AWS Introduction
AWS AI/ML stack and practice
AWS Resources for education

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It's always Day 1

Amazon.com passed many milestones in 1997…

But this is Day 1 for the Internet and, if we execute well, for Amazon.com. Today, online commerce saves customers money and precious time. Tomorrow, through personalization, online commerce will accelerate the very process of discovery.

Amazon.com uses the Internet to create real value for its customers and, by doing so, hopes to create an enduring franchise, even in established and large markets.

貝佐斯在1997年寫下了「第1天」的意思：
　　…如果我們做得還算不錯的話，這算得上是造就了Amazon.com與互聯網的「第一天」。在今天，線上商務為客戶節省了大量的金錢和寶貴的時間。 透過個人化，明天的線上商務將進一步加速這樣的過程。 Amazon.com使用網際網路為我們的客戶創造了實際的價值，藉此並希望創建一個即便面對更成熟與大型的市場，仍然可長可久的經銷模式。

It's always Day 1

True Customer Obsession

Resisting Proxies

Embracing External Tailwinds

High Velocity Decision Making

amazon marketplace

It's always Day 1

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It's always Day 1

True Customer Obsession

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High Velocity Decision Making

INTRODUCING
amazon go

Day 2
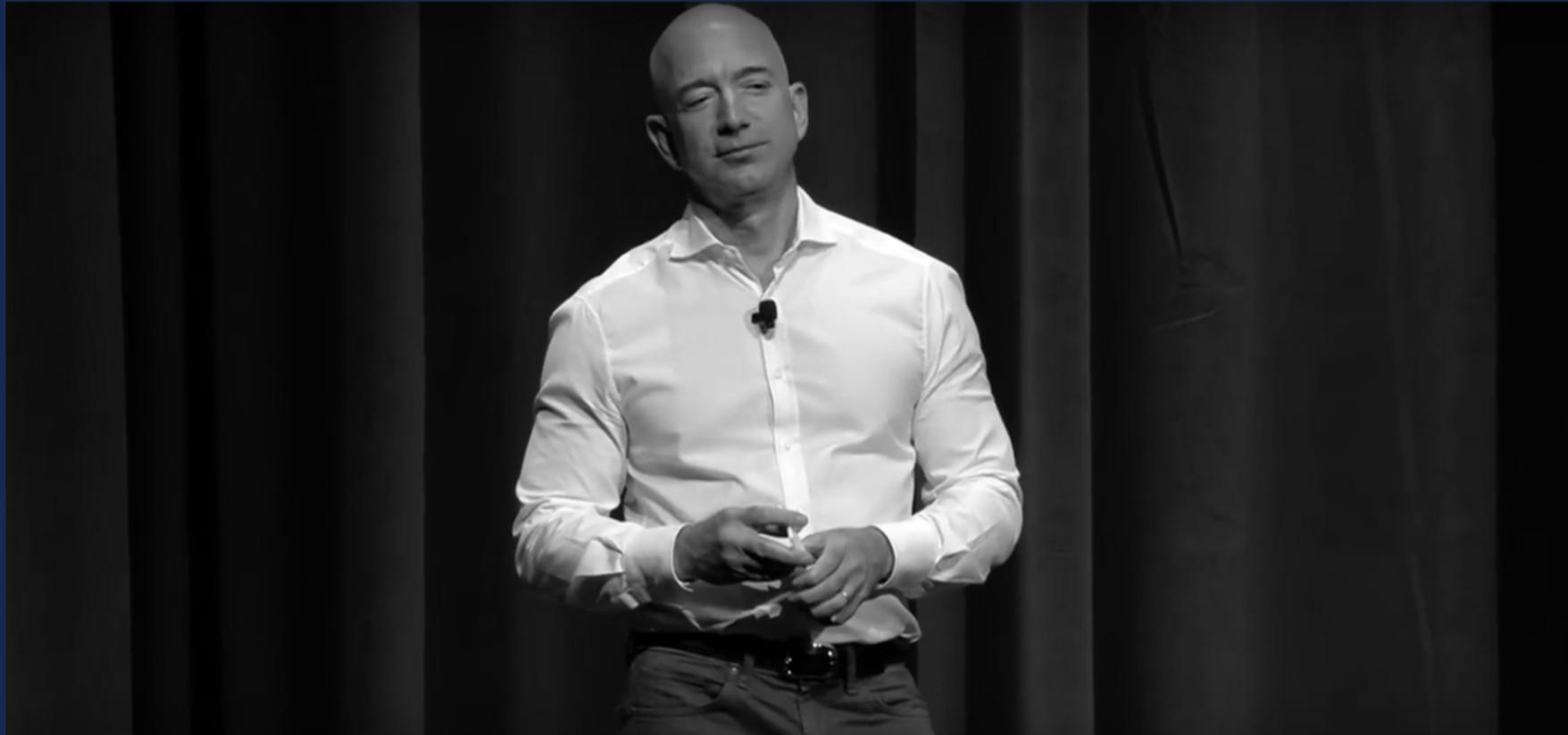
"Day 2 is decline, followed by death. That is why it is always Day 1."

Jeff Bezos, Amazon

對於貝佐斯來說,他絕不想讓Amazon進入到「Day 2」,因為:

"Day 2是停滯不前的,其次是無關緊要的。隨之而來的是令人難以忍受的痛苦與衰退,隨後死亡。 這就是為什麼我們總是要活在「Day 1」。"

Stay as the Day1Company with AWS
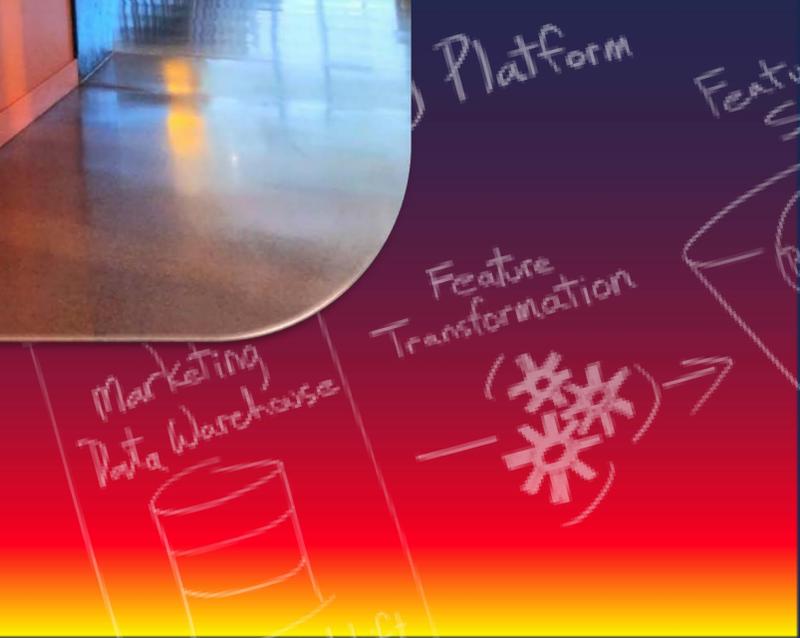
Digital Transformation and Cloud Journey

Amazon is innovating across many domains

Drone Development

Video Streaming

Kindle

In-house Entertainment

Grocery Delivery

Advanced Shopping

Cloud Computing

Home Automation

"Why Amazon Is The World's Most Innovative Company Of 2017"
fastcompany.com

Culture

Amazon Leadership Principles

Customer Obsession
Ownership
Invent and Simplify
Are Right, A Lot
Hire and Develop the Best
Insist on the Highest Standards
Think Big
Bias for Action
Frugality
Learn and Be Curious
Earn Trust
Dive Deep
Have Backbone; Disagree and Commit
Deliver Results

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SPEED VS QUALITY OF DECISION

"…most decisions should probably be made with somewhere around 70% of the information you wish you had.
If you wait for 90%, in most cases, you're probably being slow"

"If you're good at course correcting, being wrong may be less costly than you think, whereas being slow is going to be expensive for sure."

