

# AWS Vs Azure Vs GCP

Author: Nho Luong

Skill: DevOps Engineer Lead

Microsoft

Nho Luong

has successfully passed all requirements for

Microsoft Certified: Azure Solutions Architect Expert

Credential ID: 3c53d14d253f551  
Certification number: 46f9fb-703f58  
Earned on: June 14, 2024  
Expires on: June 15, 2025

Microsoft EXPERT

Online Verifiable

aws certified

nho luong

AWS Certified Solutions Architect - Professional

VALIDATION NUMBER: 119ee670510e4bb99fe2956152effb7e  
VALIDATE AT: <https://aws.amazon.com/verification>

Issue Date: June 21, 2024  
Expiration Date: June 21, 2024

alpine metrics | aws

HOME PROFILE EXAM REGISTRATION EXAM HISTORY CERTIFICATIONS BENEFITS DIGITAL BADGES SUPPORT AND FAQS

PROFESSIONAL: AWS Certified Solutions Architect - Professional SAF AWS Certified Security - Specialty SCS

ACTIVE DATE: 2024-06-19 EXPIRATION DATE: 2027-06-21

ACTIVE DATE: 2024-06-19 EXPIRATION DATE: 2027-06-17

ACTIVE DATE: 2024-06-19 EXPIRATION DATE: 2027-06-21

ACTIVE DATE: 2024-06-19 EXPIRATION DATE: 2027-06-21

VIEW MORE

FOUNDATIONAL: AWS Certified Cloud Practitioner CLF

ACTIVE DATE: 2024-06-27 EXPIRATION DATE: 2027-06-21

Certification status

NHO LUONG AWS04440591

Activity 4 items

Training

Plans

Challenges

Credentials

Q&A

Achievements

Collections

Transcript

CERTIFICATION Microsoft Certified, DevOps Engineer Expert  
Expires on June 15, 2025 at 03:59 AM (UTC) • Earned on June 14, 2024

CERTIFICATION Microsoft Certified, Azure Solutions Architect Expert  
Expires on June 15, 2025 at 03:59 AM (UTC) • Earned on June 14, 2024

CERTIFICATION Microsoft Certified, Azure Administrator Associate  
Expires on June 15, 2025 at 03:59 AM (UTC) • Earned on June 14, 2024

CERTIFICATION Microsoft Certified, Azure Fundamentals  
Earned on May 24, 2024



Sponsors

# Welcome to something a little different

Continuation of our DevOps event series Very interactive format !

Lean Beer™ style Feedback very welcome ! Future topics might  
include:

Puppet vs Ansible

Docker vs Packer

Prometheus vs ELK

ELK vs Splunk



# AWS Vs Azure Vs GCP



Author: Nho Luong

Skill: DevOps Engineer Lead

# What are we going to do?

- Overview - 60 minutes
  - 20 - AWS
  - 20 - Azure
  - 20 - GCP
- Breakout into groups to discuss - 30 minutes
  - Positives
  - Negatives
  - Decisions
- Each group shares their key findings with the others - 30 minutes
- Vote & declare the winner, then beers.

# Pillars of Cloud Services

Scalability  
Availability  
Resiliency  
Management  
Security  
Infrastructure  
Compute  
Storage  
Networking



# 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

INFINITY WORKS

Author: Nho Luong

Skill: DevOps Engineer Lead

# 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

Author: Nho Luong

Skill: DevOps Engineer Lead

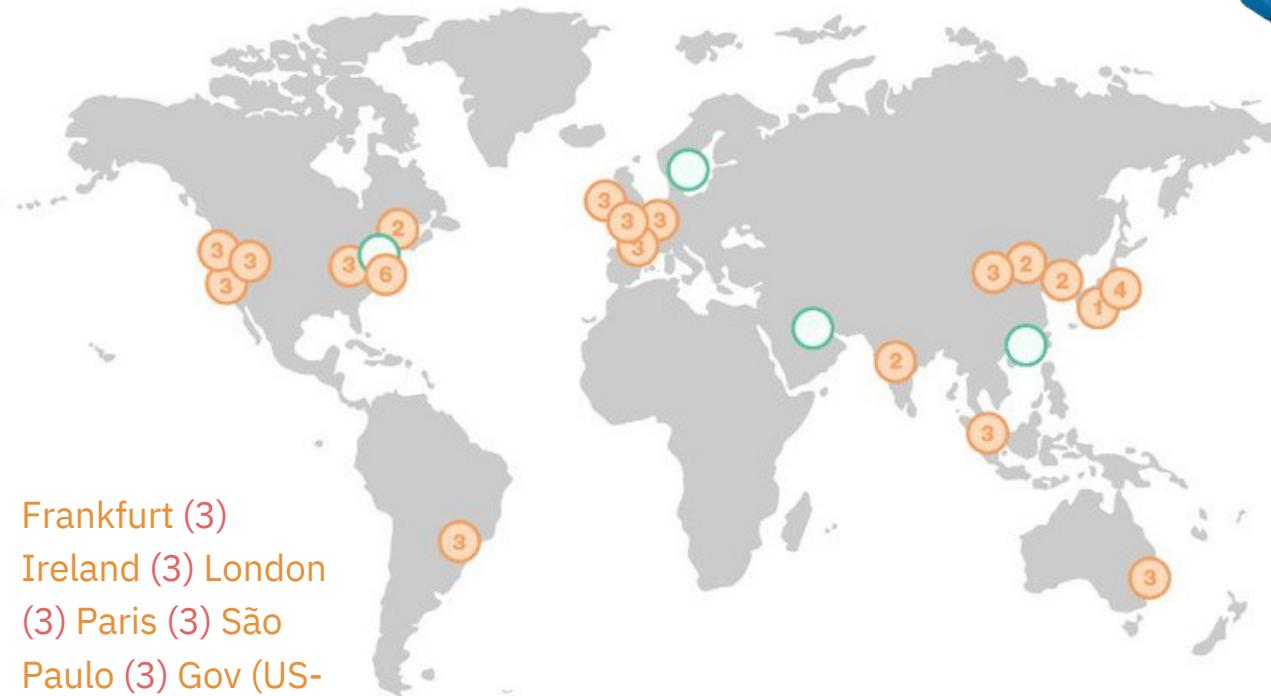
# Regions & Availability Zones



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)

