

The background image shows a construction site with several large concrete foundations under construction. Each foundation is supported by a dense grid of black steel reinforcement bars (rebar). The concrete is a light grey color. In the upper right, there's a steep, dark brown hillside. In the top left corner, there are some small green and red structures, possibly tool sheds or workbenches.

AWS
Vs
Azure
Vs
GCP

Pillars of Cloud Services

- Scalability
- Availability
- Resiliency
- Management
- Security
- Infrastructure
- Compute
- Storage
- Networking



Azure



Google
Cloud Platform



AWS - STEVEN HARPER

20 Years of IT / Development / Operations / Design / Architecture

- Started AWS with a Digital Migration of Europe's Biggest E-Service Platform
- Designed and deployed Hybris Retail systems into AWS
- OAuth open connect V2.0 platform into AWS
- AWS Journey 2013 -> Current
- What's completely new
 - Lambdas, Step Functions, Cloudformation

I N F I N I T Y W O R K S

AWS Products



Compute



Storage



Database



Migration



Networking & Content
Delivery



Developer Tools



Management Tools



Media Services



Security, Identity &
Compliance



Analytics



Machine Learning



Mobile Services



AR & VR



Application Integration



Customer Engagement



Business Productivity



Desktop & App Streaming

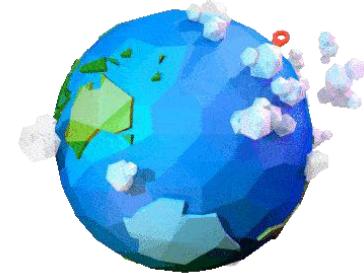


Internet of Things



Game Development

Regions & Availability Zones



N. Virginia (6)
Ohio (3)
N. California (3)
Oregon (3)
Mumbai (2)
Seoul (2)
Singapore (3)
Sydney (3)
Tokyo (4)
Osaka-Local (1)
Canada Central (2)
Beijing (2)
Ningxia (3)

Frankfurt (3)
Ireland (3)
London (3)
Paris (3)
São Paulo (3)
Gov (US-West) (3)



Over 120 Edge locations

Bahrain
Hong Kong
SAR, China
Sweden
Gov (US-East)

Who uses AWS

Gartner

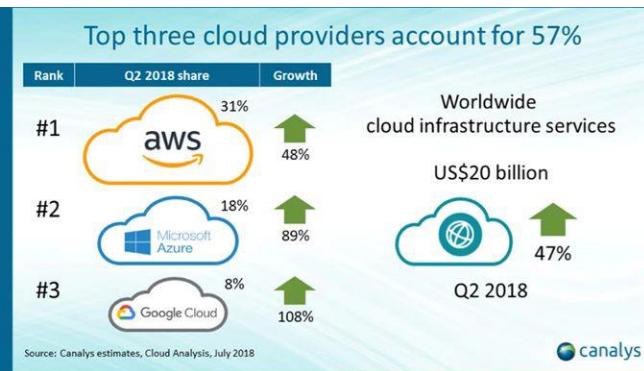


All Sizes of customers - over 1,000,000 customers



NETFLIX

UBER



twitch

twitter

LinkedIn

facebook

BBC

Security & Compliance



CloudTrail - Compliance Audits



Trusted Advisor - Real-time insight



Enterprise Support - Technical Account Manager (TAM)



KMS - Key Management Service



Cloud HSM - Hardware Security Module



AWS CLOUDHSM





- Managed Components
 - AMI's
 - CloudFormation Stacks
- Flexible Licensing Models
 - BYOL
 - Pay per hour

splunk>enterprise

SAP

TERADATA



Microsoft

FreeBSD[®]

ubuntu[®]
Delivered by Canonical

CentOS

SUSE

redhat
Linux

FORTINET[®]



CISCOTM

TREND
MICROTM

paloalto
NETWORKS[®]

Supports Many different Languages - Lambda



- 4.3
- 6.10
- 8.10



- 1.0
- 2.0
- 2.1 +



- 2.7
- 3.6



- 8



Invoking a
Lambda Function
On Demand



- 1.X

Amazon S3
Amazon DynamoDB
Amazon Kinesis Data Streams
Amazon Simple Notification Service
Amazon Simple Email Service
Amazon Simple Queue Service
Amazon Cognito
AWS CloudFormation
Amazon CloudWatch Logs
Amazon CloudWatch Events
AWS CodeCommit
Amazon CloudWatch Events

AWS Config
Amazon Alexa
Amazon Lex
Amazon API Gateway
AWS IoT Button
Amazon CloudFront
Amazon Kinesis Data Firehose

Triggered by events

Databases - Choices

- RDS
 - MariaDB, Amazon Aurora, Oracle, SQL Server, PostgreSQL, MySQL
- Non Relational
 - DynamoDB
- Graph
 - Amazon Neptune
- In Memory
 - AWS Elasticache
- Data Warehousing
 - Redshift
- Migration



Instance Families

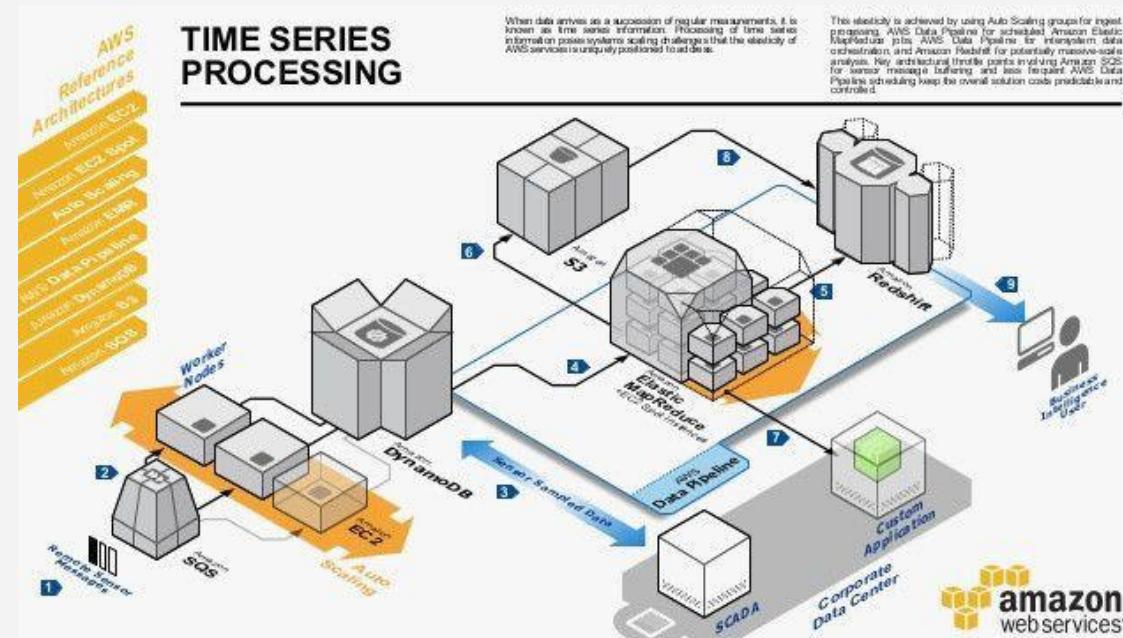
Placement Groups - Allows reduced network distance