Letter to Shareholders - April 12, 2017

Mechanisms

"WE'RE NOT COMPETITOR OBSESSED, **WE'RE CUSTOMER OBSESSED**. WE START WITH WHAT THE CUSTOMER NEEDS AND WE WORK BACKWARDS."

Press Release

When you write your press release, imagine that your customer is going to read it.
It's a one-page narrative explaining your vision using customer-centric language

- No Marketing Buzz Words (e.g. simple, easy, fast). The reader decides if it's "easy" to use.

- The most important info first. No one reads past the first paragraph.

- Only metrics and data that matters to the customer (e.g. their time, their money).

Innovation and the Working Backwards Process
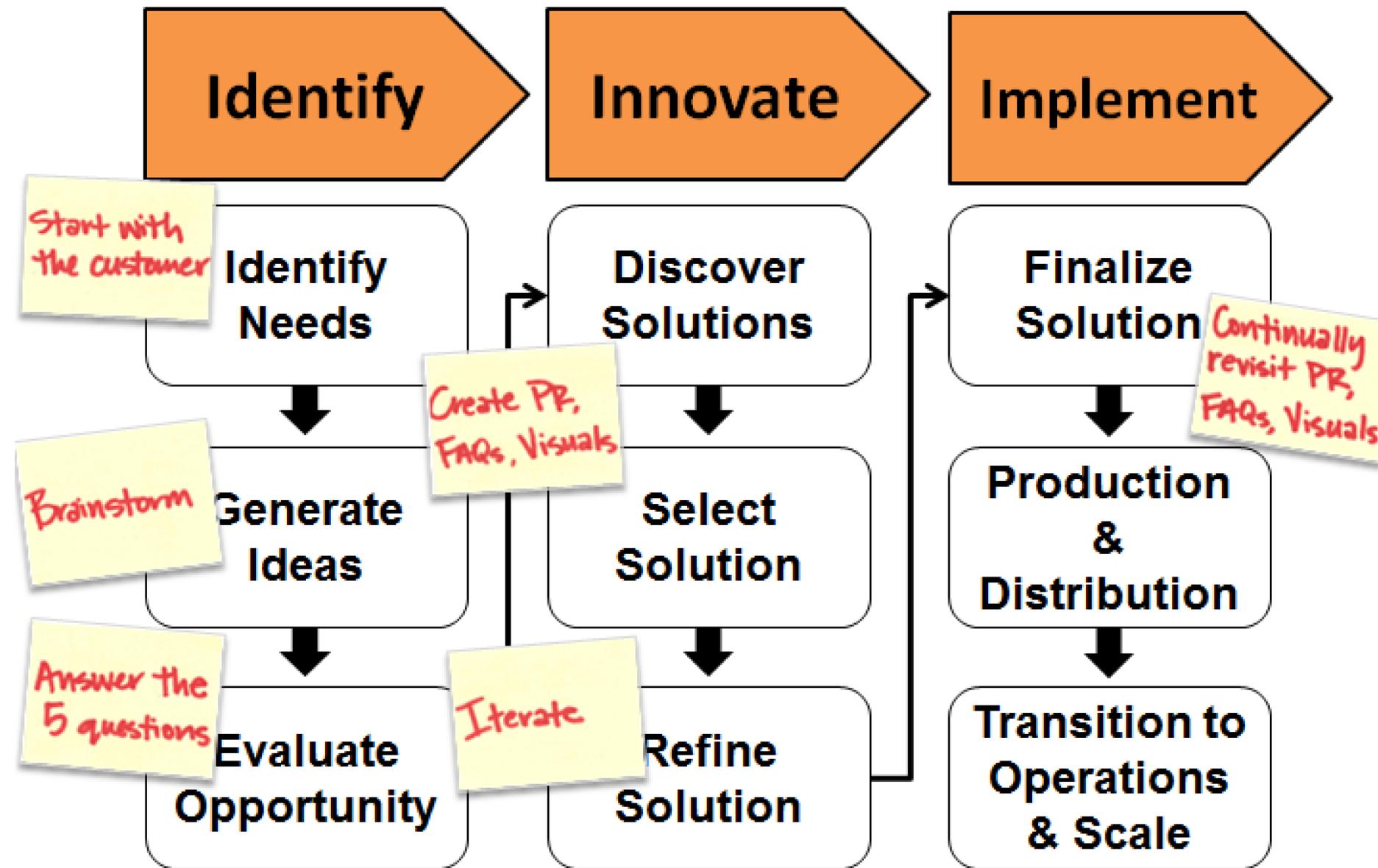
Organisation

Pushing Decisions Down

2 PIZZA TEAMS

Characteristics

Outcome-based

Iterative

Optimize for Responsiveness

Empowerment & Autonomy

Feedback & Learning

Safety & Trust

amazon
web services

Amazon Web Services since 2006

- Any decision can be undone
- Disagree and commit with yourself
- Act with 70% information

Typical weekly traffic to Amazon.com
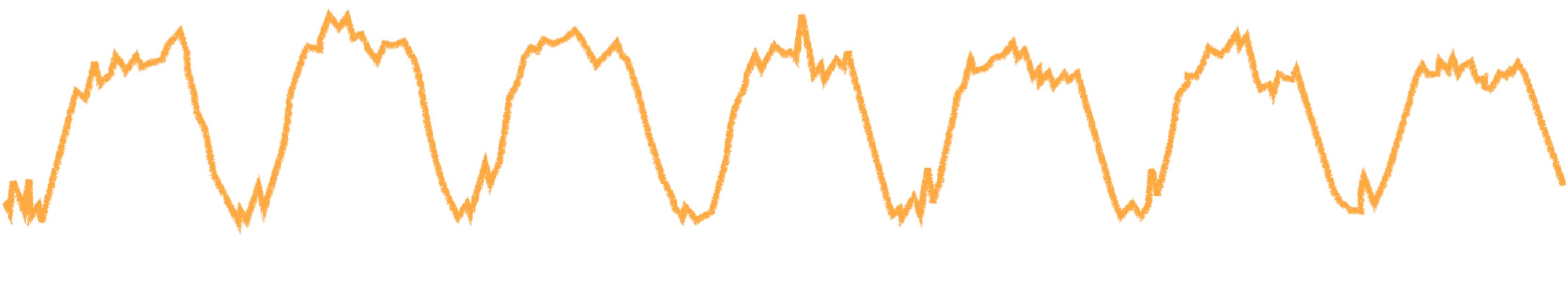
Sunday Monday Tuesday Wednesday Thursday Friday Saturday