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



Over 120 Edge locations

# Who uses AWS

Gartner



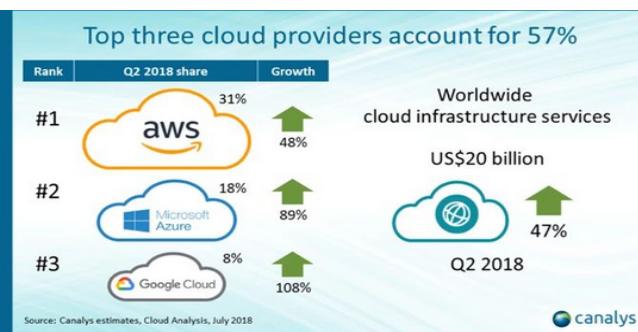
All Sizes of customers - over 1,000,000 customers

Baidu 百度



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



TERADATA



FORTINET®

..|.|.|.|.  
CISCO™

TREND MICRO™

paloalto NETWORKS®



# Supports Many different Languages - Lambda



- 4.3
- 6.1
- 0

- 8.1
- 0
- 2.
- 7



- 1.0
- 2.0
- 2.1 +



Invoking a  
Lambda Function  
On Demand



- 1.X



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

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

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

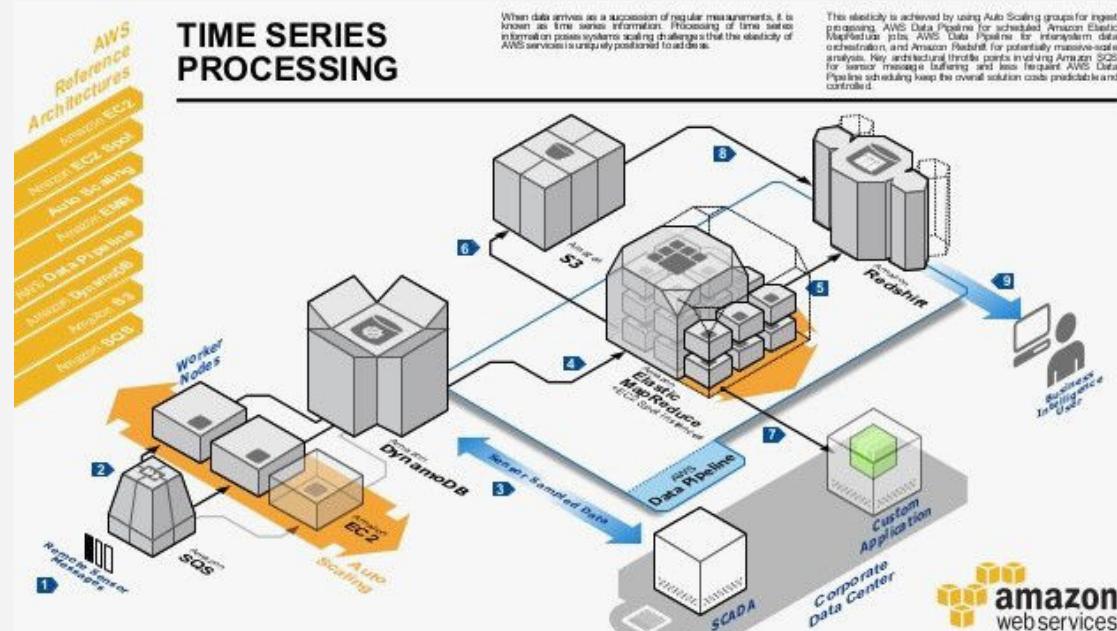
Placement Groups - Allows reduced network distance

