CLOUD COMPUTING – ORIENTATION

SSCLZG527

2025-26

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BITS Pilani
Pilani Campus

About Me

- Technology Lead, IITI DRISHTI, IIT Indore
- Ph.D. in CSE, IIT Indore (Specialization – SOA, Web Services, Cloud Computing)
- AWS Certified Cloud Practitioner Certification
- AWS Accredited Educator

Course Objectives

- CO1: Students will learn the fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability; benefits, as well as current and future challenges;
- CO2: Students will learn the basic ideas and principles in data centre design and management
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- CO3: Students will learn about cloud components and technologies and relevant distributed file systems
- CO4: Students will learn a variety of programming models and develop working experience

Learning Outcome

- LO1: **Explain** the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing;
- LO2: **Apply** the fundamental concepts in data-centres to understand the tradeoffs in power, efficiency and cost
- LO3: **Discuss** system virtualization and outline its role in enabling the cloud computing system model.
- LO4: **Illustrate** the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and HDFS
- LO5: **Analyze** various cloud programming models and apply them to solve problems on the cloud

Why this Course

- **Comprehensive Understanding of Cloud Paradigms**: evolution and rationale behind the cloud computing paradigm, gaining insights into its impact on modern IT infrastructures and business models..

- **Insight into Cloud Models and Services**: various service and deployment models (IaaS, PaaS, SaaS, public, private, hybrid), enabling students to assess and select appropriate solutions for different enterprise and application needs.

- **Foundation in Data Center Design**: knowledge of data center architecture, energy consumption, cooling systems, and cost-efficiency tradeoffs, which are crucial for understanding how cloud providers build and manage scalable infrastructure

Why this Course

- **Bridge between Data Centers and Cloud**: emphasizes how modern cloud computing is built upon virtualized data center infrastructures, helping students connect low-level hardware and facility considerations with high-level cloud services.

- **Hands-on to Virtualization Technologies**: The course delves into system virtualization (e.g., hypervisors, containers) as the core enabler of cloud elasticity, allowing students to build scalable, multi-tenant cloud systems.

- **Exposure to Real-World Cloud Programming Models**: By working with cloud-native programming paradigms (MapReduce, serverless, microservices), students will be able to build efficient, scalable applications tailored for cloud deployment.