November traffic to Amazon.com

November

November traffic to Amazon.com

Provisioned capacity

November

November traffic to Amazon.com

Provisioned capacity

76%

24%
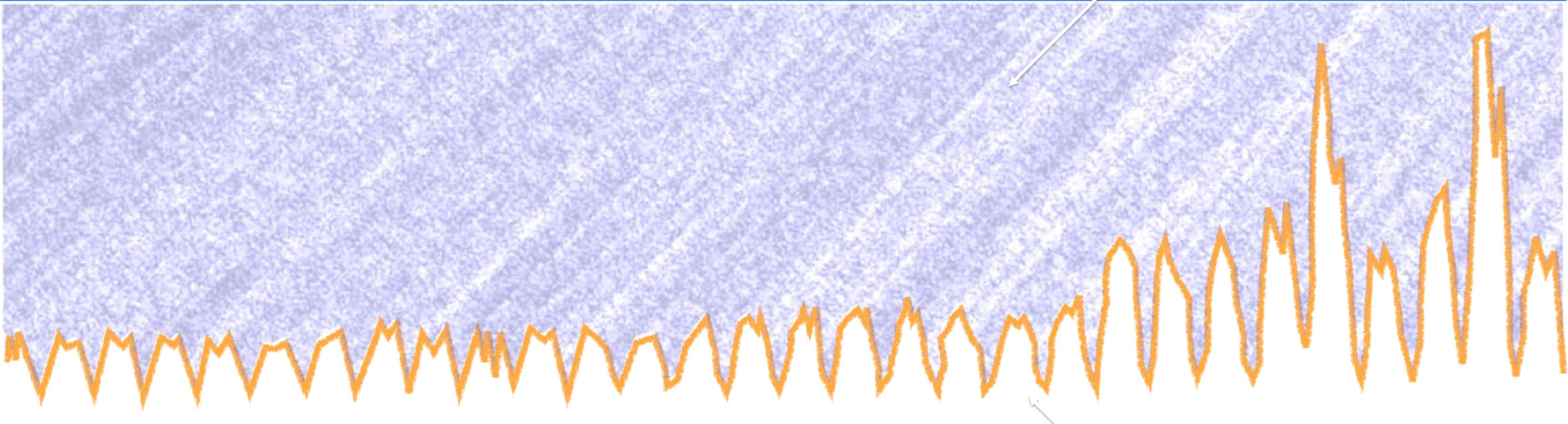
November

A quick update on the AWS business...

$27b
revenue run rate
(ANNUALIZED FROM Q4 2018)

49%
y/y growth
(Q4 2018 VS Q4 2017)

Millions of
active customers

2008   2009   2010   2011   2012   2013   2014   2015   2016   2017   TODAY

aws
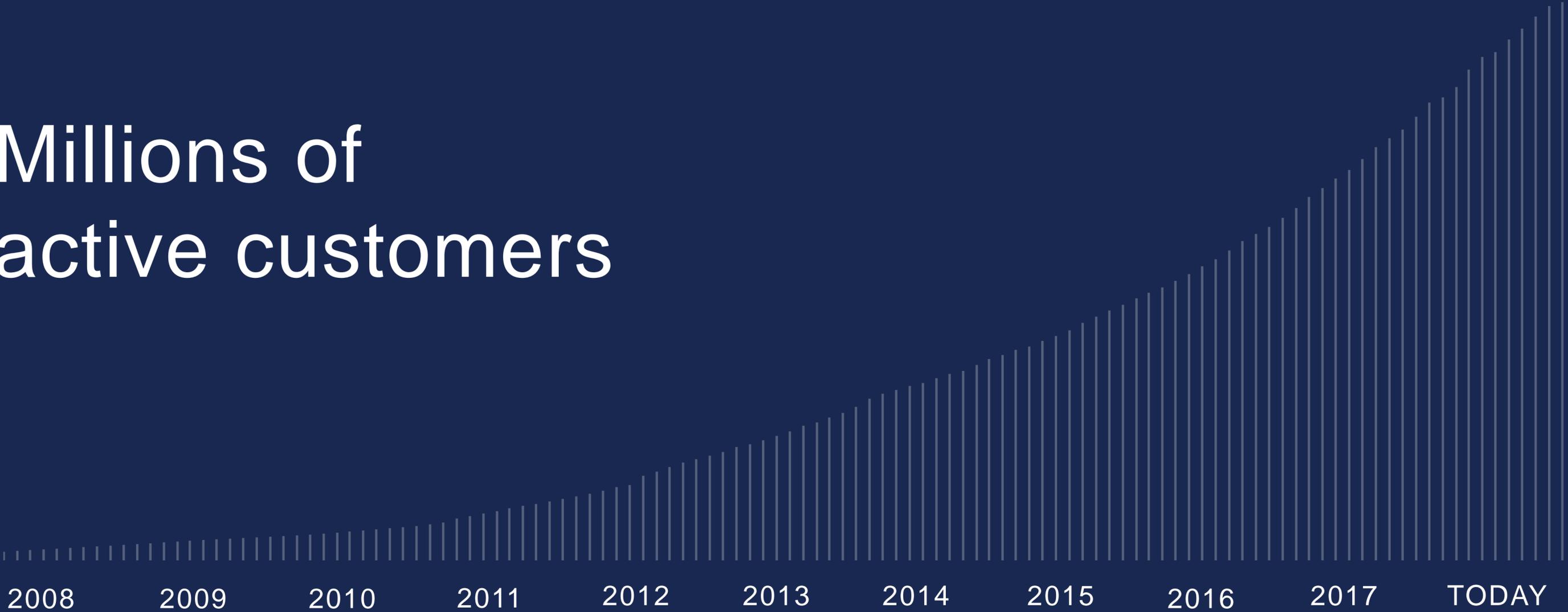
MOST ROBUST, FULLY FEATURED TECHNOLOGY INFRASTRUCTURE PLATFORM

TECHNICAL & BUSINESS SUPPORT

Support	Professional Services	Optimization Guidance	Partner Ecosystem	Training & Certification	Solutions Management	Account Management	Security & Billing Reports
							Personalized Dashboard

MARKETPLACE

Business Apps	Business Intelligence	DevOps Tools	Security	Networking	Databases	Storage

ANALYTICS

Data Warehousing	Elasticsearch
Business Intelligence	Data Pipelines
Hadoop/Spark	Interactive SQL Queries
Streaming Data Analysis	ETL
Streaming Data Collection	

APP SERVICES

Queuing & Notifications	Email
Workflow	Transcoding
Search	

DEV OPS

- One-click App Deployment
- Resource Templates
- Build & Test
- Application Lifecycle Management
- DevOps Resource Management
- Triggers
- Containers
- Analyze & Debug
- Patching

MOBILE SERVICES

- API Gateway
- Single Integrated Console
- Identity
- Sync
- Mobile Analytics
- Mobile App Testing
- Targeted Push Notifications

IoT

- Rules Engine
- Device Shadows
- Device SDKs
- Device Gateway
- Registry
- Local Compute

MACHINE LEARNING

- Custom Model Training & Hosting
- Image & Scene Recognition
- Facial Recognition & Analysis
- Facial Search
- Text to Speech
- Conversational Chatbots
- Deep Learning (Apache MXNet, TensorFlow, & others)

ENTERPRISE APPS

- Virtual Desktops
- Sharing & Collaboration
- Corporate Email
- App Streaming
- Communications
- Contact Center

HYBRID ARCHITECTURE

- Data Integration
- Integrated Networking
- Integrated Identity & Access
- Integrated Resource & Deployment Management
- Integrated Devices & Edge Systems

MIGRATION

- Schema Conversion
- Exabyte-Scale Data Migration
- Application Migration
- Database Migration
- Server Migration

INFRASTRUCTURE

- Regions
- Availability Zones
- Points of Presence

CORE SERVICES

Compute
VMs, Auto-scaling, Load Balancing, Containers, Virtual Private Servers, Batch Computing, Cloud Functions, Elastic GPUs, Edge Computing

Storage
Object, Blocks, File, Archivals, Import/Export, Exabyte-scale data transfer

Databases
Relational, NoSQL, Caching, Migration, PostgreSQL compatible

Networking
VPC, DX, DNS

CDN

SECURITY & COMPLIANCE

|				
Identity Management	Access Control	Monitoring & Logs	Assessment & Reporting	Web Application Firewall
Configuration Compliance	Key Management & Storage	Account Grouping	Resource & Usage Auditing	DDOS Protection

MANAGEMENT TOOLS

Manage Resources	Service Catalogue	Configuration Tracking
Monitoring	Server Management	Resource Templates

GovCloud (US-West)

Oregon

N. California

São Paulo

Ohio

GovCloud (US-East)