- **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

- Email services

SNS

- Topics and Subscriptions push notifications



SNS, SES

Author: Nho Luong

Skill: DevOps Engineer Lead

# 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

Author: Nho Luong

Skill: DevOps Engineer Lead

Educate

STORAGE & CONTENT DELIVERY

Amazon S3

**5 GB**

of standard storage

COMPUTE

Elastic Load Balancing

**750 Hours**

per month shared between Classic and Application load balancers

COMPUTE

Amazon EC2

**750 Hours**

per month

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

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!"*

Author: Nho Luong

Skill: DevOps Engineer Lead

## 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



Author: Nho Luong

Skill: DevOps Engineer Lead

# 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



### Hybrid Operations



### Integration



### Analytics & IoT



### Data



### Media & CDN



## Infrastructure Services

### Compute



### Storage



### Networking



## Datacenter Infrastructure ( 54Regions)

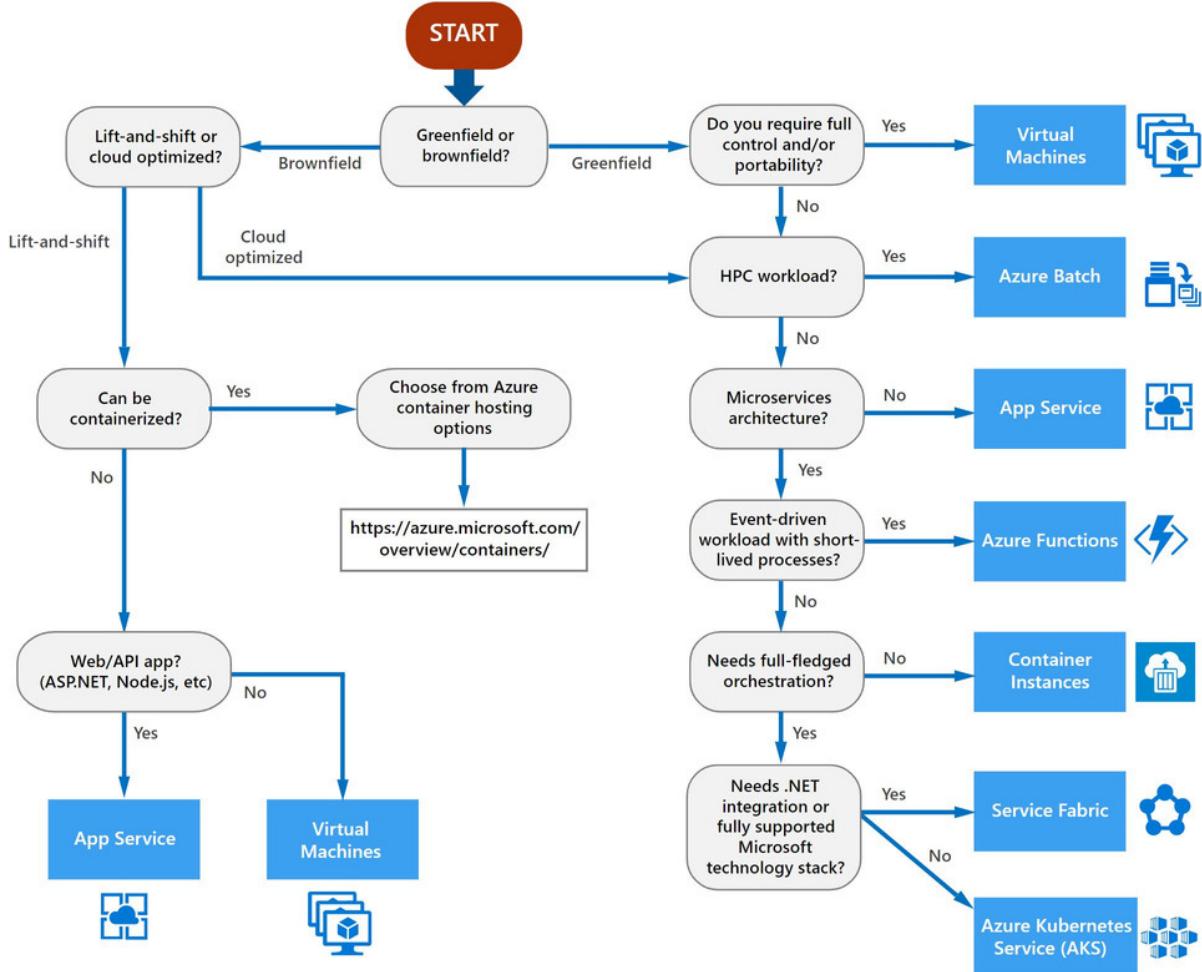


Author: Nho Luong

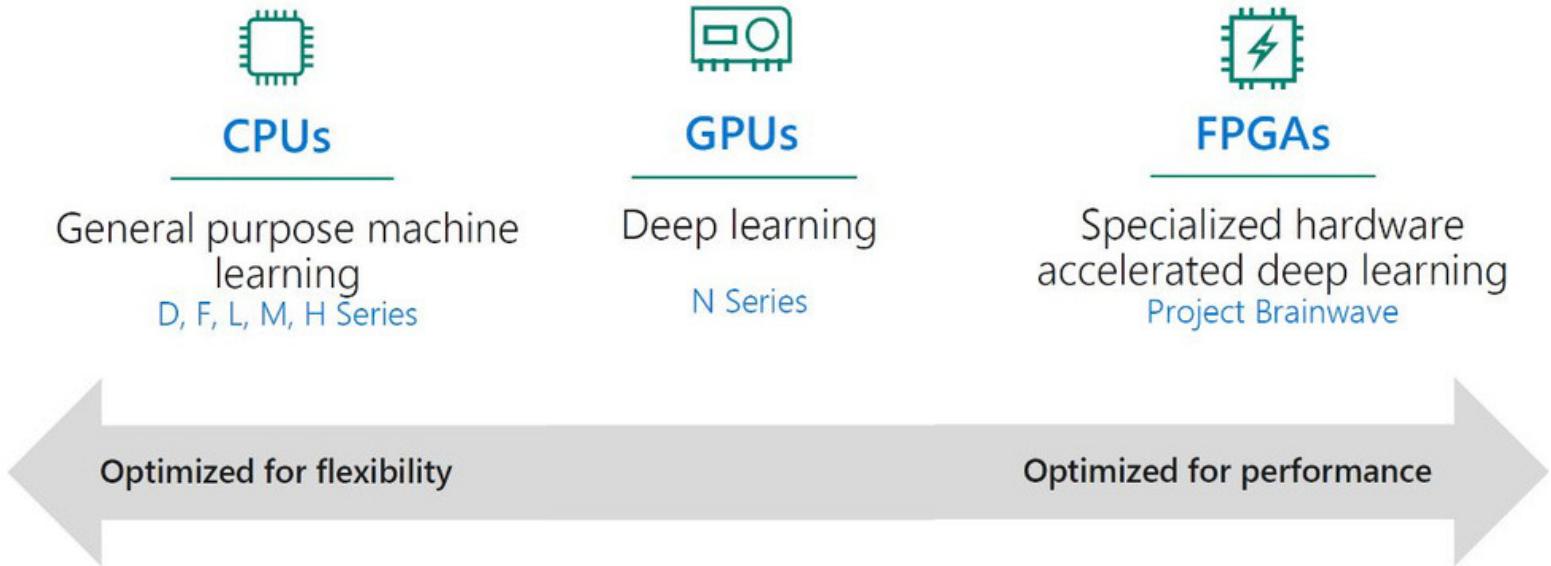
Skill: DevOps Engineer Lead

# Azure Compute

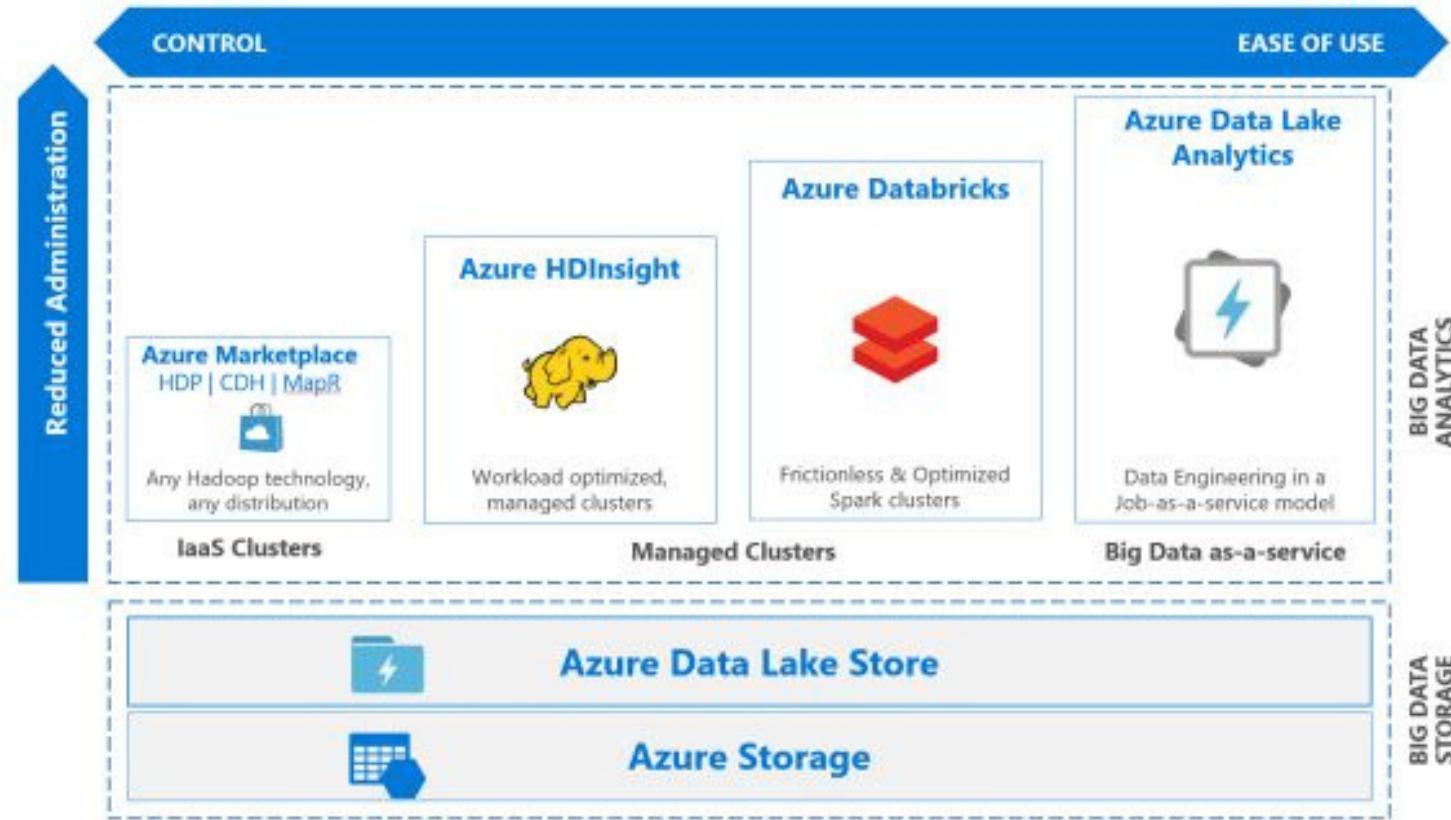
Virtual Machines Windows  
Virtual Machines Linux VMs  
Virtual Machine Scale Sets  
Azure Batch Azure  
Container Service  
Container Instances Azure  
Container Service  
Kubernetes Service Azure  
Container Registry Cloud  
Services Service Fabric  
Service Fabric Mesh Azure  
Functions  
Azure Batch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