- **Burstable:** T (10% capacity, burst to 100%) - Free Tier
- **General purpose:** M
- **Compute optimized:** C (CPU Focused)
- **Memory optimized:** R, X, Z (RAM Focused)
- **Storage optimized:** D, H ,I (IO Focused)
- **Accelerated computing:** F, G, P (Hardware Acceleration Focused)

t3.nano (1 vCPU, 512 MiB) <-----> u-12tb1.metal (448 vCPU, 12 TiB)

VPC Separation & Low level network control

- Direct Connect
- VPN Connections
- VPN Peering
- VPC Separation
- Subnets (Private/Public)
- Security Groups
- NAT Gateways
- Virtual Private Gateways
- Network Access Control Lists
- Elastic IP's
- Elastic Load Balancers



SQS, Kinesis, Firehose

Simple Queue Service

- FIFO - only once
- Best Order - at least once

Kinesis

- Massively, Scalable & Durable real-time data streaming service

Firehose

- Delivery of kinesis into storage

SES



SNS

- Topics and Subscriptions push notifications

SNS, SES

Tooling & API's

AWS - CodeStar, CodeCommit, CodeBuild,
CodeDeploy, CodePipeline

Terraform / CloudFormation

AWS Tools for Azure DevOps

Ansible, Puppet, Chef

AWS - CLI/SDK



Ease of Entry

AWS Training

APN Partner Training

AWS Certification

AWS Academy

AWS Educate

DATABASE

Amazon RDS

750 Hours

per month of db.t2.micro database usage (applicable DB engines)

APPLICATION SERVICES

Amazon API Gateway

1 Million

API Calls Received per month

DEVELOPER TOOLS

AWS Trusted Advisor

4

checks on performance and security

STORAGE & CONTENT DELIVERY

Amazon CloudFront

50 GB

of data transfer out

STORAGE & CONTENT DELIVERY

Amazon S3

5 GB

of standard storage

COMPUTE

Amazon EC2

750 Hours

per month

COMPUTE

Elastic Load Balancing

750 Hours

per month shared between Classic and Application load balancers

DATABASE

Amazon ElastiCache

750 Hours

of cache.t2micro Node usage

MANAGEMENT TOOLS

AWS OpsWorks for Chef Automate

7500

node hours (which equals 10 nodes) per month

STORAGE & CONTENT DELIVERY

Amazon Elastic Block Storage

30 GB

ARTIFICIAL INTELLIGENCE

Amazon Polly

5 Million

characters per month

NEW

ANALYTICS

Amazon Elasticsearch Service

750 Hours



The Good & The Bad

GOOD

- Capability to build anything
- Ease to automate
- Constantly innovating
- Language & OS agnostic
- Huge user base
- Great support



BAD

- Small components, difficult to start
- Out of Free Tier, everything costs
- No Event Bus
- AI Offering & Machine learning poor compared to other offerings
- AWS Users / Server Roles



Azure - Sherin Mathew

Current - Azure Analytics Architect, IBM. GBS

Background - Telecom Application Dev and BI Dev, BI Programme Delivery, Project Management, Solution Architect, Principal Consultant.

Experience - near 14 years in Telecom, Healthcare, ,Housing groups and Higher Education Sector along with Police forces and ICO.

My Azure Journey - Last 4 years feel like 20!

- Healthcare - 2015-16
- Higher Education 2016-18
- Housing 2017-18
- ICO 2017-2018

Volunteer - AI-Tech.UK, AI Tech User Group, AI Tech North 2019, SQL Pass

@SMdisrupt “*Disrupt the disruption!*”

Azure

More than 95 percent of Fortune 500 companies use Azure

120,000 New Azure Customers per month

30+ years Over three decades of experience serving enterprise customers

68,000+ partners

70+ certifications

Cloud Leader since 2015



54 Regions



Services

Compute

Web & Mobile

Data & Storage

Analytics

Integration (Hybrid and Cloud)

