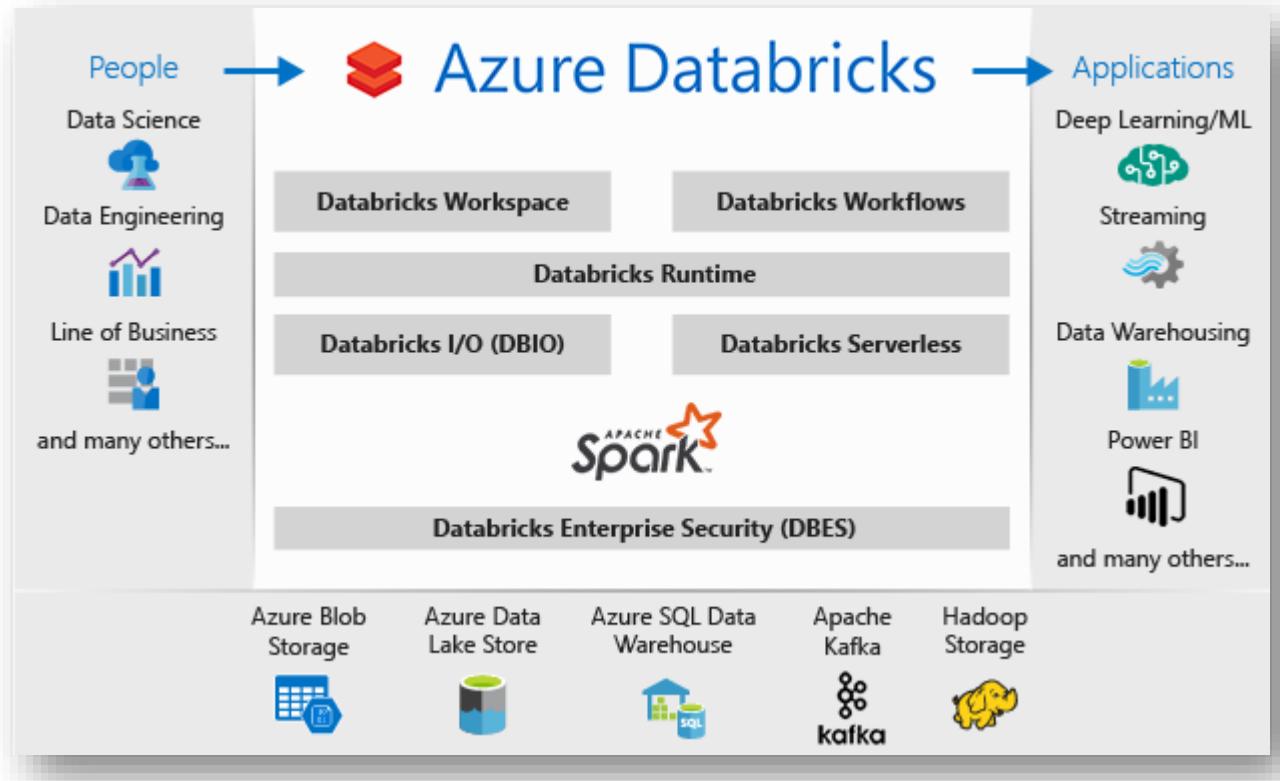


Big Data / Hadoop in Azure





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



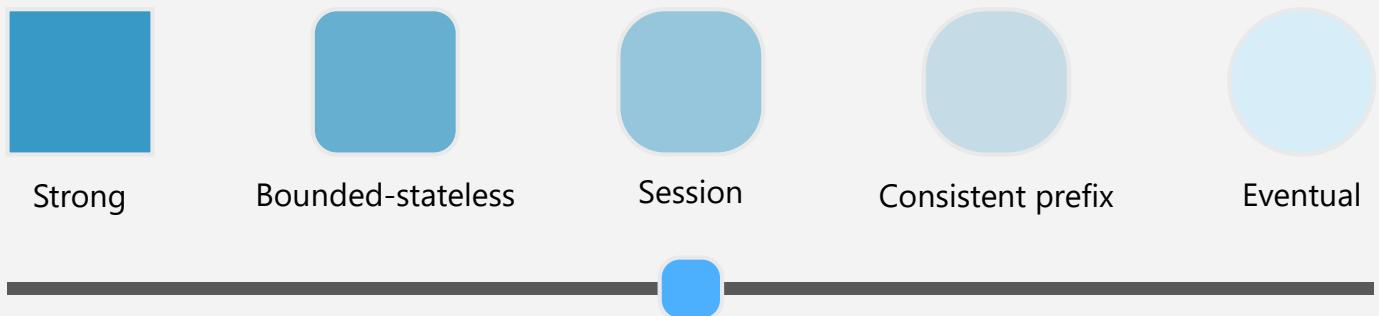
COMPREHENSIVE
SLAS

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