N. Virginia

Montréal

London

Ireland

Paris

Milan

Frankfurt

Cape Town

Stockholm

Bahrain

Mumbai

Ningxia

Beijing

Singapore

Hong Kong

Seoul

Tokyo

Sydney
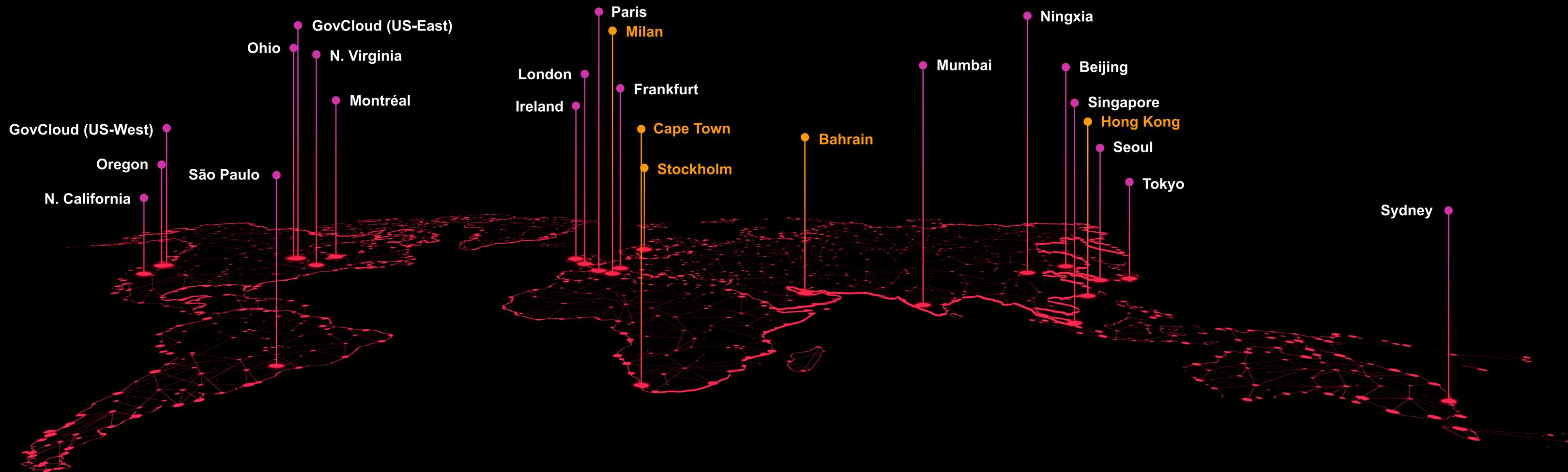
■ Active Regions   ■ Announced Regions

Fully-scaled Availability Zone
Highly redundant regional network
with **massive** capacity
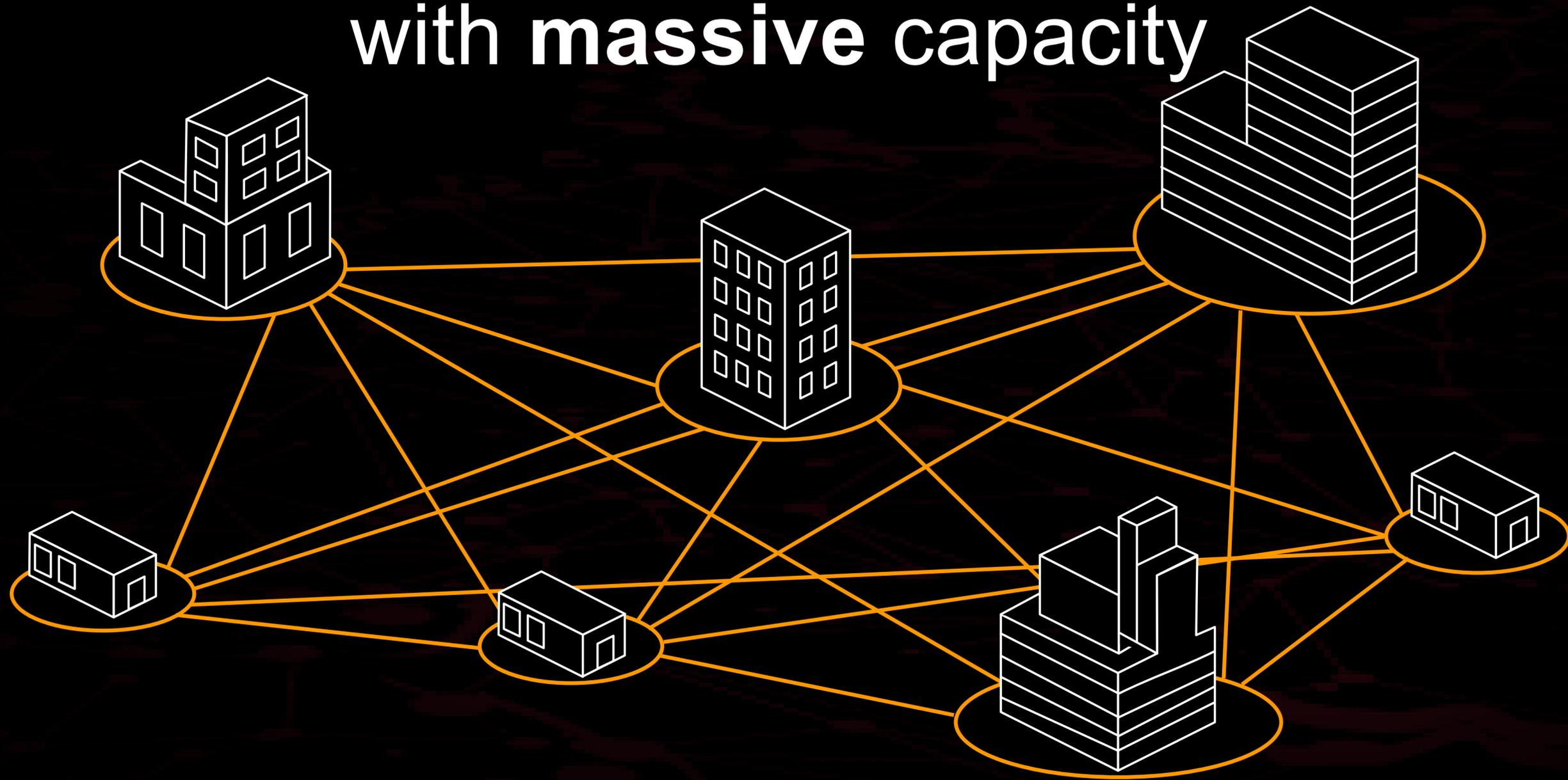
亞馬遜雲端運算服務 (AWS)

AWS Positioned as a Leader in the IDC MarketScape: Worldwide Infrastructure as a Service 2017 Vendor Assessment*

"AWS has effectively defined and led the core offering portfolio in the public cloud IaaS market."