Internet of Things

Networking

Hybrid Operations

Security & Management

Developer Services

Machine Learning and AI

Support

Platform Services

Security & Management



Compute



Web and Mobile



Developer Services



Integration



Analytics & IoT



Data



Media & CDN



Hybrid Operations



Infrastructure Services

Compute



Storage

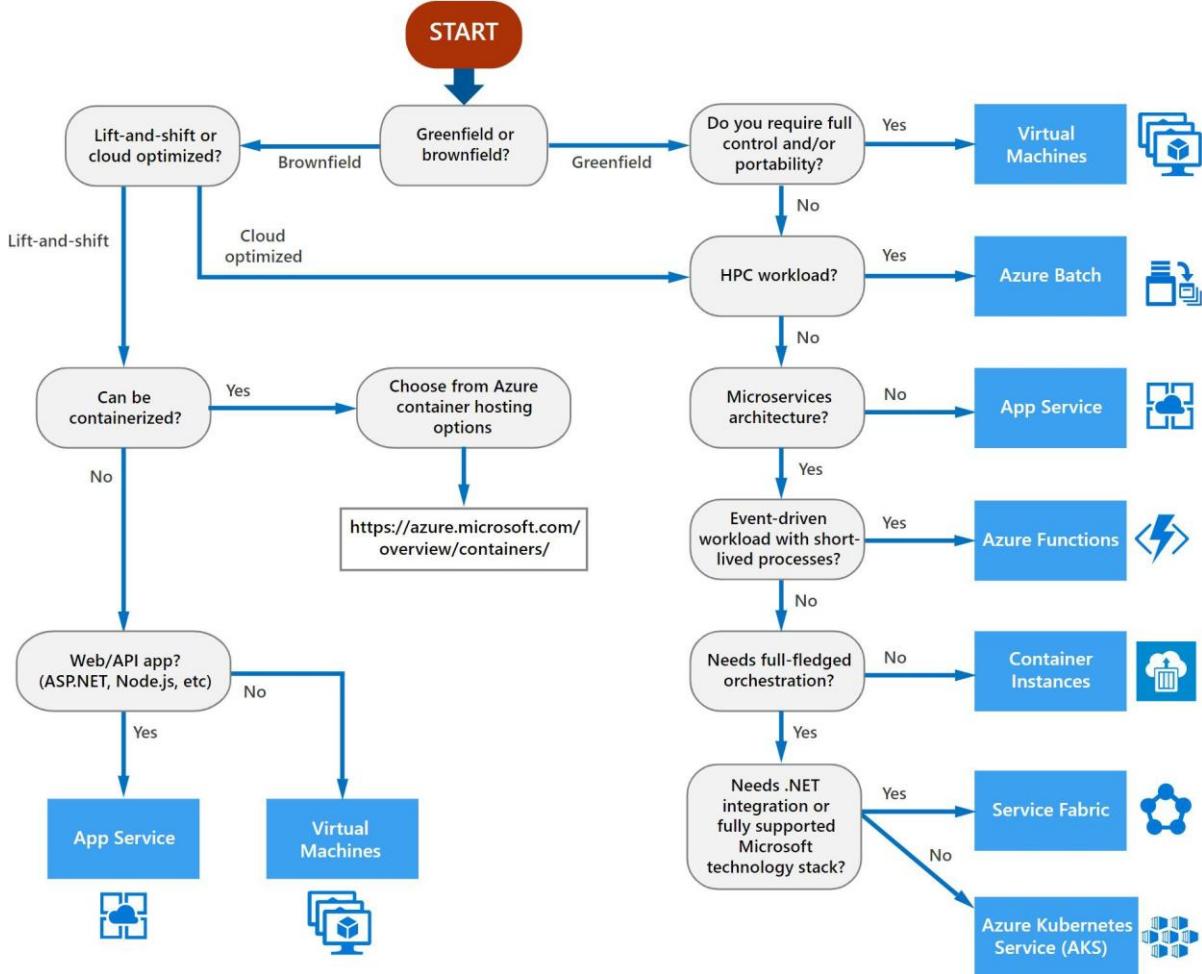


Datacenter Infrastructure (54Regions)



Azure Compute

Virtual Machines
Windows Virtual Machines
Linux VMs
Virtual Machine Scale Sets
Azure Batch
Azure Container Service
Container Instances
Azure Container Service
Kubernetes Service
Azure Container Registry
Cloud Services
Service Fabric
Service Fabric Mesh
Azure Functions
Azure Batch AI
DSVM