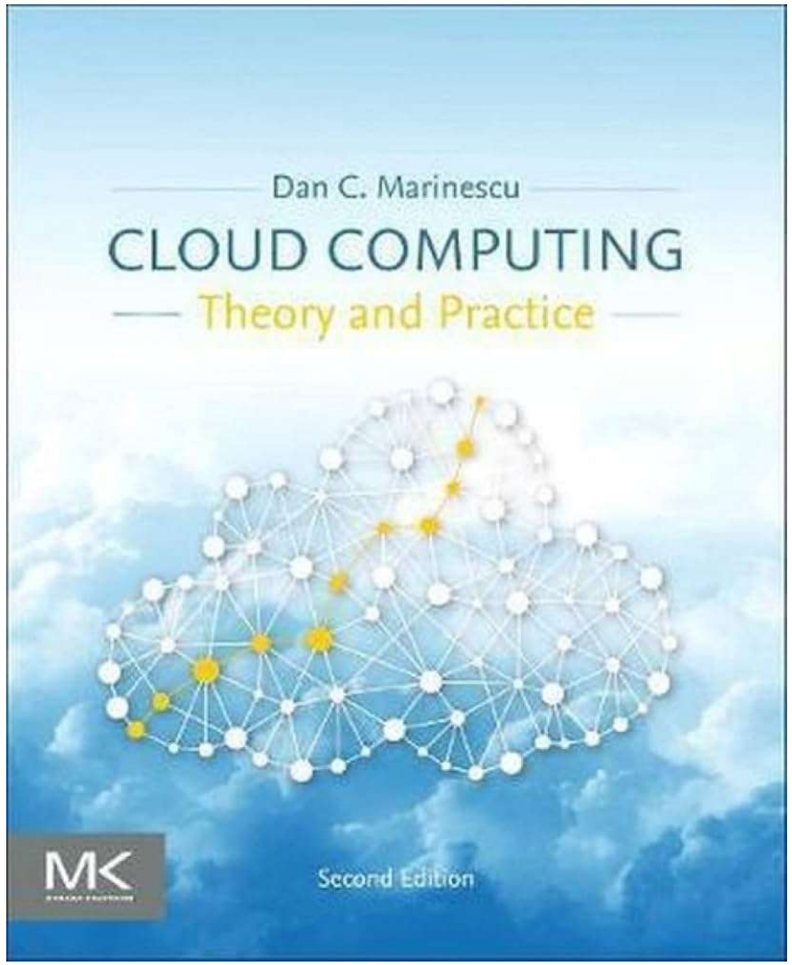
Why this Course

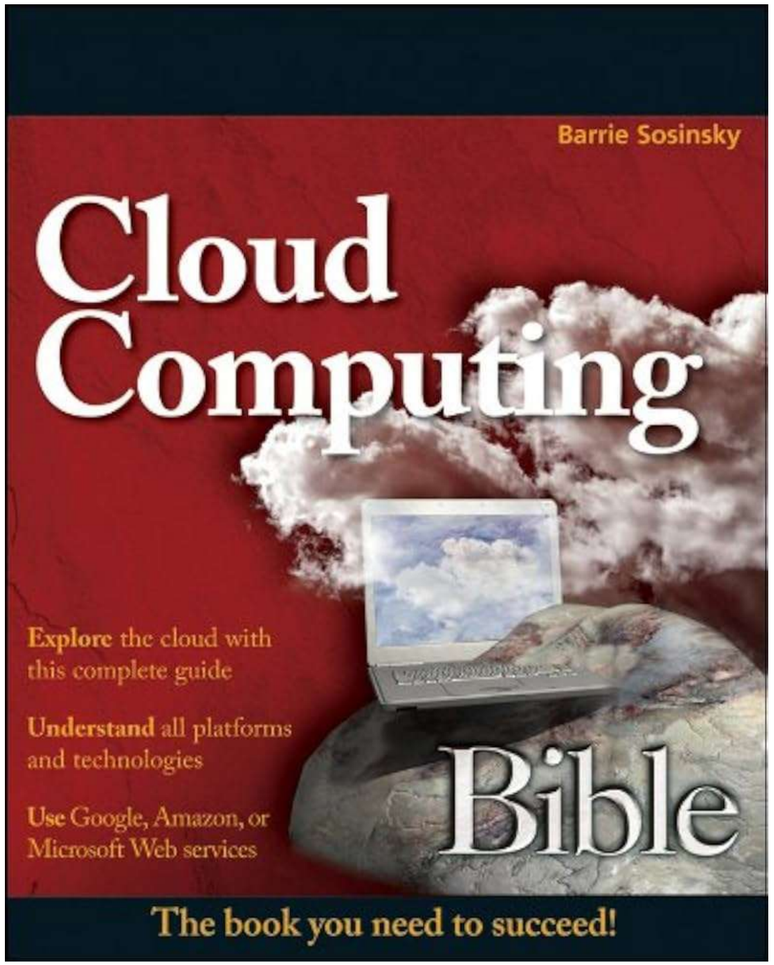
- **Industry-Relevant Skillset**: With a blend of theory and practice, students will be better prepared for careers in cloud engineering, cloud solution architecture, DevOps, or systems administration.

- **Strategic Thinking in Cloud Infrastructure Planning**: Students will develop the ability to align IT infrastructure choices—whether cloud-based or on-premises—with business goals, compliance needs, and cost constraints.