# The Compute Power



# KNOWING THE VARIOUS BIG DATA SOLUTIONS

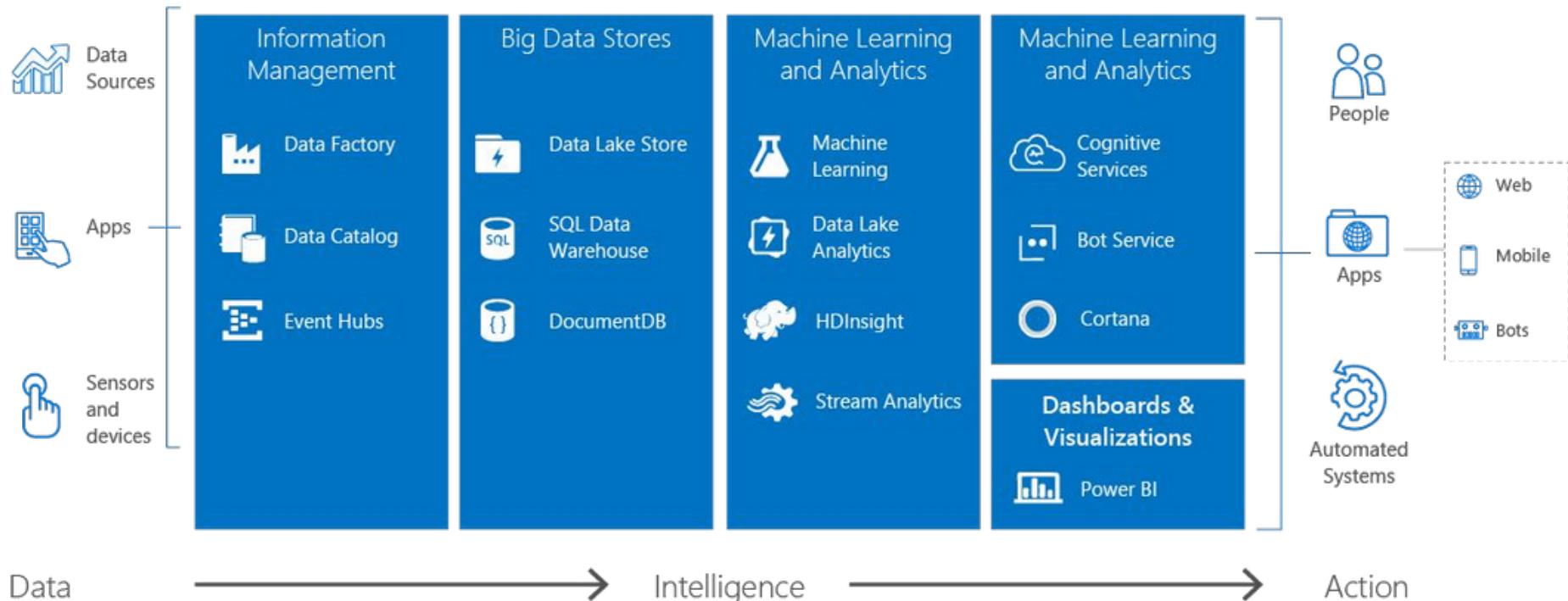


# Azure Data Storage and Analytics

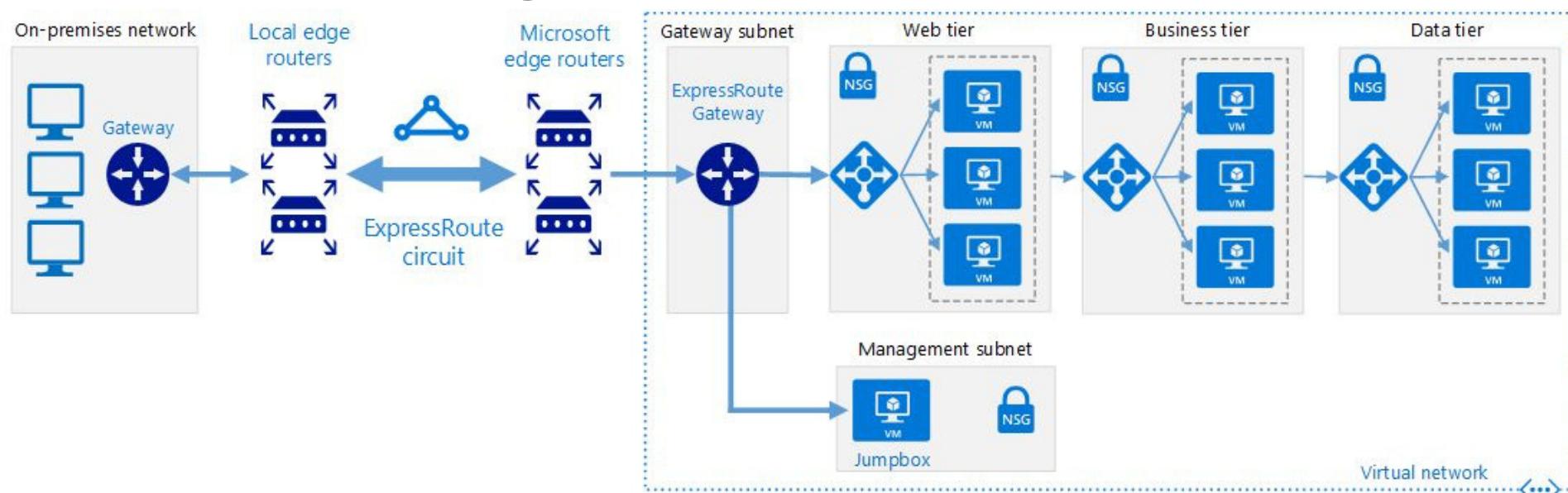


- Azure SQL Database
- Azure Data Warehouse\*
- Azure Data Lake Store
- Azure Storage Azure
- Cosmos DB\*
- Azure Data Factory\*
- Event Hub Event Grid IoT hub Stream Analytics Data Catalog Data Explorer\*
- Machine Learning\*
- Data Lake Analytics\*
- HDInsight Azure
- Databricks Analysis Services\*

# Azure Analytics in Action



# Azure Networking



- Virtual Network
- Load Balancer
- Azure DNS
- Traffic Manager
- Data Gateway

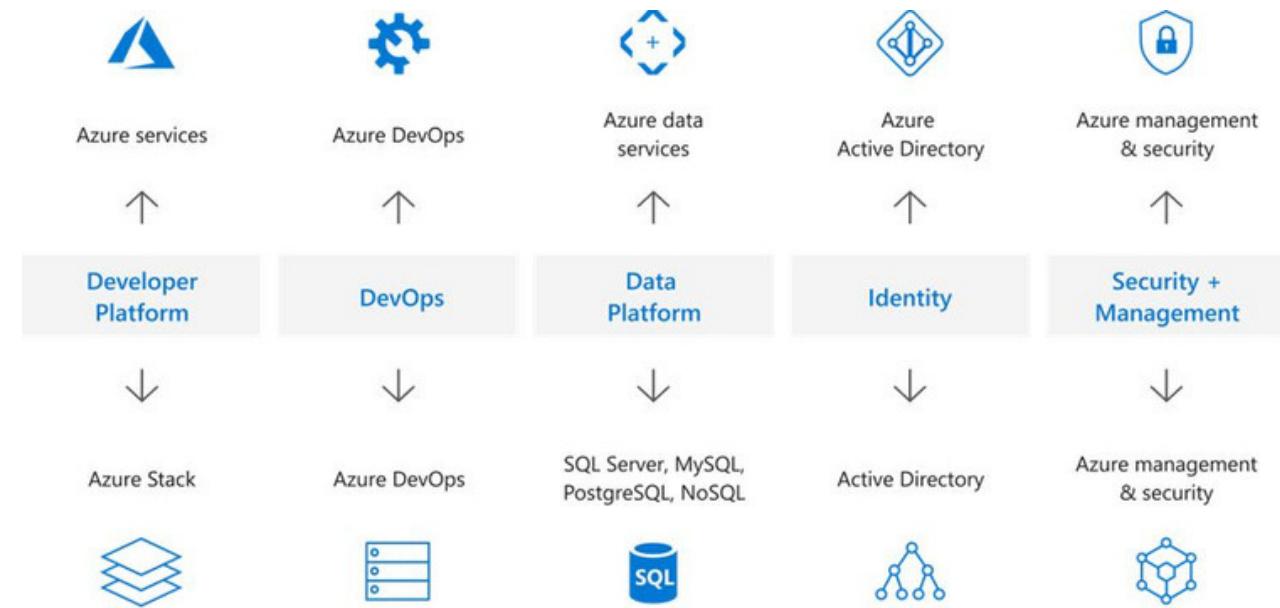
- VPN Gateway
- ExpressRoute
- Application Gateway
- Network Watcher
- CDN