The Compute Power



CPUs

General purpose machine learning
D, F, L, M, H Series



GPUs

Deep learning
N Series



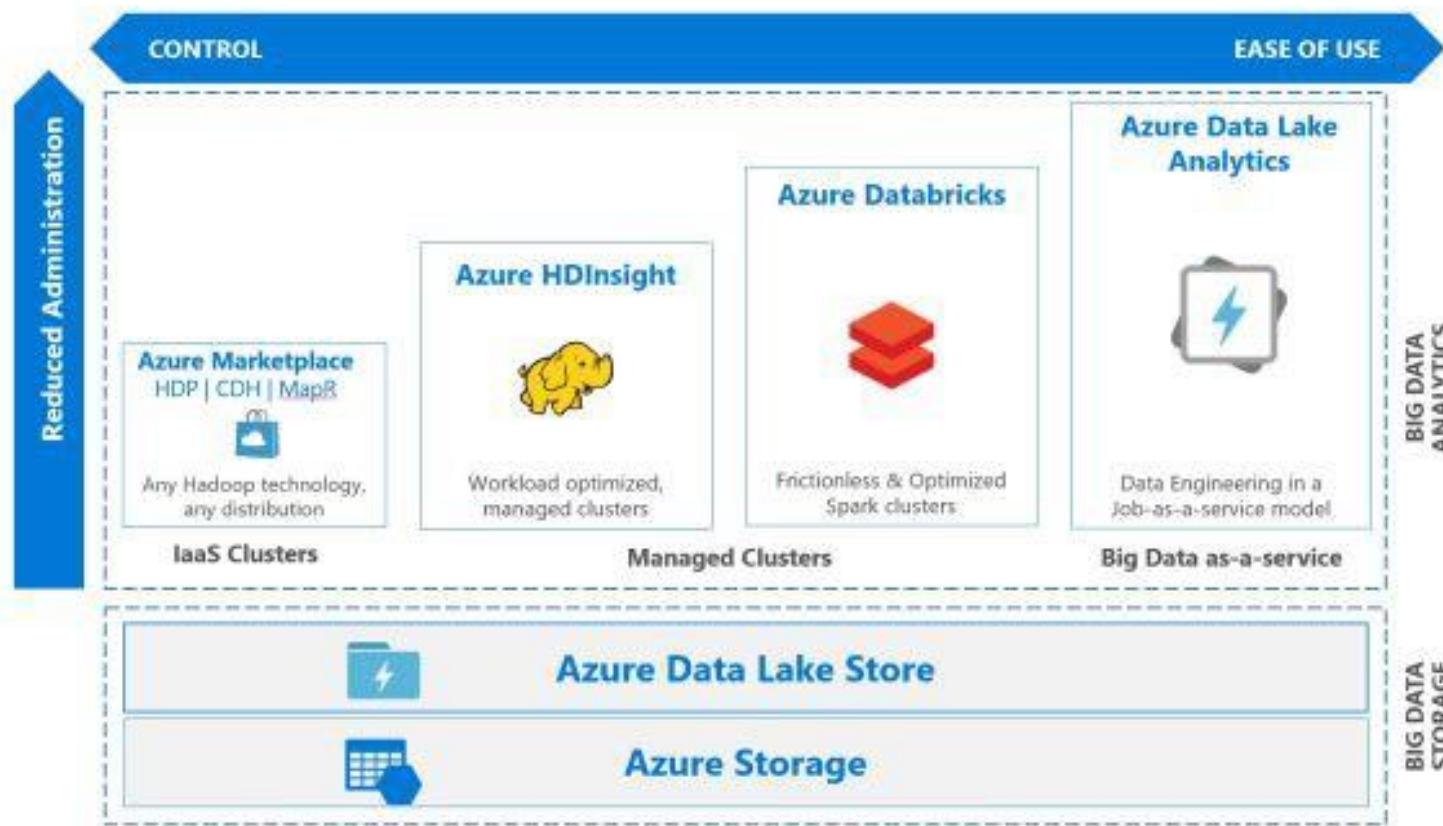
FPGAs

Specialized hardware accelerated deep learning
Project Brainwave

Optimized for flexibility

Optimized for performance

KNOWING THE VARIOUS BIG DATA SOLUTIONS

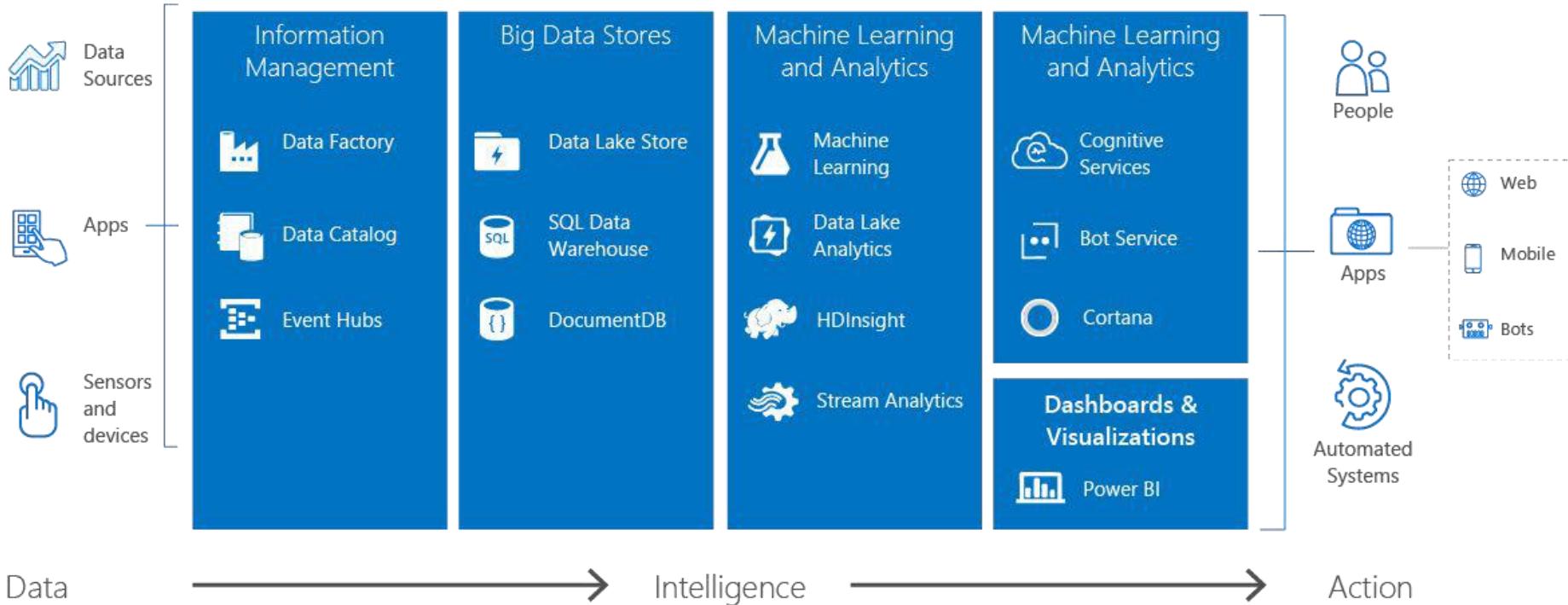


Azure Data Storage and Analytics

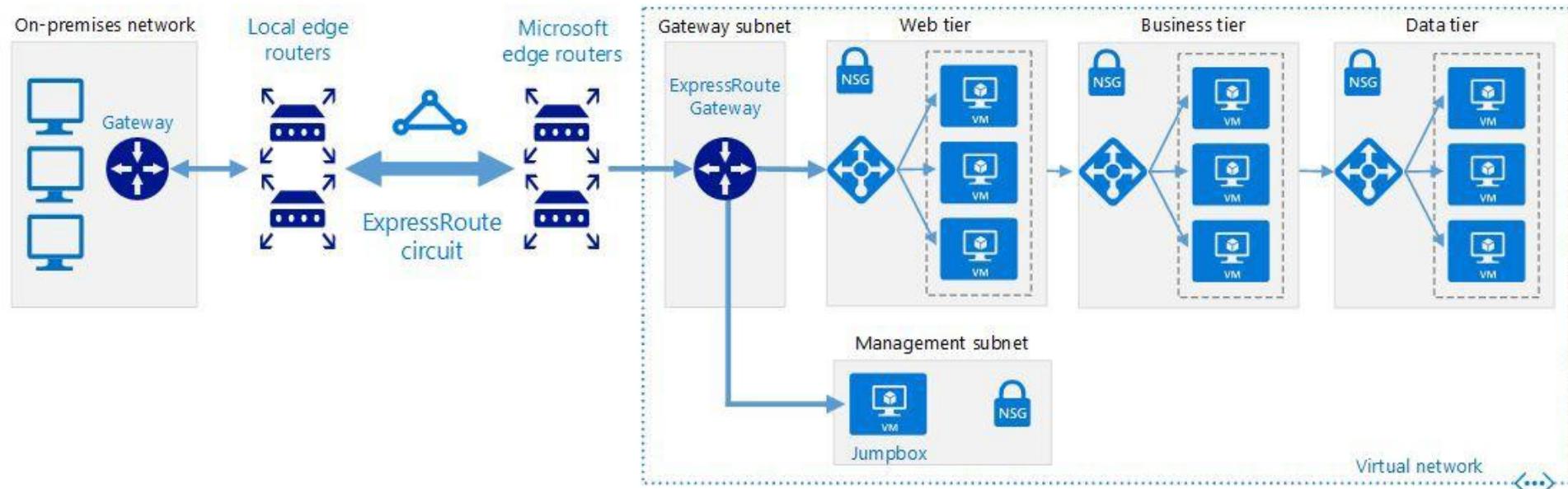


- Azure SQL Database
- Azure Data Warehouse*
- Azure Data Lake Store
- Azure Storage
- Azure Cosmos DB*
- Azure Data Factory*
- Event Hub
- Event Grid
- IoT hub
- Stream Analytics
- Data Catalog
- Data Explorer*
- Machine Learning*
- Data Lake Analytics*
- HDInsight
- Azure Databricks
- Analysis Services*

Azure Analytics in Action



Azure Networking



- Virtual Network
- Load Balancer
- Azure DNS
- Traffic Manager
- Data Gateway
- VPN Gateway
- ExpressRoute
- Application Gateway
- Network Watcher
- CDN