Content @ Glance

Resources


Dan C. Marinescu
CLOUD COMPUTING
Theory and Practice
MK
Second Edition

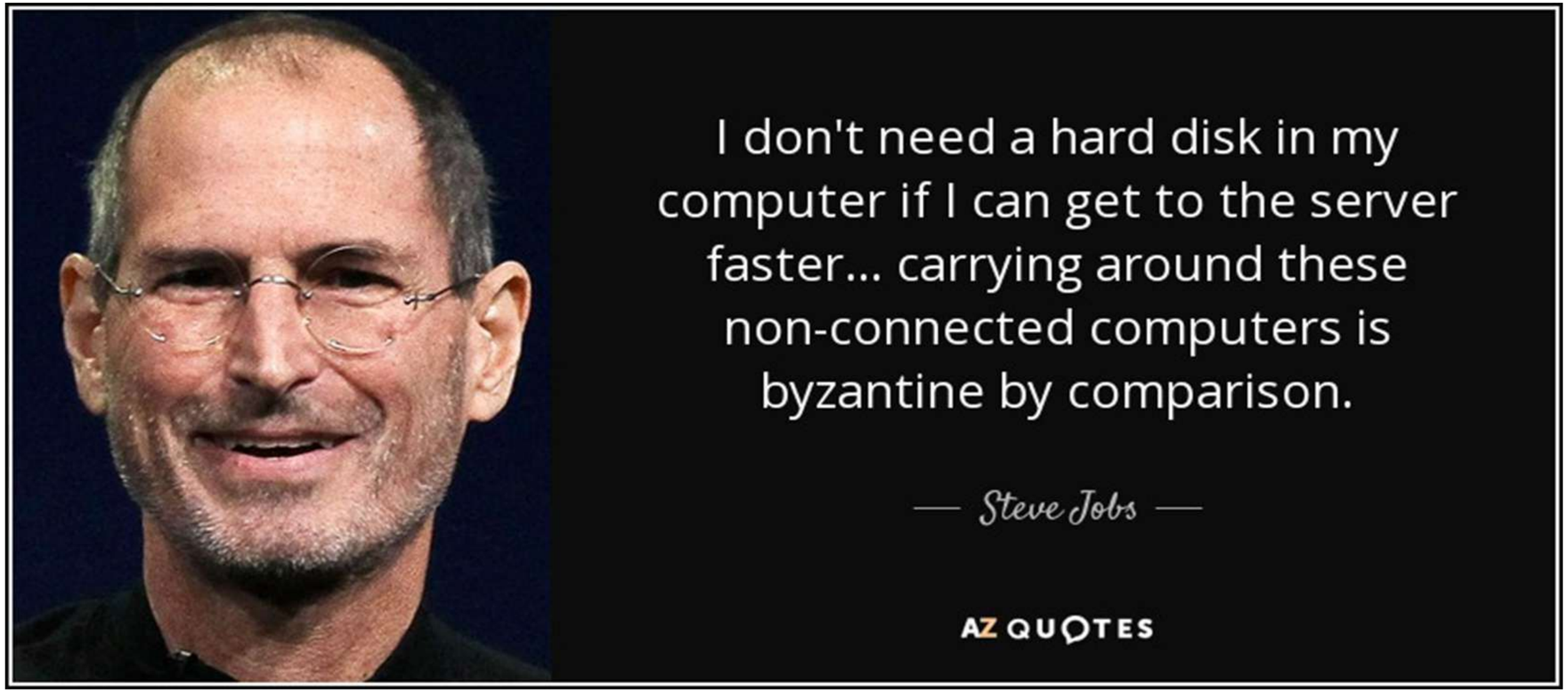

Barrie Sosinsky
Cloud Computing
Bible
Explore the cloud with this complete guide
Understand all platforms and technologies
Use Google, Amazon, or Microsoft Web services
The book you need to succeed!