IDC MarketScape Worldwide Infrastructure as a Service 2017

Leaders

Amazon Web Services

Microsoft

Google

Major Players

IBM

Capabilities

Fujitsu

Contenders

Rackspace

Participants

Strategies

AI/ML case

- https://www.youtube.com/watch?v=HHbBizyTet4
- NFL Next Gen Stats

https://www.youtube.com/watch?v=-T4CXkFkfXw

- F-1 Insight https://aws.amazon.com/tw/f1insights/

AWS re:Invent

aws CIO advisory council
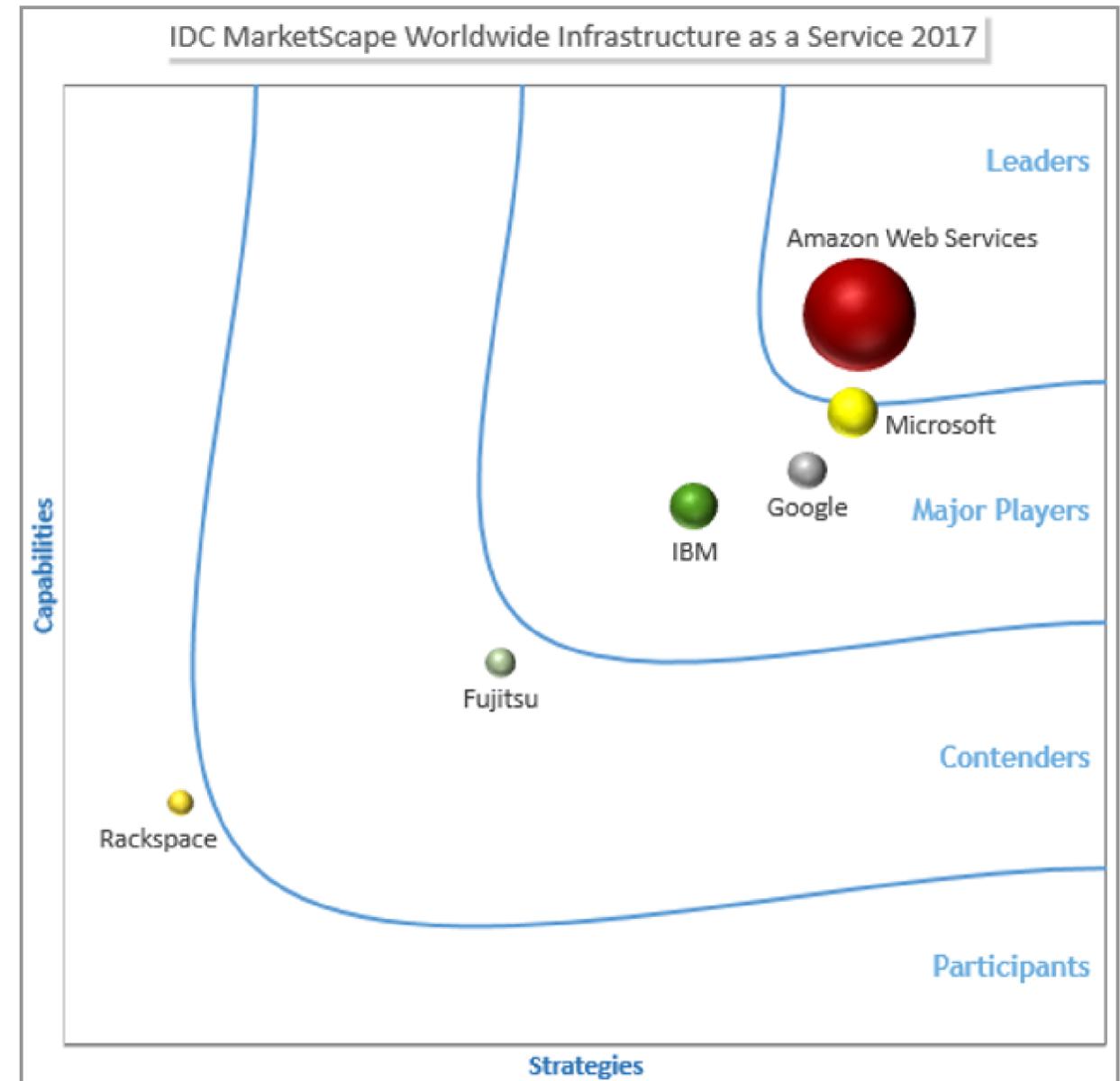
"AIoT" (AI and IoT) – Industrial Trend

ML: Train in the Cloud, Infer at the Edge

- ✓ Process State
- ✓ Product Quality
- ✓ Equipment Health
- ✓ Output Forecast
- ✓ Equipment Efficiency
- ✓ Leak Detection
- ✓ Asset Planning
- ✓ Ops Optimization
- ✓ Tool Productivity

Data Transport & Routing

AWS IoT Core

Data Aggregation, Enrichment, Cleansing, Time Series, Model Config

AWS IoT Analytics

Endpoints

a:FreeRTOS

AWS Greengrass

Data Collection, Model Inference

Amazon SageMaker

Machine Learning & Model Generation
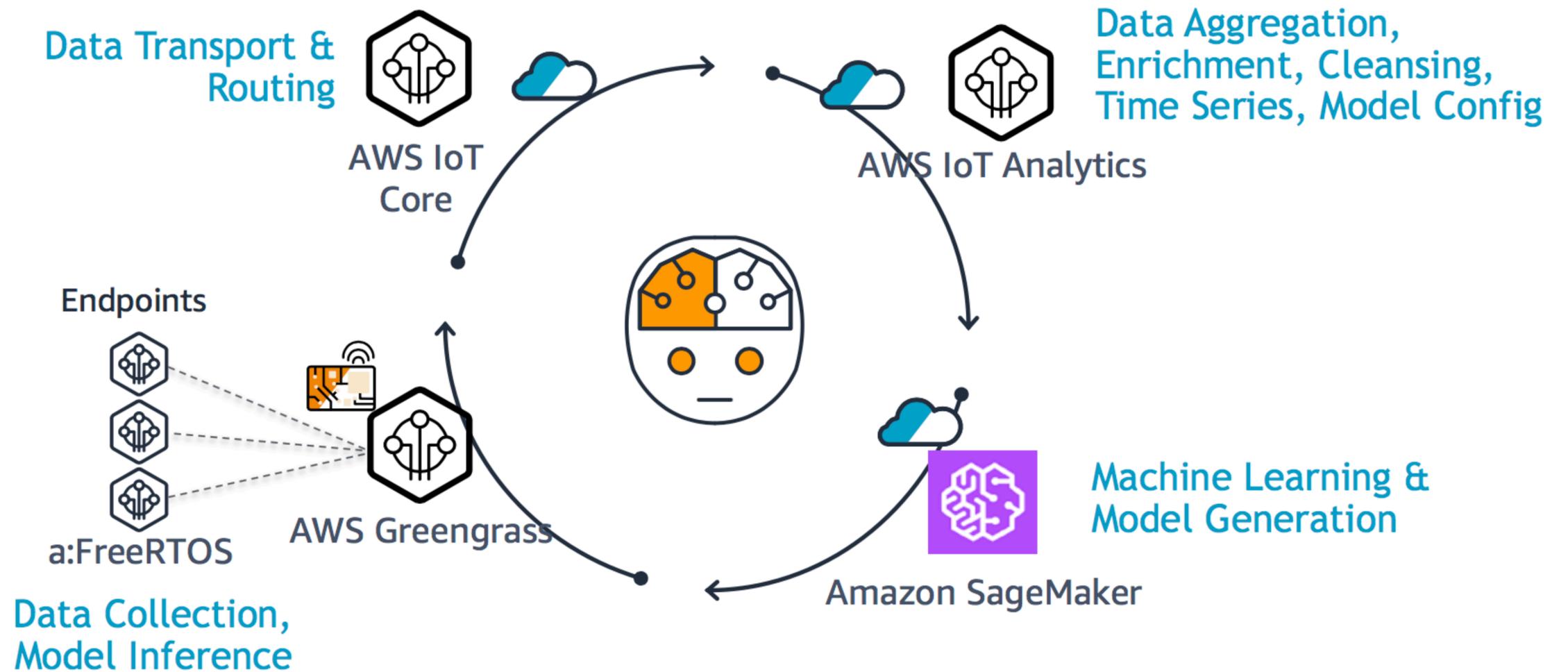
The Amazon ML stack: Broadest & deepest set of capabilities

	Vision			Speech		Language		Chatbots	Forecasting	Recommendations

AI SERVICES

REKOGNITION IMAGE | REKOGNITION VIDEO | TEXTRACT | POLLY | TRANSCRIBE | TRANSLATE | COMPREHEND | LEX | FORECAST | PERSONALIZE

AMAZON SAGEMAKER   AWS DeepLens   AWS DEEP RACER

ML SERVICES

BUILD
Pre-built algorithms & notebooks

Data labeling (GROUND TRUTH)