Author: Nho Luong

Skill: DevOps Engineer Lead

# Azure Hybrid Integration

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



# 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
- 
- 
- 

## Framework

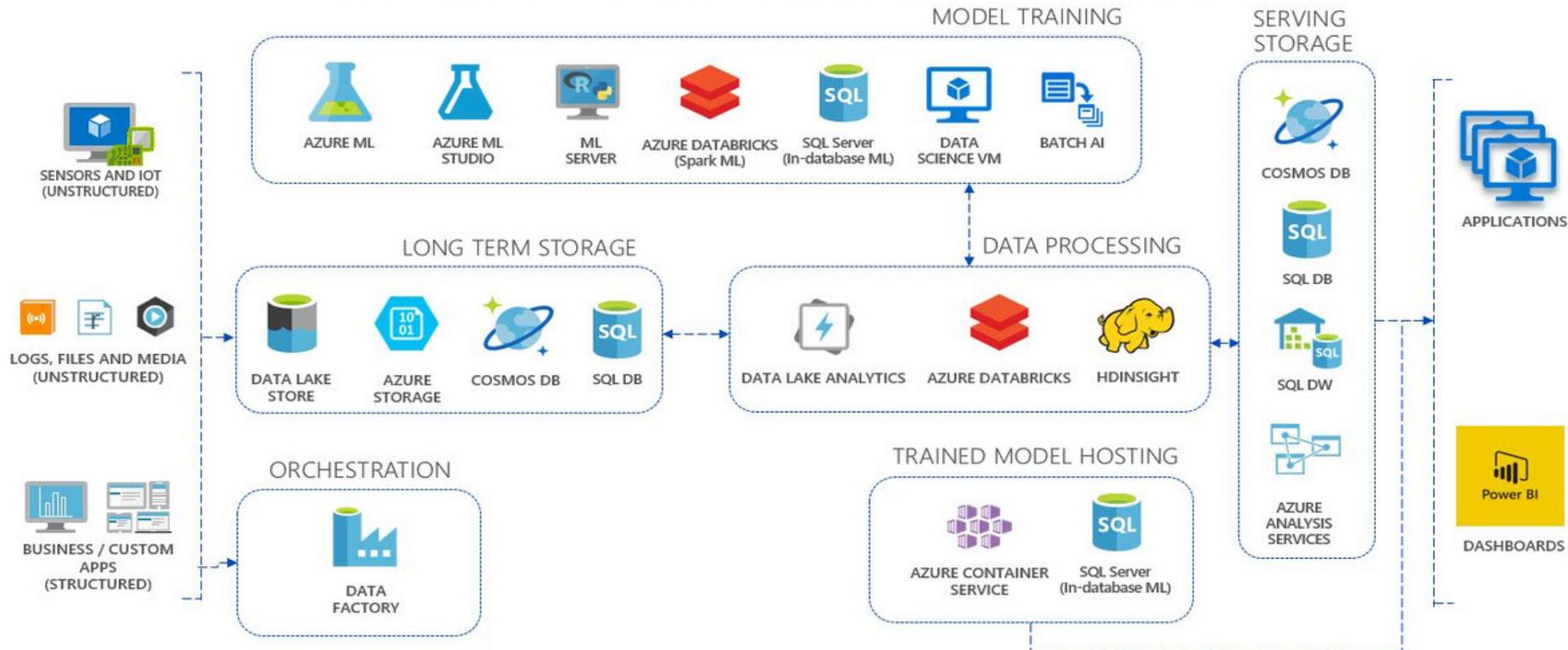
- CNTK
- ONNX
- TensorFlow
- Pytorch
- MXNet
- Caffe2