Lab / Experiential Learning

EC 1 Component - 30%

- **Quiz 1**: 5
- **Quiz 2**: 5

- **Assignment 1**: 10 (30% theory, 70% AWS environment)
- **Assignment 2**: 10 (20% theory, 80% AWS environment)


I don't need a hard disk in my computer if I can get to the server faster... carrying around these non-connected computers is byzantine by comparison.
— Steve Jobs —
AZ QUOTES

Opportunities & Cloud Computing

NECESSITY FOR ANY PROFESSIONAL

- Proficiency in Cloud Computing Is a necessity for almost every professional.

- Widespread utilization of Machine Learning (ML), data science & big data, artificial intelligence (AI), blockchain, IoT, AR/VR, gaming etc. in the cloud is projected to be a trend that continues well into and beyond 2025.

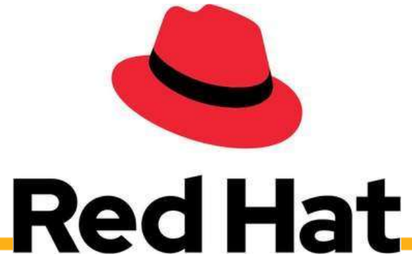
DEMAND FOR CLOUD SKILLS

- Demand for cloud skill jobs outstrips available professionals.

- In the public cloud job market, there are between 6 to 12 times more job postings available than there are job seekers.