Azure Hybrid Integration

Azure Managed Instance *
DMA/DMS
Azure Backup
Azure Recovery
Azure Storsimple
Azure Sync
Azure Data box*
Azure Gateways
AD Connect
Containers Service
Azure Stack



Azure services



Azure DevOps



Azure data services



Azure Active Directory



Azure management & security



Developer Platform

DevOps

Data Platform

Identity

Security + Management



Azure Stack

Azure DevOps

SQL Server, MySQL,
PostgreSQL, NoSQL

Active Directory

Azure management & security



Machine Learning and AI



Vision



Speech



Language



Knowledge



Search



Bot Service



Language
Understanding



QnA Maker



Azure Machine
Learning



Visual Studio
Code Tools for
AI



Machine
Learning Studio

Tools

- ML Studio
- VS Code
- ML.NET
- Azure ML Packages
- AI Toolkit for IoT
- MML Spark

Frameworks

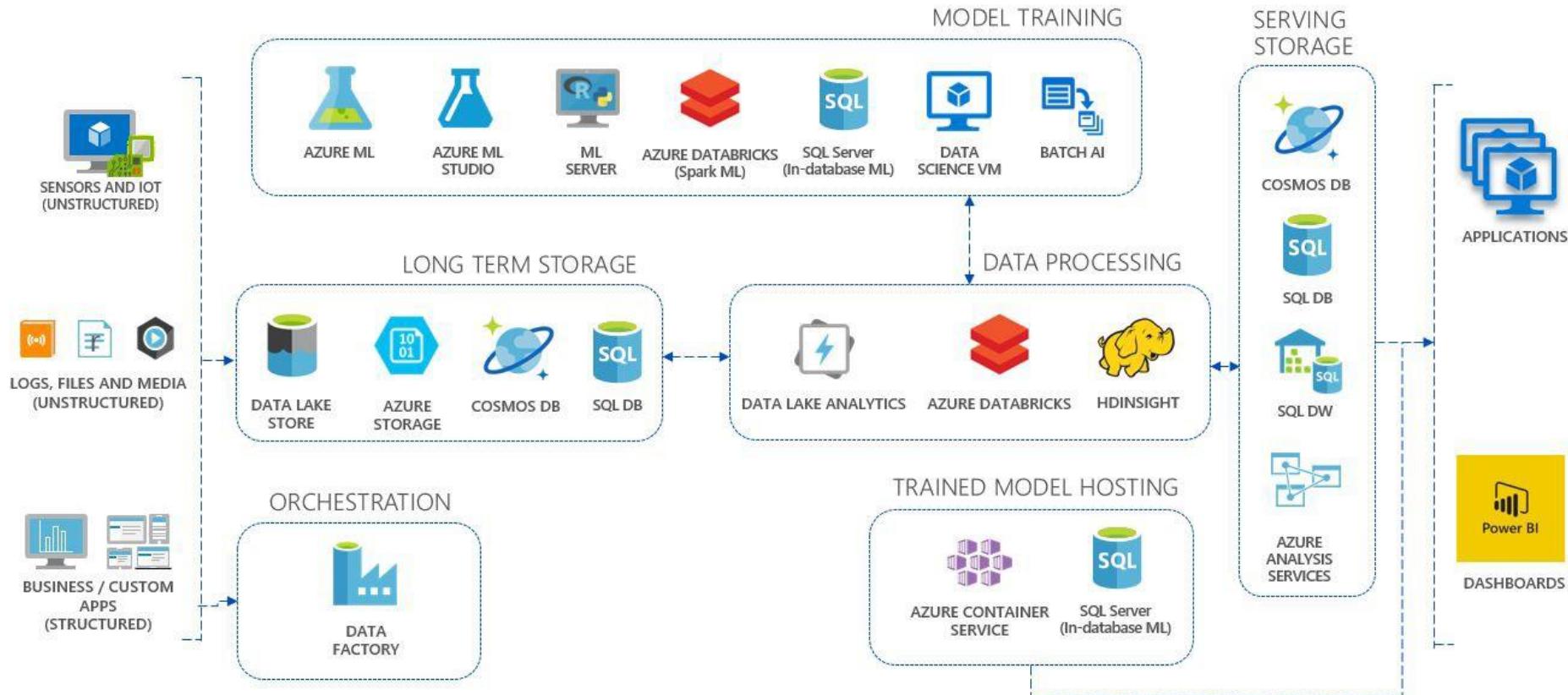
- CNTK
- ONNX
- TensorFlow
- Pytorch
- MXNet
- Caffe2

Infrastructure

- Azure Batch AI / DSVM
- AKS
- ADLS
- Databricks
- Spark for Azure HDInsight
- Edge
- SQL

Azure Advanced Analytics Pattern

Performing data collection/understanding, modeling and deployment



Azure Dev and Ops Support

- Visual Studio Code
- Azure SDK
- Command-line tools
- Azure PowerShell
- Azure Command-Line Interface (Azure CLI)
- Storage Explorer
- Visual Studio Tools for Azure
- Visual Studio for Mac
- Docker Tools
- Azure Portal!
- DevOps
- OMS and log analytics

Build cloud
apps for Java,
Node, Python,
Ruby, PHP or
.NET

T-SQL!

Security and Compliance

- Azure AD
- Subscription Security - IAM and RBAC
- Operational Security - Advanced Threat Detection, Auditing and Logging, OMS
- Network Security
- Compute Security
- Key Security
- Data Security
- Identity and Information Protection
- Security Centre
- 70+ Global, Government, Industry and Regional Compliances inc GDPR

Azure - What's Different

Regions

PaaS Power

Nature of Integration

Easier - Everything

Hybrid

Documentation

Development platform

Community

Reporting platform

IP

Support

Ethos and Philosophy

TCO

Azure - Good and Bad

Positives

- True Trusted Enterprise
- Dominance in Paas, ML, Analytics, IoT, PowerBI
- Maturity - Cloud Leader since 2015
- Great Dev and Test support and tools
- Works well in Windows or Microsoft environment
- Agility and commitment
- Great knowledgeable support
- 54 regions and Data box!
- Clear consideration for .NET.
- Open Source integration
- Hybrid consistency

Negatives

- Maturity in Prod and Enterprise is low
- Cross platform
- Devops for some services can be tricky
- Free and Preview services
- Quick Releases, changes and updates