Algorithms & models (AWS MARKETPLACE FOR MACHINE LEARNING)

TRAIN
One-click model training & tuning

Reinforcement learning

Optimization (NEO)

DEPLOY
One-click deployment & hosting

Frameworks   Interfaces   Infrastructure

ML FRAMEWORKS & INFRASTRUCTURE

TensorFlow   GLUON   EC2 P3 & P3dn   EC2 C5   FPGAs   GREENGRASS   ELASTIC INFERENCE

mxnet   K Keras

PYTORCH

aws

More ML happens on AWS than anywhere else

**Tens of thousands**
of active developers
running ML on AWS

250%
growth YoY

2x
customer references

8 out of 10
of all TensorFlow
workloads in the
cloud run on AWS

TENSORFLOW ON AWS
Nucleus Research, December 2017 - Report R206

aws

Natural Language Processing at Clemson University – 1.1 Million vCPUs & EC2 Spot Instances

- ## 1.1M vCPUs at peak execution in a single AWS Region

- ## Total of 1,832,923 vCPU hours

- ## 2 hours of run time

- ## $32,423 total execution cost

- ## **Average of 1.72¢ per core hour**

Concurrent vCPUs in US East (Northern Virginia)
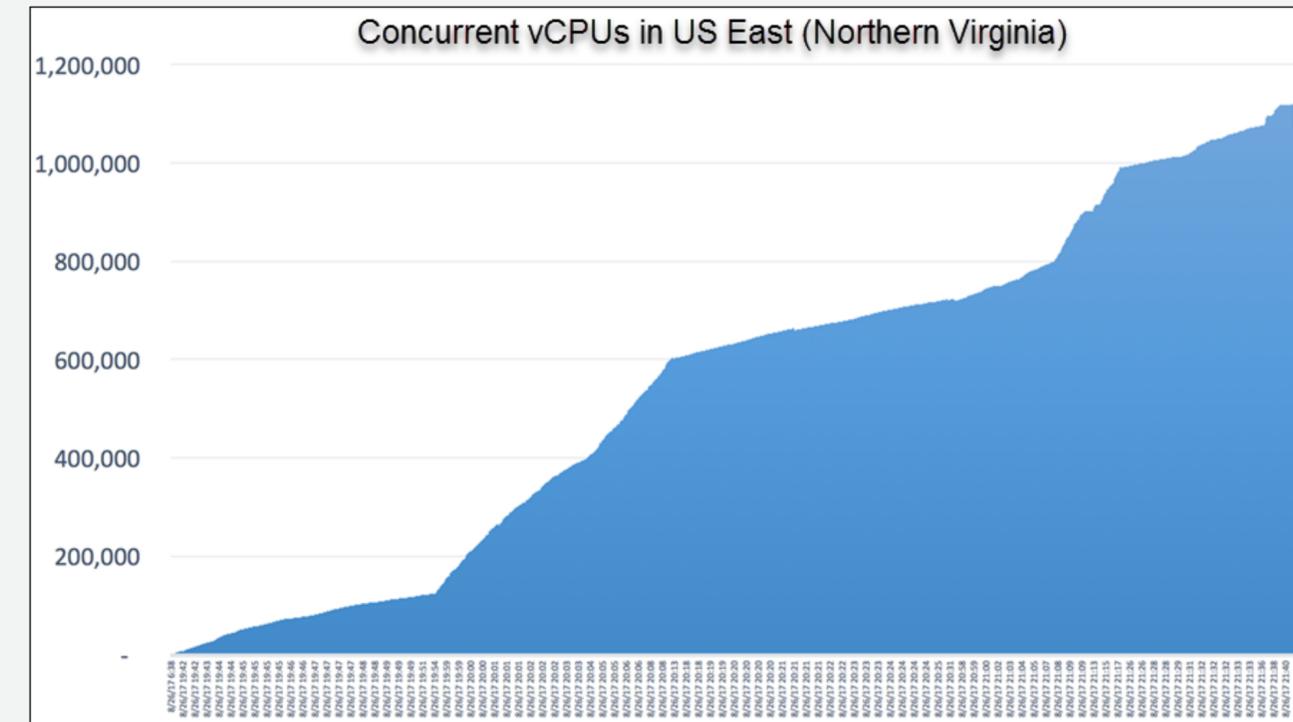
I am absolutely thrilled with the outcome of this experiment. The graduate students on the project are amazing. They used resources from AWS and Omnibond and developed a new software infrastructure to perform research at a scale and time-to-completion not possible with only campus resources. Per-second billing was a key enabler of these experiments. ~Professor Amy Apon, Co-Director of the Complex Systems, Analytics and Visualization Institute at Clemson University

aws

Amazon Translate
…a "pocket" knife on amazon.de

Amazon Translate

…a happy customer wrote

★★★★★ **Spitze!**

Von ▬▬▬ am 30. Juni 2015

Wirklich ein sehr gutes Taschenmesser. Habe gestern nach dem Frühstück etwas Mohn zwischen den Zähnen hängen gehabt. Da ich mal wieder keine Zahnstocher gefunden habe, bestellte ich mir kurzerhand dieses Taschenmesser. Der integrierte Zahnstocher (Nr. 3) ist sehr stabil und ich konnte meine Zähne sehr schnell reinigen. Super! Zu dem Rest kann ich leider nichts sagen, da ich ihn nicht benötige.

Really a very good Pocket knife. Had yesterday after breakfast something poppy hang between the teeth. Because I once again found no toothpicks, I ordered mine without further ADO this pocket knife. The integrated toothpick (Nr. 3) is very stable and very quickly I could clean my teeth. Super! To the rest I can tell nothing unfortunately because I him not be emergency.

aws

Amazon Translate
…the neural version

"Really a very good pocket knife. Had a little poppy between the teeth yesterday after breakfast. Since I didn't find a toothpick again, I ordered this pocket knife shortly. The integrated toothpick (No.3) is very stable and I could clean my teeth very quickly. Great! I can't say anything about the rest because I don't need it."

aws

適用於教育及學術研究機構之AWS計畫

適用於教育及學術研究機構之AWS計畫

教學及證照

Educate: 旨在為學生和教育人員提供所需的資源，以大幅加速與雲端相關的學習，並協助提升未來企業家、人力和研究人員的能力。

Academy: 為大專院校提供 AWS 課程，以協助學生所需的雲端運算技能，並做好取得業界認可 AWS 證照的準備。

資料及研究

Public Data Sets: 託管可開放大眾免費使用的資料集。在AWS平台上分享數據，可讓世界各地的使用者據此進行研究及建置服務，而無需購置伺服器或儲存容量。