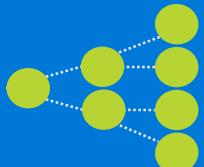
Key-Value



Tabular



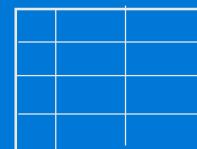
Documents



Graph



Relational



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



Table
API

SQL



Power BI: experience your data

MICROSOFT CLOUD

Microsoft Azure



Stream
Analytics

NON-MICROSOFT CLOUD

Acumatica



comSCORE



Analytics

Intelligent
Apps

ON-PREMISE DATA

hadoop



Microsoft
SQL Server

ORACLE

TERADATA



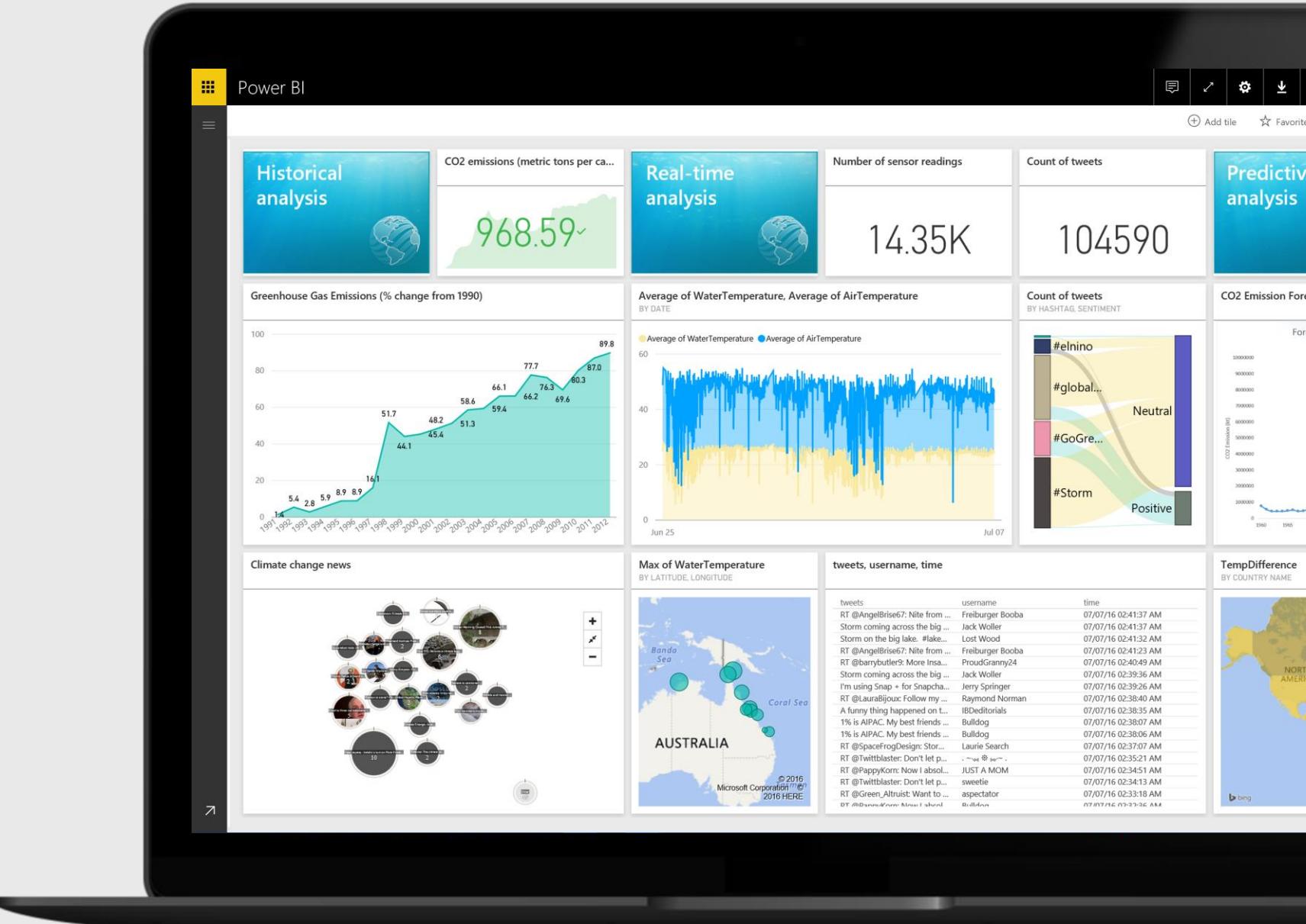
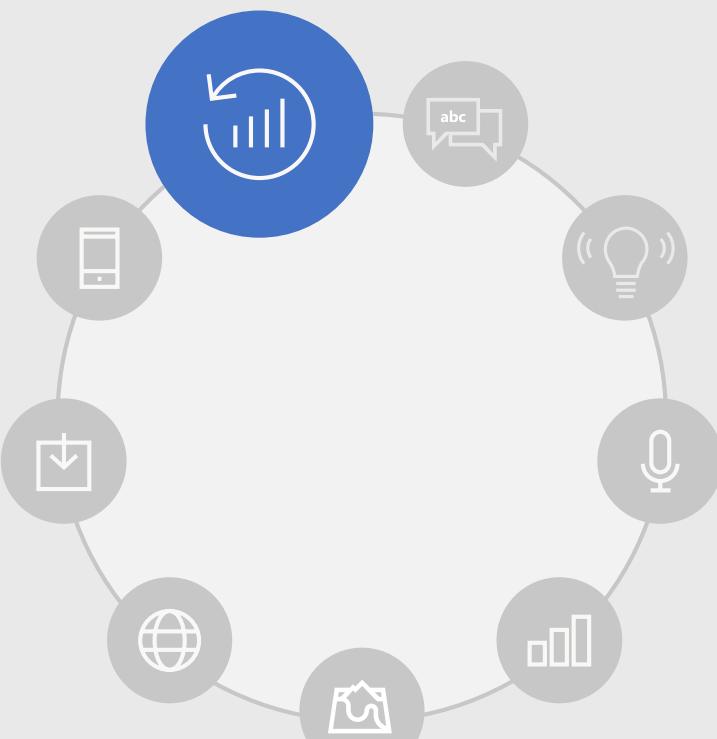
5,000,000+
subscribers