Google Cloud Platform - James Heggs

Tech Returners - <https://techreturners.com>

Background

10+ years Software Development SaaS

Discovered the world of DevOps for improving delivery of our operations

One of those 'ooh shiny new things' types of Techies

Experience

Software development largely in web application and SaaS platforms

Migration from on-premise virtualisation to cloud based environments

Big fan of containerisation and Kubernetes orchestration

Very big fan of Continuous deployment and deployment pipelining

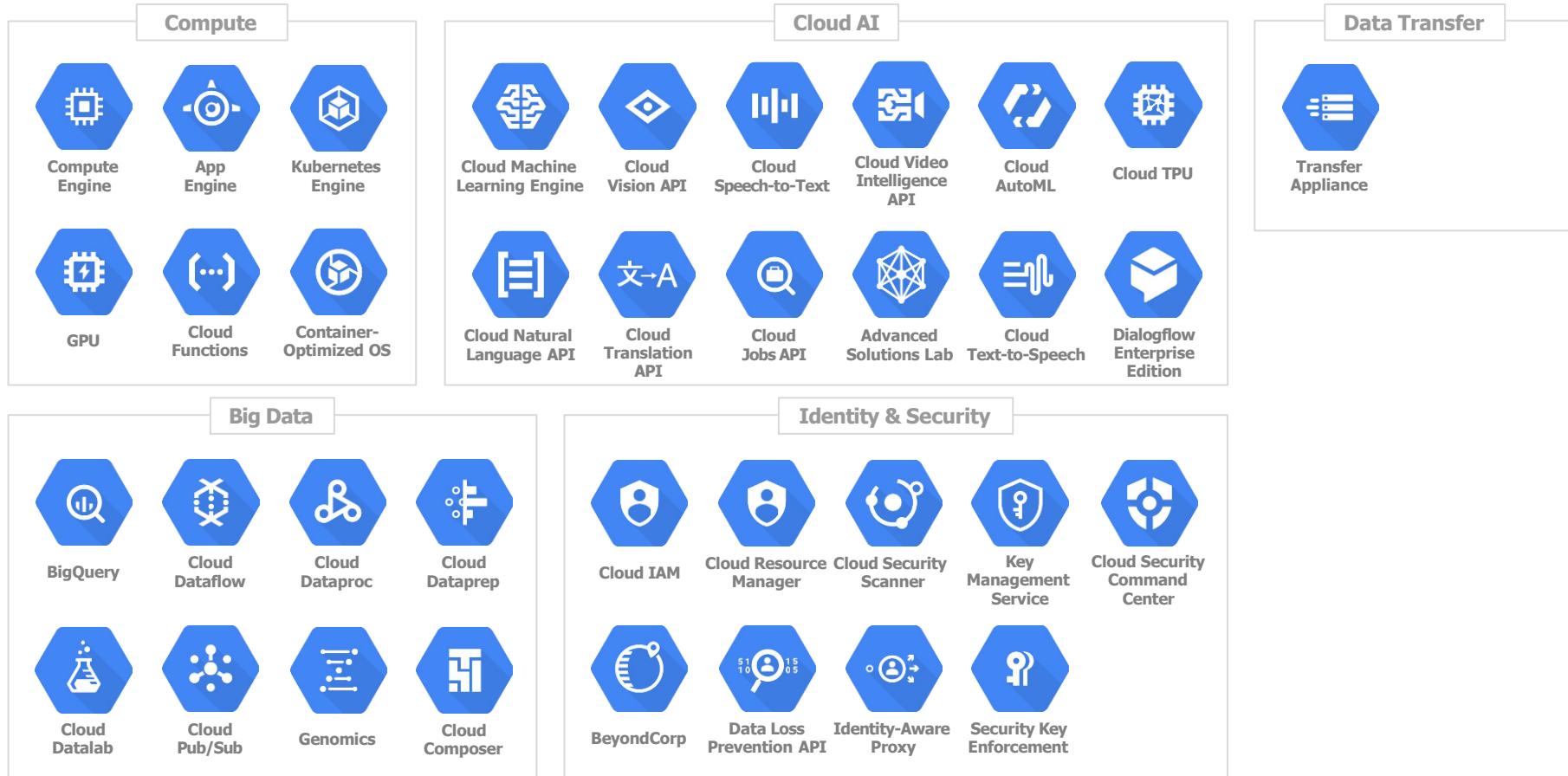
CNCF/Open source adoption tooling and infrastructure automation

GCP Journey

Used in anger only really the past 6-12 months

Decided to try a largely PaaS based approach for the construction of software for a startup

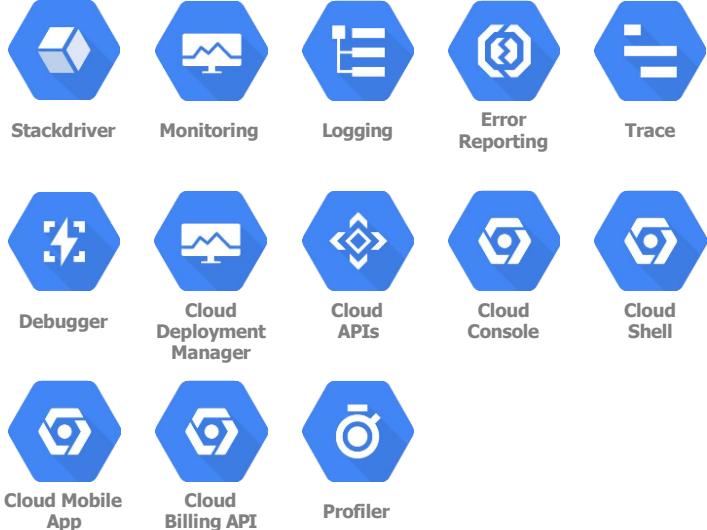
Google Cloud Platform Icons



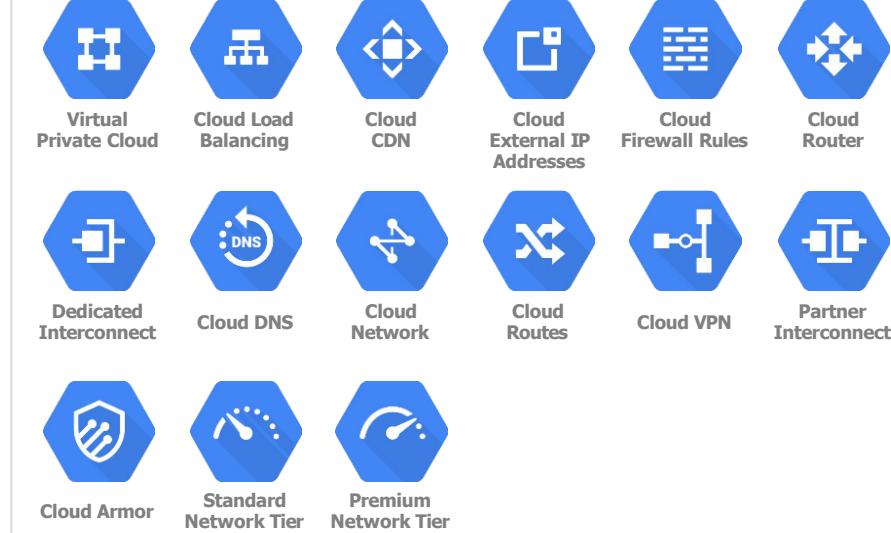
The Products logos contained in this icon library may be used freely and without permission to accurately reference Google's technology and tools, for instance in books or architecture diagrams.