## 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

I

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
- 
- 
- 

## Negative

s

- 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

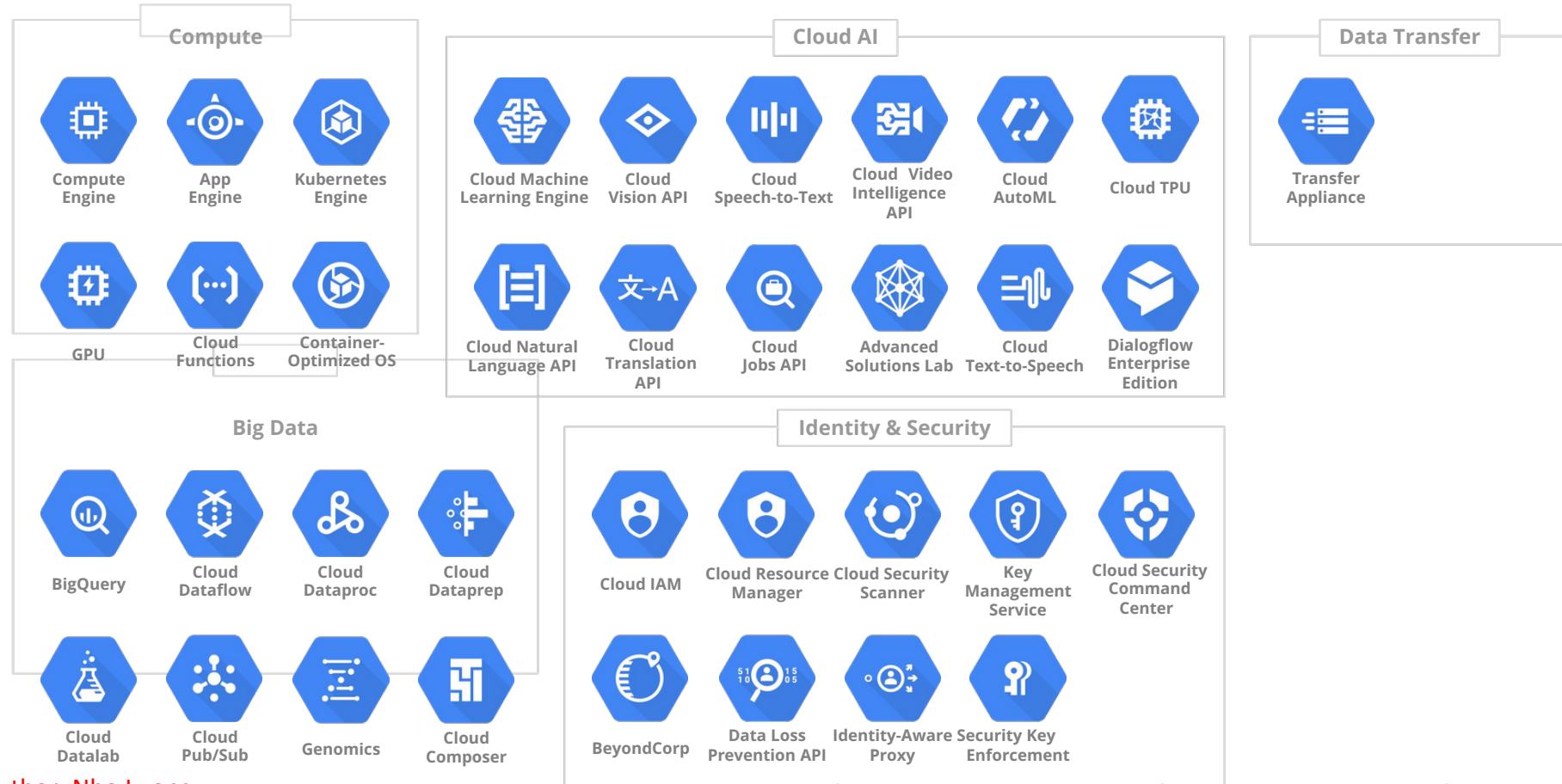
## Experience

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

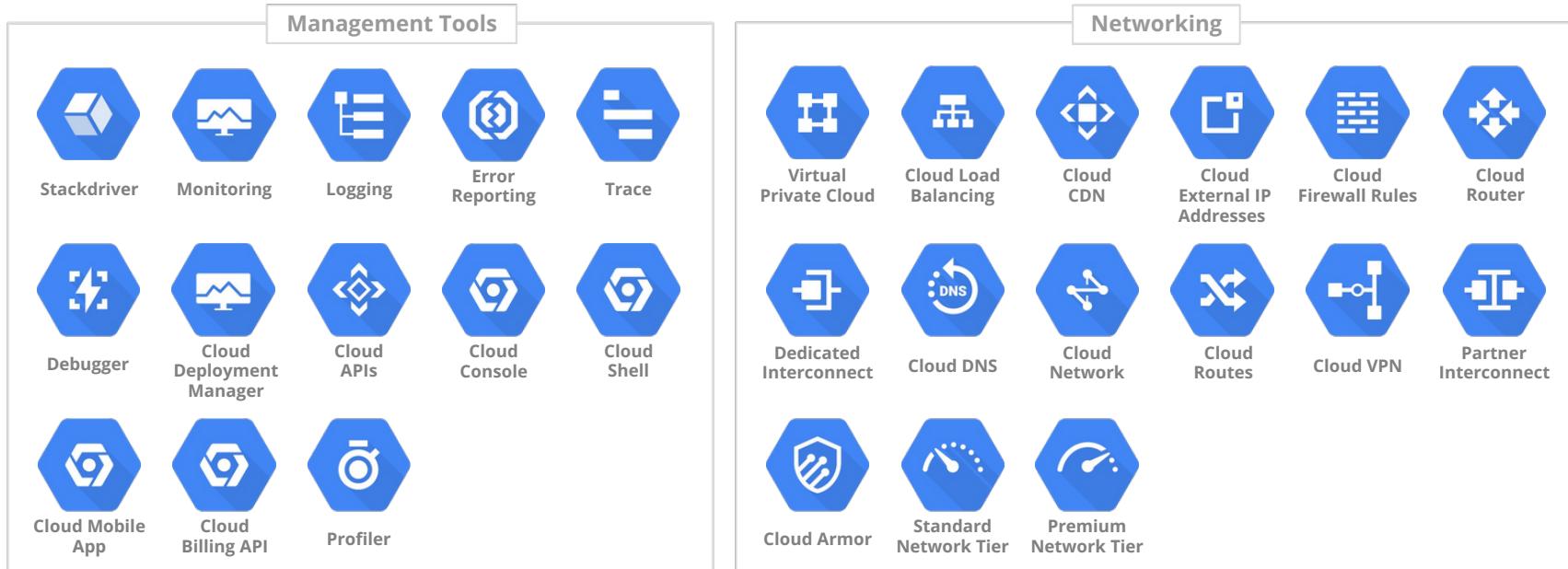


Author: Nho Luong

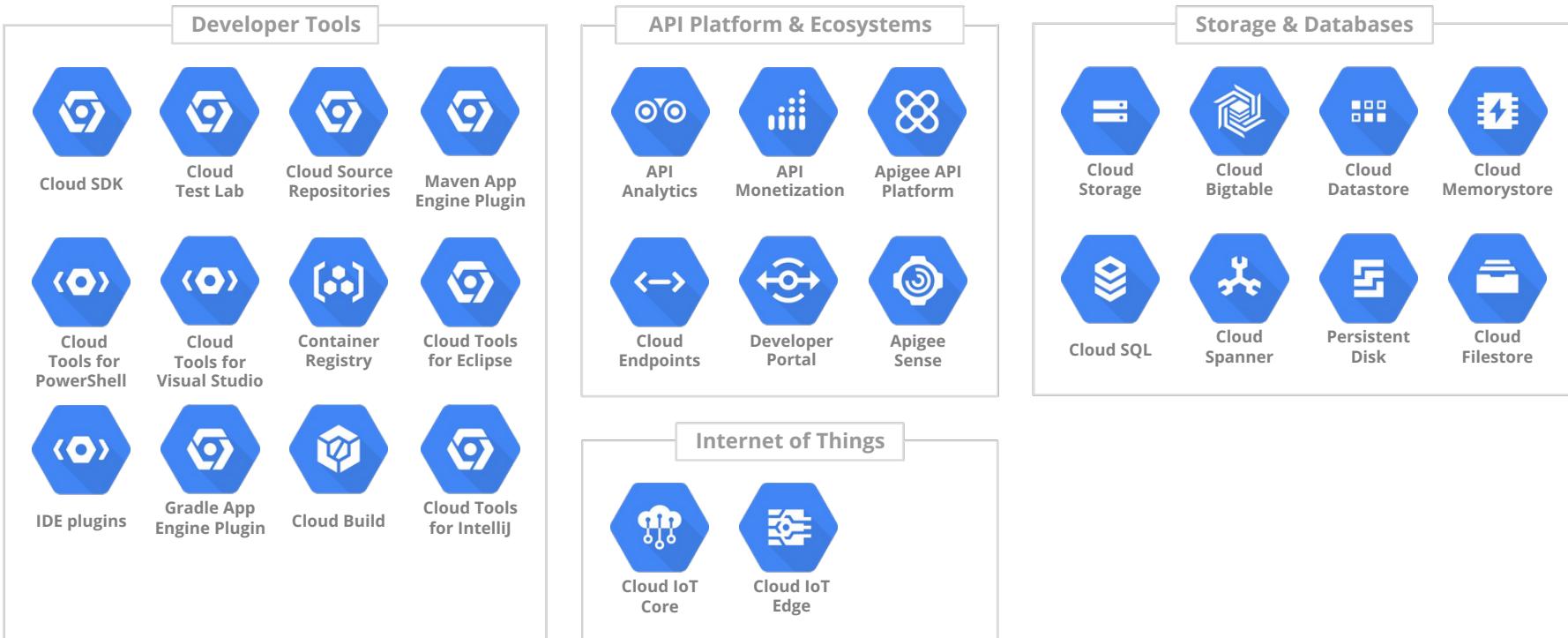
Skill: DevOps Engineer Lead

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



# Google Cloud Platform Icons



Author: Nho Luong

Skill: DevOps Engineer Lead

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.