Top Cloud Companies

TOP CLOUD COMPANIES



Application Areas

AI/ML RESEARCH

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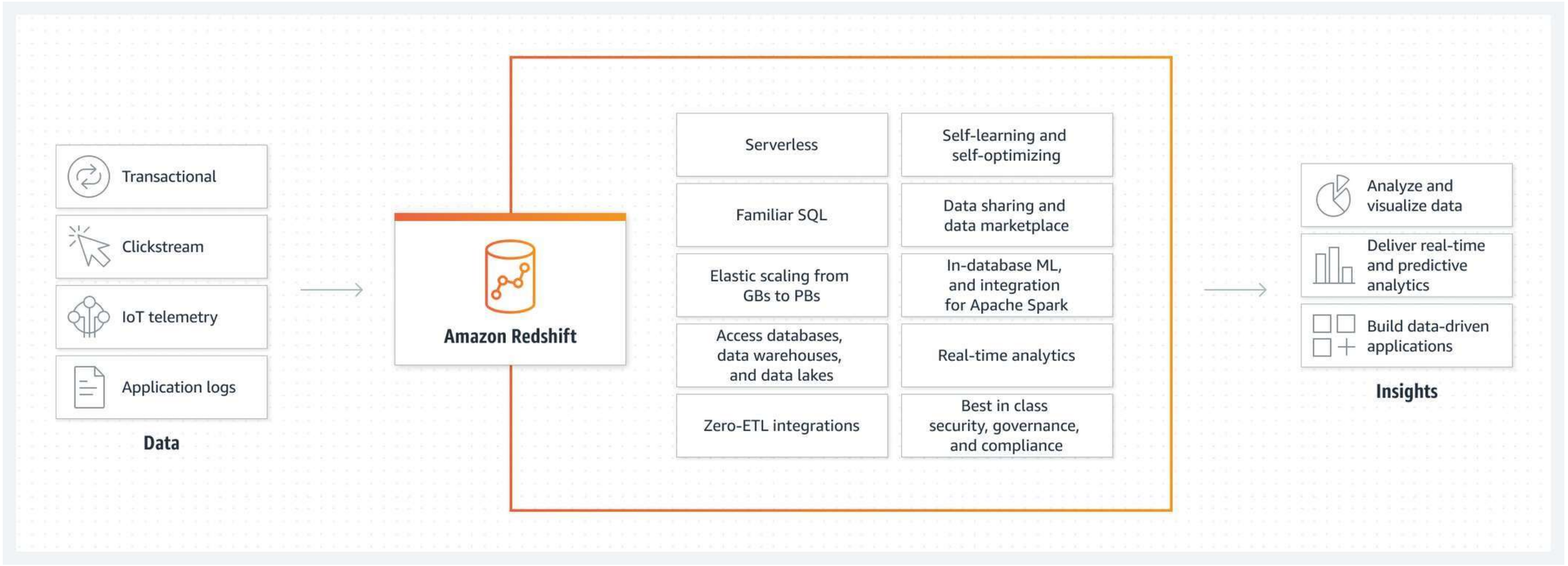
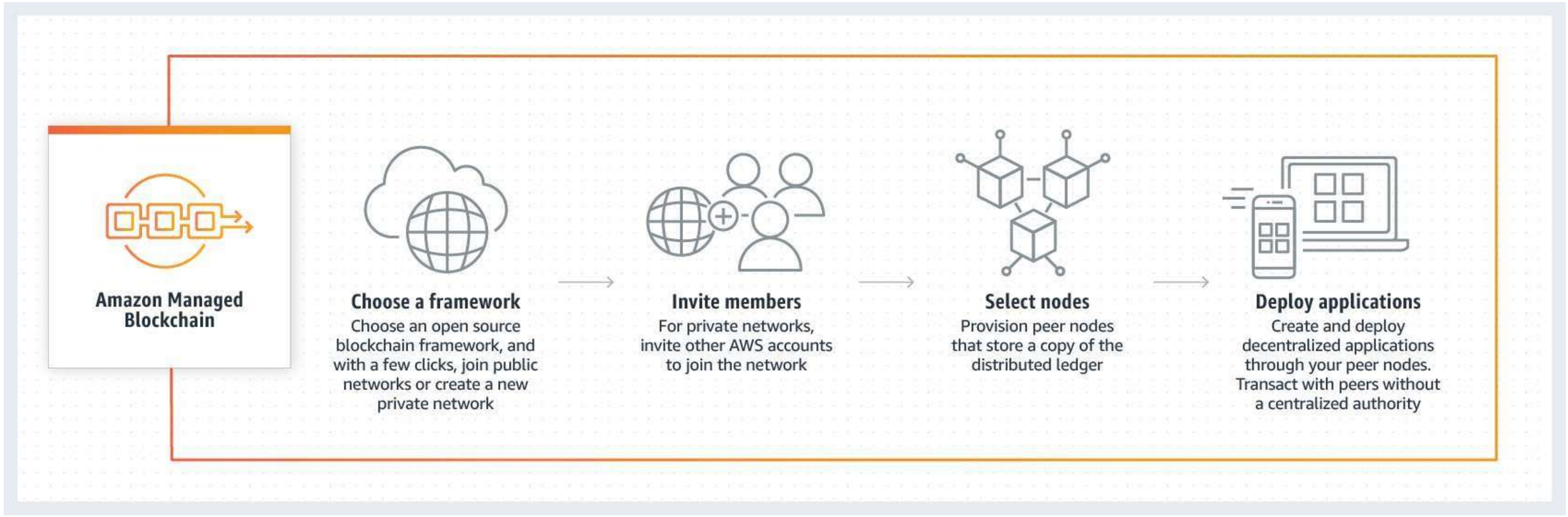
- Microsoft has OpenAI, Google has DeepMind. Will AWS be left behind?