Credits for Research: 提供 AWS雲端資源給研究暨學術單位從事研究計畫暨研究開發與應用。

新創及商轉

**Activate**: 為新創公司提供快速開始使用 AWS 所需的資源 – 包括雲端服務、培訓和支援。

Market Place: 透過AWS 的全球佈建，可以迅速將你的服務或解決方案擴展到全球。

Solution Architect 解決方案架構師
協助客戶在學習、研究、新創及佈署上給予架構上的建議及優化
以達到雲端資源的最佳運用

AWS Educate program benefits
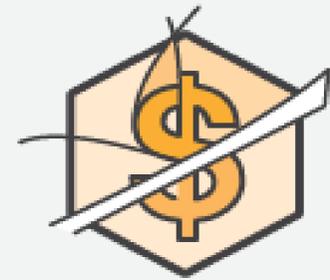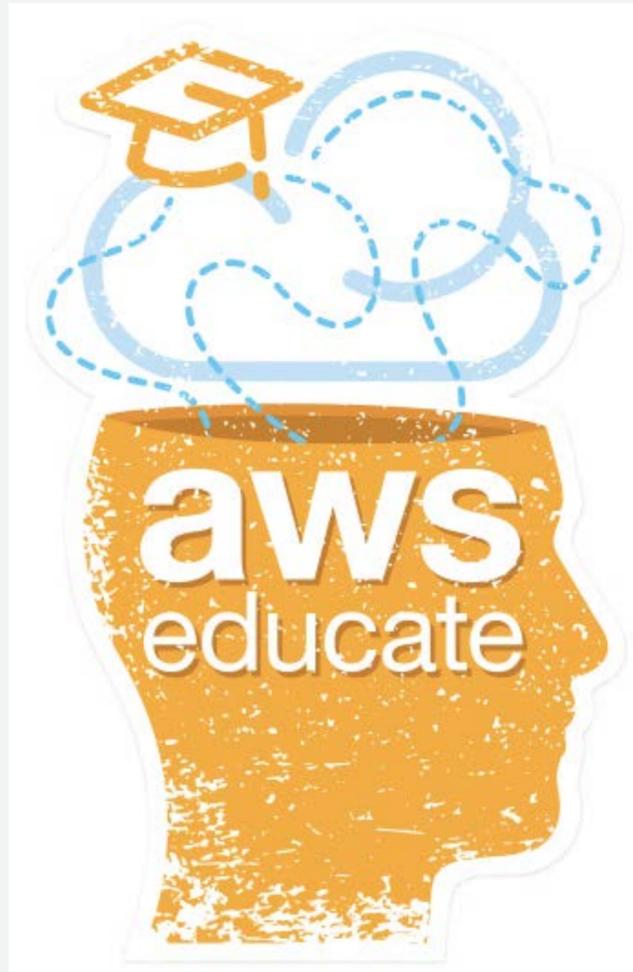
Grants for free usage of AWS services

Labs and training on cloud topics and AWS products

Open course content by leading professors and AWS

AWS Educate Cloud Career Pathways tied to industry job roles

✓ Holistic program to positively impact students around the world

✓ Curriculum change

✓ Student app development and entrepreneurship

✓ Accelerate career opportunities and corporate hiring pipeline

+JOBS*

*AWS Educate Job Board is for 18 years old and above

48

Used by educational institutions worldwide

什麼是 AWS Academy 計劃

aws academy

為高等教育機構提供AWS課程，以協助學生開發所需的雲端運算技能，並做好取得業界認可AWS認證的準備

教育機構和教育工作者可獲得完整的課程，該課程的設計可輕鬆整合到現有的教育計劃中

AWS 負責建立和更新課程內容，讓教育工作者有更多時間專注在學生上

教育工作者成員可透過講師認證獲得免費 AWS 培訓及 AWS 認證的折扣

aws academy

AWS Public Data Sets

提供兩年資料儲存及資料下載的費用

We work with data providers who seek to:

- Democratize access to data by making it available for analysis on AWS.

- Develop new cloud-native techniques, formats, and tools that lower the cost of working with data.

- Encourage the development of communities that benefit from access to shared datasets.

Putting Data to AWS

Examples of how data shared on AWS is accelerating research and creation of new applications.

Visit **Earth on AWS** to learn about building planetary-scale applications in the cloud with open geospatial data.

All public data from the **Hubble Space Telescope**'s active instruments are available for large-scale analysis on Amazon S3.
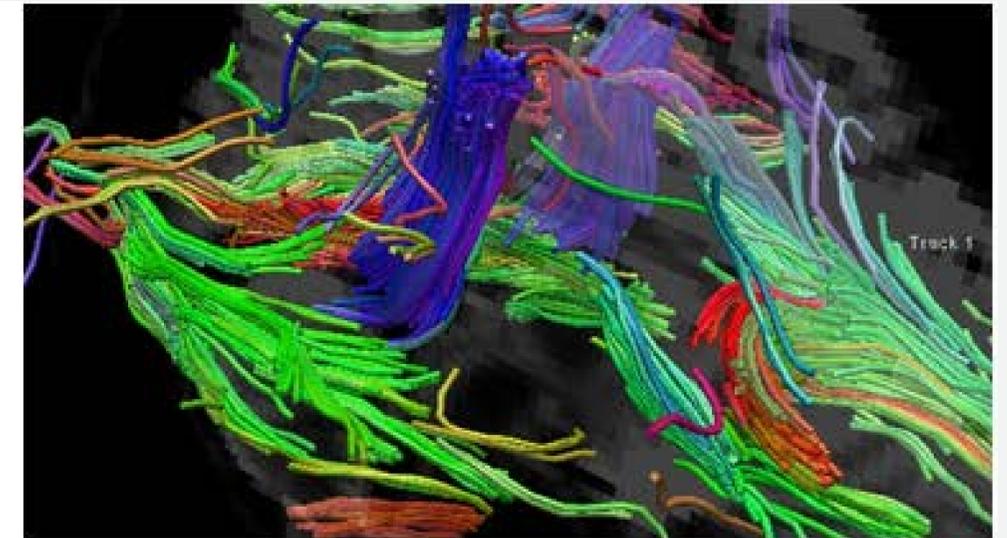
The **Allen Institute for Brain Science** and the **University of Washington** provided students with 35TB of data with Amazon S3.
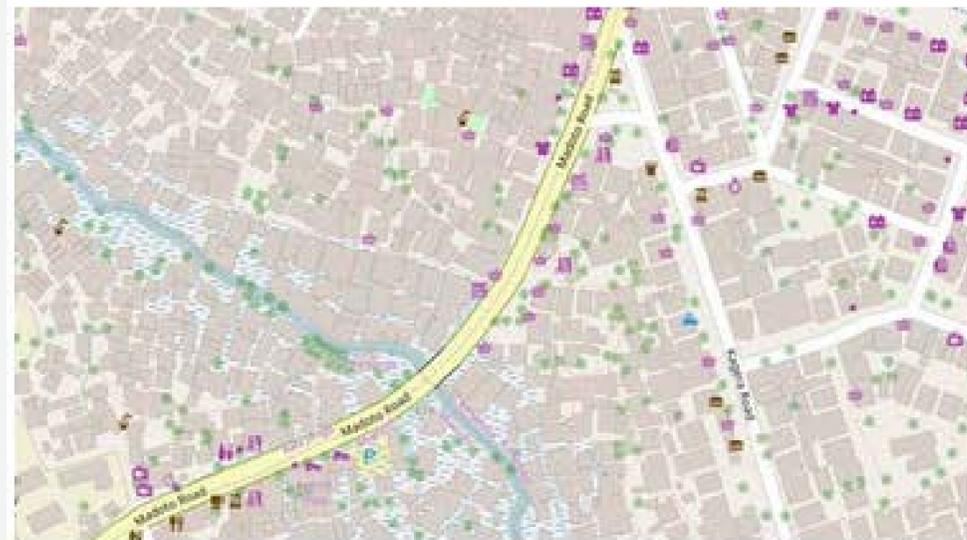
You can query billions of **OpenStreetMap** features with Amazon Athena without needing to download data or set up a server.

The **National Renewable Energy Laboratory (NREL)** makes a 500 TB open weather model dataset available to the world on Amazon S3.

Learn how to prepare **1000 Genomes** data for fast interactive analysis using Amazon Athena.

AWS Credits for Research

# IT'S ABOUT SCIENCE, NOT SERVERS.

We recognize that whilst research is often a compute-intensive activity, most researchers are not IT experts.

We want to simplify research in the cloud with easy-to-use tools for researchers and their students, and share the catalogue of "researcher-obsessed" products and services created by many of our partners.