# Regions and Zones

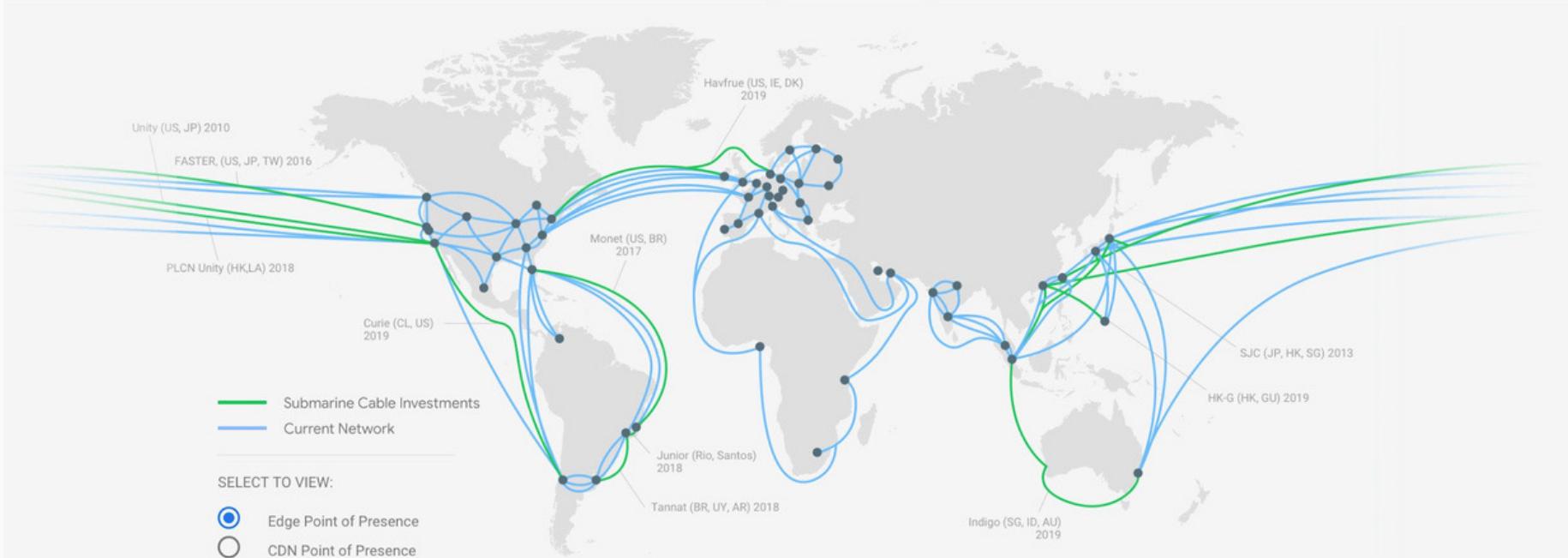


\* While some regions may launch with 2 zones, all regions are planned for a minimum of 3 zones.

Author: Nho Luong

Skill: DevOps Engineer Lead

# Network



Author: Nho Luong

Skill: DevOps Engineer Lead

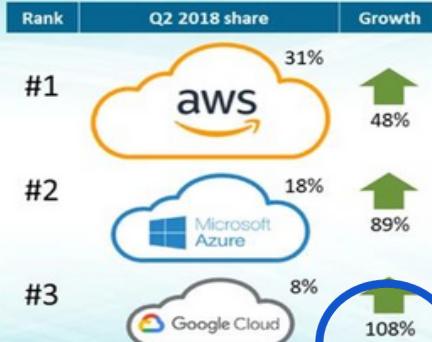
# Where is GCP going

Totally ripped off this slide - Yoink!

Thanks Steven

<-- No Worries

Top three cloud providers account for 57%



Gartner®



Author: Nho Luong

Skill: DevOps Engineer Lead

## 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.
<b>28</b> Instance hours per day	<b>5 GB</b> Cloud Storage	<b>1 GB</b> 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.
<b>5 GB-Months</b> Regional storage	<b>10 GB</b> Messages per month	<b>2 million</b> Invocations per month

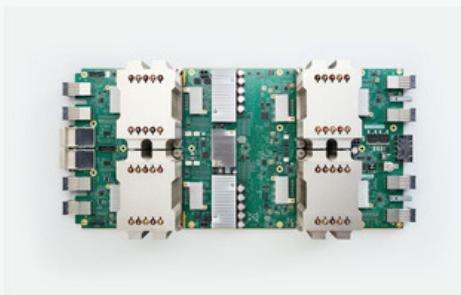
Author: Nho Luong

Skill: DevOps Engineer Lead

# 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>  
L
- 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

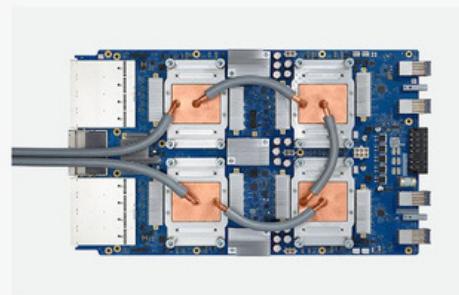
## Cloud TPU offering



Cloud TPU v2

180 teraflops

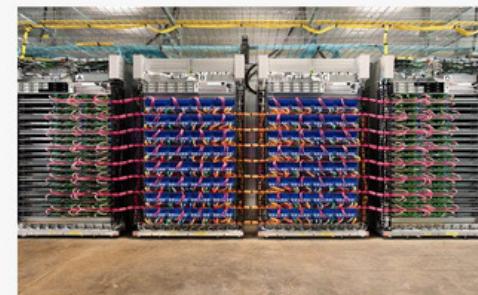
64 GB High Bandwidth Memory (HBM)



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	Ba
GCP Product Strategy Developer ready -	GCP Product Strategy Cloud
PaaS, Serverless, Firebase	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

# Personal experiences

- Which services have you had good experiences with Where have you found gaps / poor experiences

Please spread Azure & Google experience around the groups - use colour codes !

# Lean Coffee

- Everyone writes down what they want to talk about, writes questions they have, or ideas they want to discuss on a post-it and sticks it down A volunteer
- de-duplicates the post-its for a group Everybody puts 3 dots on the post-its
- they most want to talk about Start a 5-minute timer and start talking about
- the most-voted-for post-it, starting with the person who wrote the post-it When the timer beeps, everyone votes on whether they want another 2 mins
- If it's time to move on, pick up the next most-voted-for post-it At the end of
- the session, each group decides what they'd like to share with everyone
-

# TIME TO VOTE



Open in a browser: <https://kahoot.it/>

Prepare to enter an 8 digit PIN (number)

Enter your name

Wait.....

Vote!



# Thank You