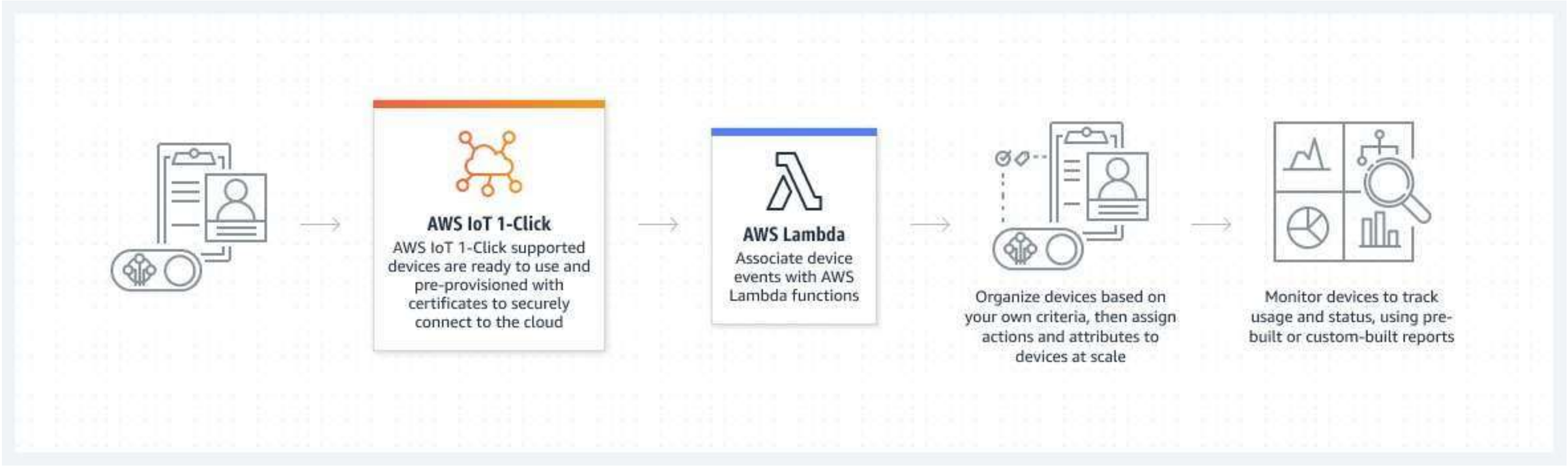
DATA SCIENCE



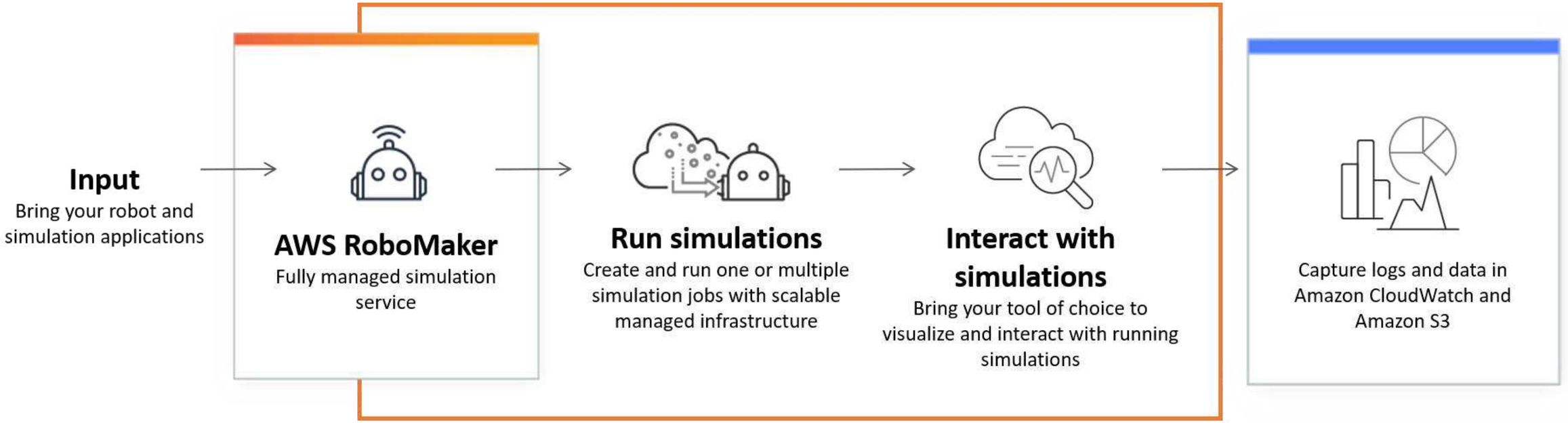
BLOCKCHAIN


Amazon Managed Blockchain
Choose a framework
Choose an open source blockchain framework, and with a few clicks, join public networks or create a new private network
Invite members
For private networks, invite other AWS accounts to join the network
Select nodes
Provision peer nodes that store a copy of the distributed ledger
Deploy applications
Create and deploy decentralized applications through your peer nodes. Transact with peers without a centralized authority