210+
countries

200,000+
organizations

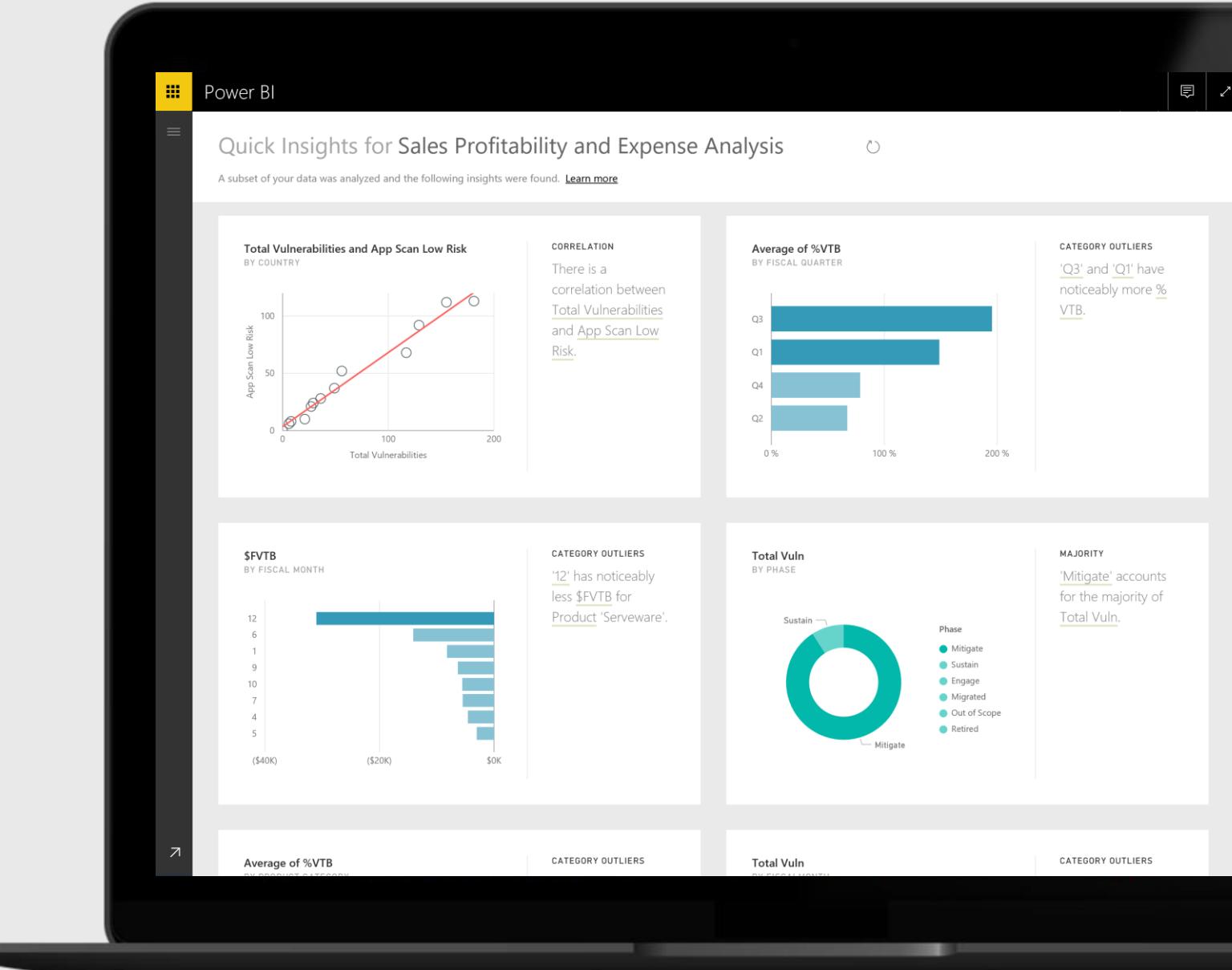
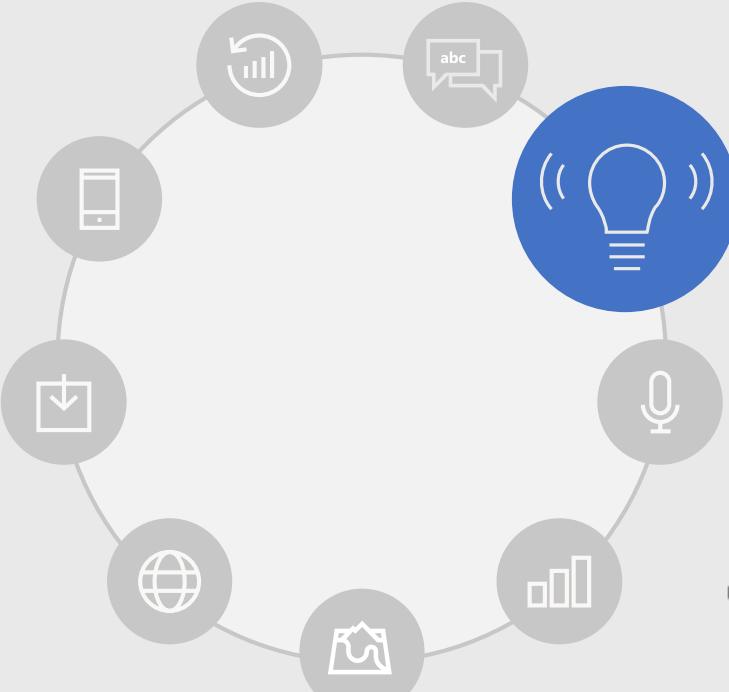
Power BI