Google Cloud Platform Icons

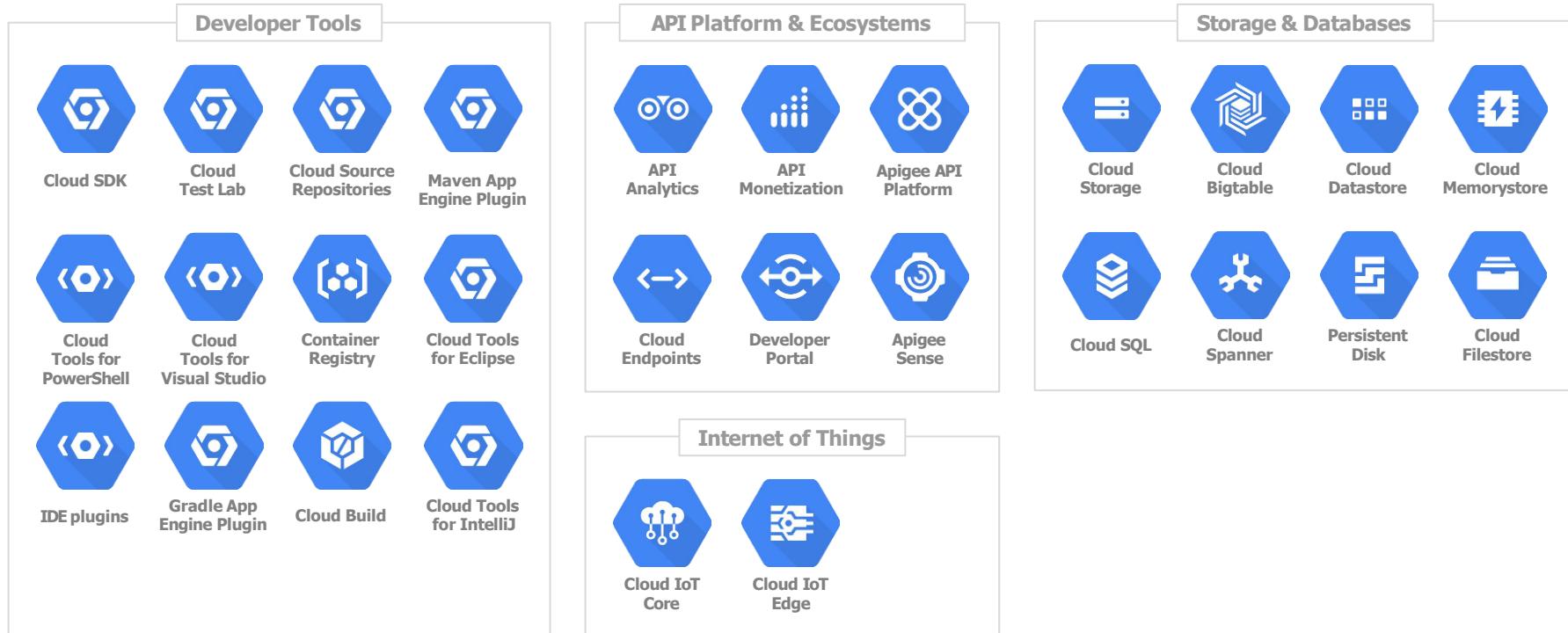
Management Tools



Networking



Google Cloud Platform Icons

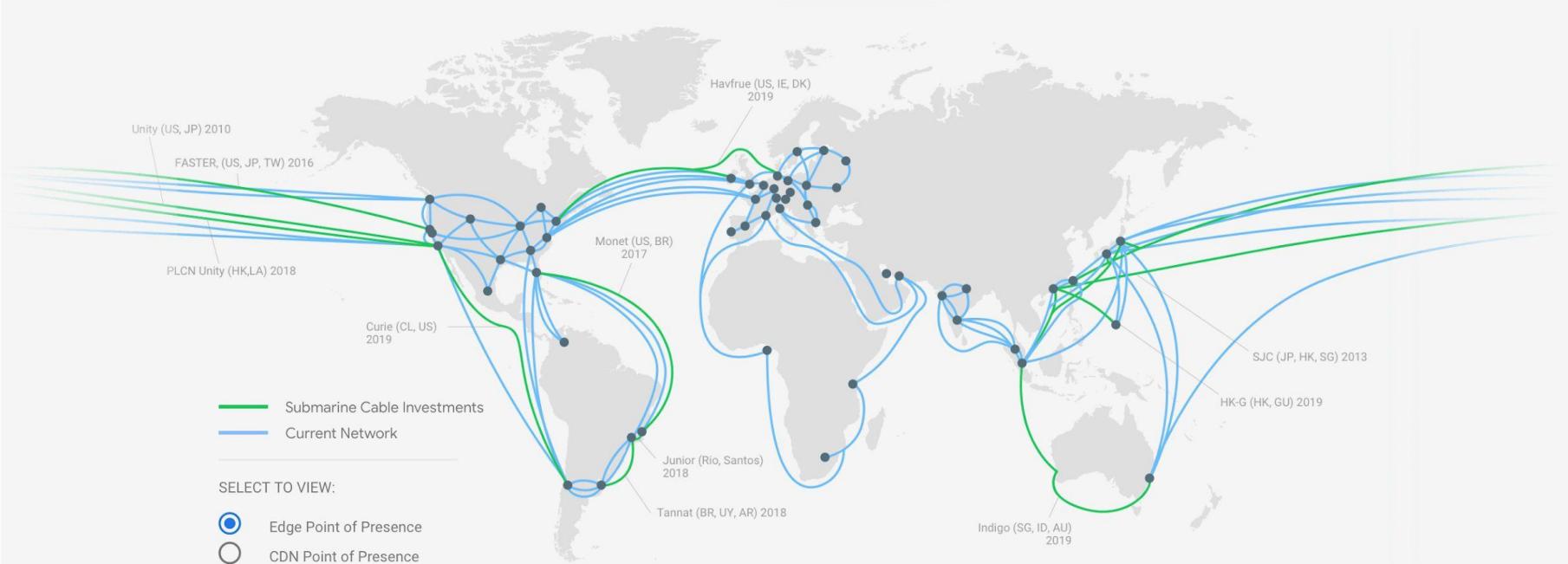


Regions and Zones



* While some regions may launch with 2 zones, all regions are planned for a minimum of 3 zones.