The Cancer Genome Atlas (TCGA)

- Biospecimen Repositories
- Genomics Data Analysis Centers
- Analysis Working Groups
- Proteome Characterization Centers
- Genome Characterization Centers
- Data Coordinating Center

NATIONAL CANCER INSTITUTE
THE CANCER GENOME ATLAS

TCGA BY THE NUMBERS

TCGA produced over

2.5 PETABYTES of data

To put this into perspective, **1 petabyte** of data is equal to

212,000 DVDs

TCGA data describes

33 DIFFERENT TUMOR TYPES

...including

10 RARE CANCERS

...based on paired tumor and normal tissue sets collected from

11,000 PATIENTS

...using

7 DIFFERENT DATA TYPES

National Science Foundation
WHERE DISCOVERIES BEGIN

Forbes

FEB 18, 2018 @ 02:42 PM   1,933 👁

NSF's New Initiative To Bring The Cloud Era To Academic Big Data Research

aws **Amazon Web Services** ✔
@awscloud

Follow ⌄

Researchers awarded to push boundaries of modern science using AWS via @NSF BIGDATA program. amzn.to/2nKsbpw

aws 🔬**Research**Initiative

NSF Partners With 3 Cloud Providers for Data Science Research Support Program
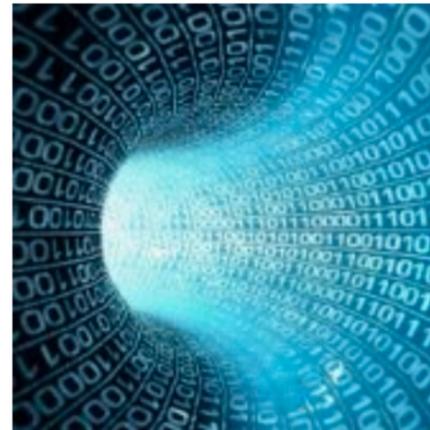
The National Science Foundation has partnered with Amazon Web Services, Microsoft and Google to support research projects in the data science and engineering field. NSF said Wednesday it will obligate nearly $30 million to the Critical Techniques, Technologies and Methodologies for Advancing Foundations and Applications of Big Data Sciences and Engineering program...

Read More

 Collaborative program with the National Science Foundation (NSF)

- The big data program supported by multiple directorates at NSF, provides funds up to $26.5 million in addition to Cloud Credits to perform **cutting edge big data research on cloud for a period of 3-4 years** (up to 2021)

- Big Data Award (2017): Out of 8 awards – 5 were awarded to researchers using AWS for Research

awsResearch Initiatives - https://amzn.to/2GVxx9a

aws SUMMIT

AWS Activate Program

Amazon Web Services 為新創公司提供擴展各種業務規模所需之低成本、易用型基礎設施。全球最熱門的新創公司，包括 Airbnb、Slack 和 Robinhood，都利用 AWS 的強大功能來迅速擴展事業版圖。AWS Activate 是為您的新創公司提供所需資源的一個計劃，讓您開始利用 AWS，躋身全球發展最快速的新創公司之列。

Portfolio / Portfolio Plus 套裝服務

AWS Activate 為精選 Accelerator、種子/創投基金等組織中之符合資格的新創公司提供客製化的 Portfolio 和 Portfolio Plus 套裝服務：

最高 **15,000 USD** 的 AWS 促銷積分 (抵扣卷)，可供使用 2 年 (金額依組織而有不同) 或 100,000 USD 可供使用 1 年 (此選擇僅在 Portfolio Plus 套裝)

最高 10,000 USD 的 AWS Support 積分，可用於 AWS Support (商業計劃) 2 年
AWS Business Essentials 線上培訓或面授培訓 (價值 600 USD)
AWS Technical Essentials 線上培訓或面授培訓 (價值 600 USD)
80 點的自主進度實驗室積分 (價值 80 USD)

# AWS Market Place

Questions

?

Thank you

Appendix

全球雲端人才需求若渴
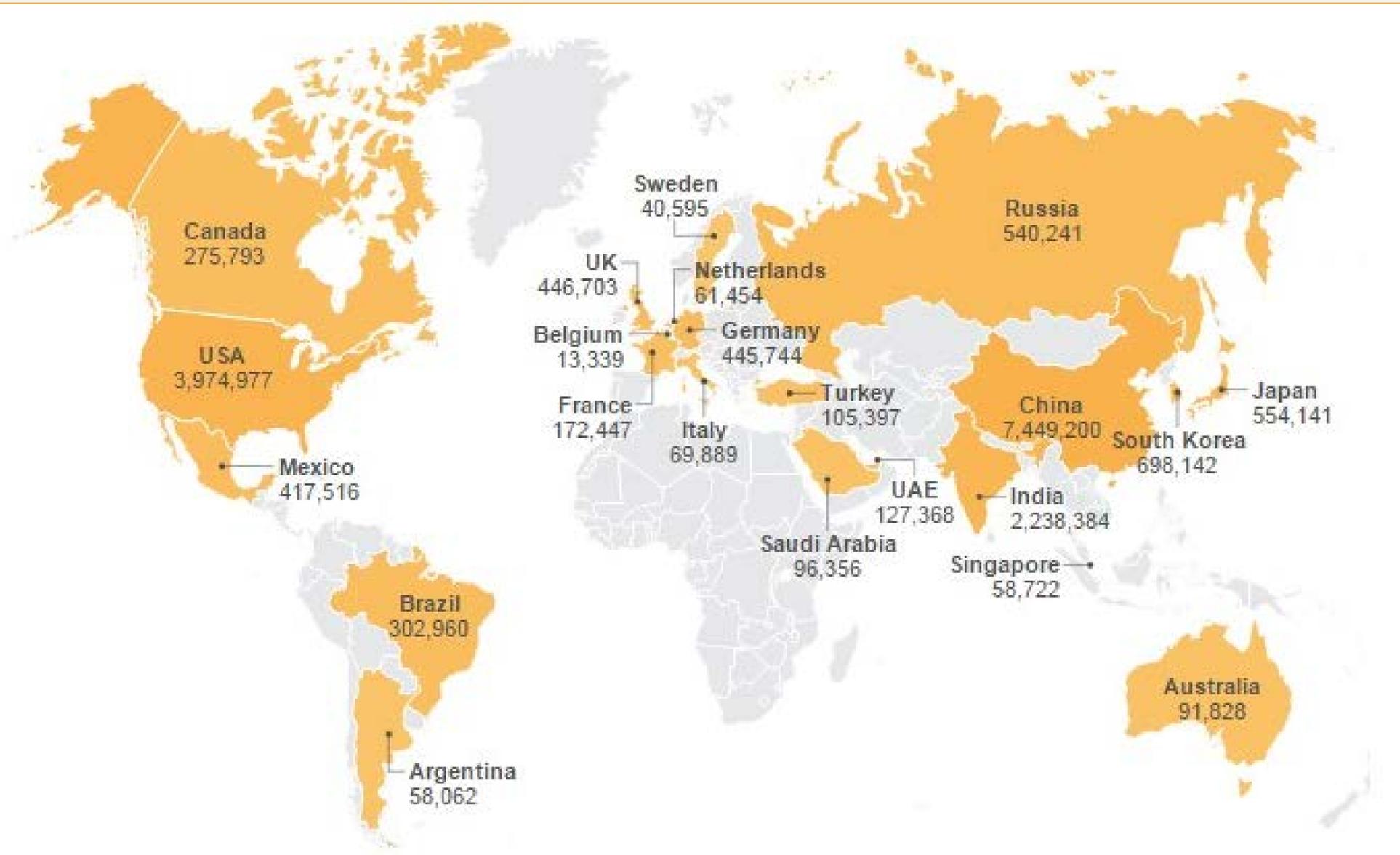
*Source: WANTED Analytics

27.5% The average salary of AWS-certified IT professionals is 27.5% higher than the norm.

$114K AWS-certified IT decision-makers and professionals make an average of $113,932.

AWS Certified Solutions Architect (Associate) is the third highest paying certification in the U.S. and Canada.

Certification Roadmap