Get dashboards
in minutes



Power BI

Quick Insights

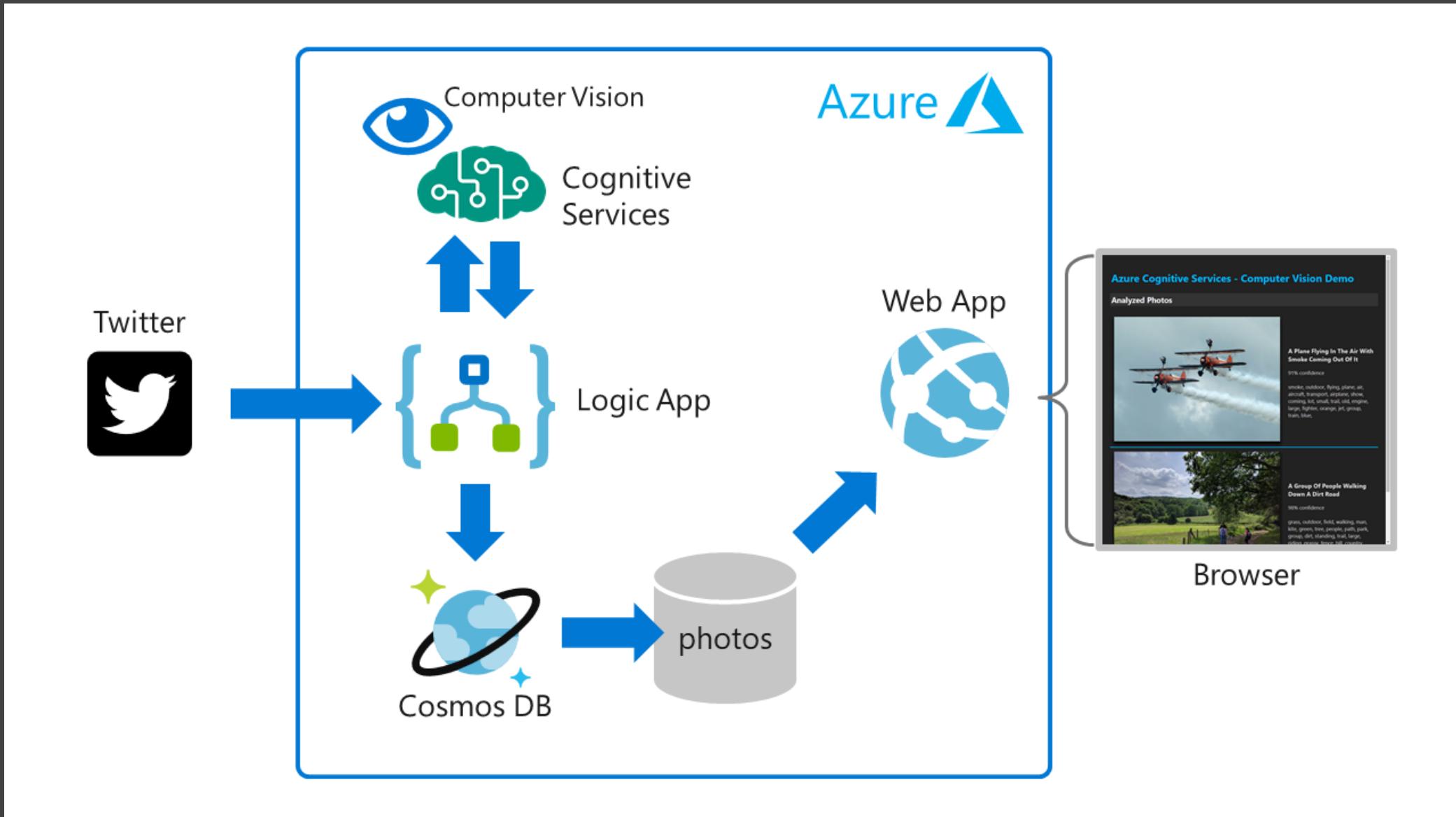


Hands On Exercise 5

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



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



Fill Out Short Survey <http://aka.ms/smilr>

Azure In A Day Site <http://aka.ms/azure-day>





Microsoft