Network

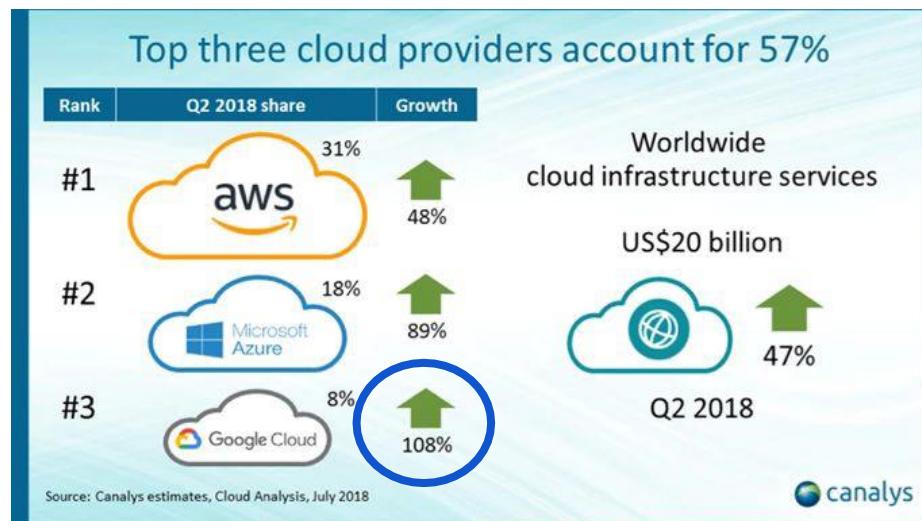


Where is GCP going

Totally ripped off this slide - Yoink!

Thanks Steven

<-- No Worries



12 Months

\$300 free credit to get started with any GCP product.



Always Free

Free usage limits on participating products for eligible customers, during and after the free trial. Offer is subject to change.

Always Free

 Google App Engine Platform for building scalable web applications and mobile backends.	 Google Cloud Datastore Google Cloud Firestore Beta Highly-scalable NoSQL database.	 Google Compute Engine Scalable, high-performance virtual machines.
28 Instance hours per day 	5 GB Cloud Storage 	1 GB Storage 
 Google Cloud Storage Best in class performance, reliability, and pricing for all your storage needs.	 Google Cloud Pub/Sub A global service for real-time and reliable messaging and streaming data.	 Google Cloud Functions A serverless environment to build and connect cloud services with code.
5 GB-Months Regional storage 	10 GB Messages per month 	2 million Invocations per month 

Google Cloud Platform - Machine Learning and AI

- Developer ready API's
 - Vision API - Image Content Analysis
 - Cloud speech to text
 - Cloud text to speech
 - Cloud natural language processing
- Firebase Predictions API
 - <https://firebase.google.com/products/predictions/>
- DialogFlow
 - ChatBot (Conversational Interfaces and leverages Google ML)
 - Google Cloud Functions Ready
 - Multi Language Support
- More control - Cloud Machine Learning Engine or Cloud TPU's
 - TensorFlow Model Creation
 - Access to high throughput/spec machines

Google Cloud Platform - Machine Learning - Cloud TPU

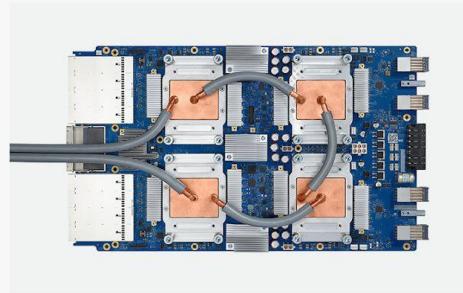
Cloud TPU offering



Cloud TPU v2

180 teraflops

64 GB High Bandwidth Memory (HBM)



Cloud TPU v3 Alpha

420 teraflops

128 GB HBM



Cloud TPU v2 Pod Alpha

11.5 petaflops

4 TB HBM

2-D toroidal mesh network

Google Cloud Platform - Databases

- Cloud SQL
 - MySQL or Postgres
- BigTable
 - Low latency
 - Useful for AdTech (instant response)
 - NoSQL
- Cloud Spanner
 - Mission Critical Relational Database
 - Transactional
 - Powers Google Search
- Lots of others like:
 - Cloud Datastore
 - Cloud Firestore
 - Firebase Realtime Database

Google Cloud Platform - Databases

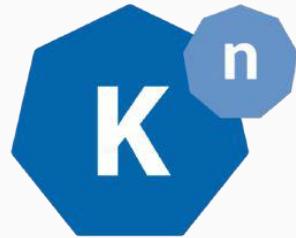
Cloud Spanner: The best of the relational and non-relational worlds

	CLOUD SPANNER	TRADITIONAL RELATIONAL	TRADITIONAL NON-RELATIONAL
Schema	✓ Yes	✓ Yes	✗ No
SQL	✓ Yes	✓ Yes	✗ No
Consistency	✓ Strong	✓ Strong	✗ Eventual
Availability	✓ High	✗ Failover	✓ High
Scalability	✓ Horizontal	✗ Vertical	✓ Horizontal
Replication	✓ Automatic	⌚ Configurable	⌚ Configurable

Google Cloud Platform - Serverless

- <https://cloud.google.com/serverless/>
- Cloud Functions
 - Less language coverage than AWS Lambda
 - Only recently out of Beta
- App Engine
 - Essentially bundle your apps (EG. Express) automatically in to Docker containers and deploy
- Cloud Pub/Sub
 - Like SNS - Message Architecture - Zero Config
- Kubernetes Engine Serverless AddOn
 - Run your own Kubernetes cluster whilst providing ability to deploy serverless apps to it
- Cloud Build
 - Serverless build and deployment pipelines

Google Cloud Platform - Kubernetes - OOTB



+ On-Prem

Google Cloud Platform - The Good and The Bad

Good	Bad
GCP Product Strategy	GCP Product Strategy
Developer ready - PaaS, Serverless, Firebase	Cloud functions language coverage
Machine Deep Learning made (slightly) accessible	Less documentation of lower level config like VPC, Security
Serverless Offering Growing	IAM and Service Accounts