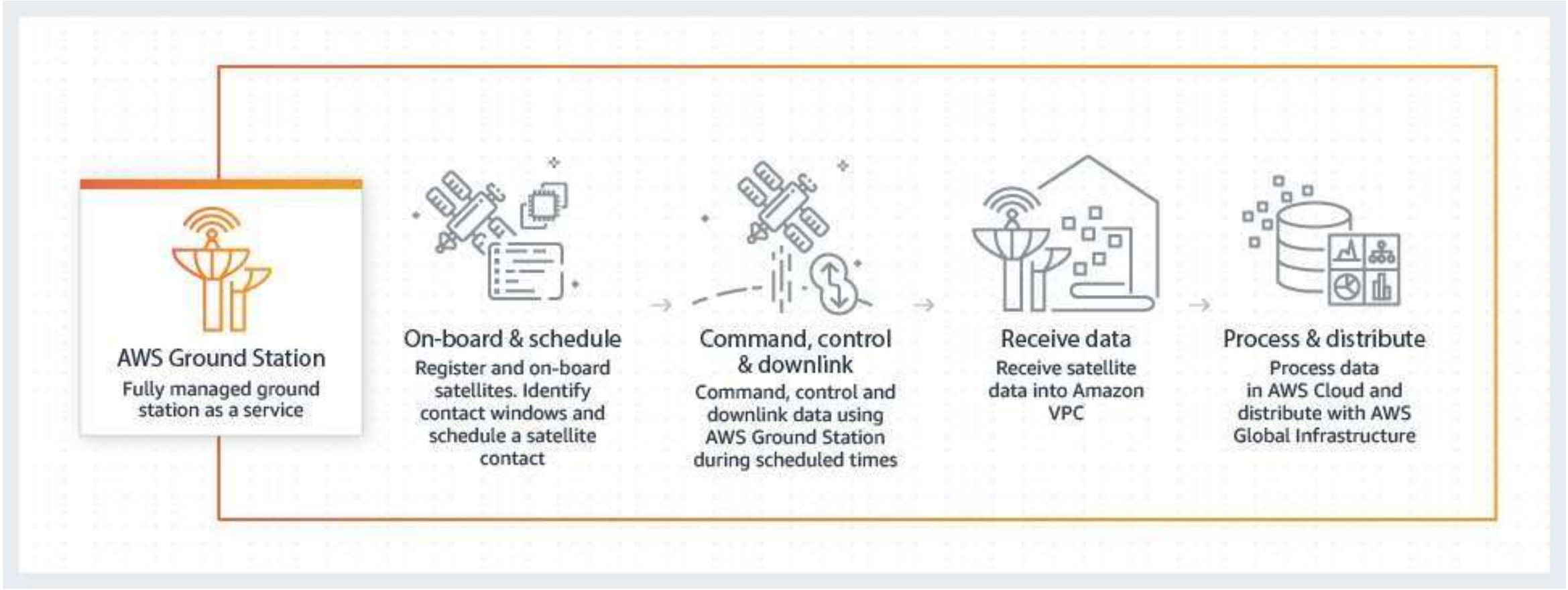
IOT


AWS IoT 1-Click
AWS IoT 1-Click supported devices are ready to use and pre-provisioned with certificates to securely connect to the cloud
AWS Lambda
Associate device events with AWS Lambda functions
Organize devices based on your own criteria, then assign actions and attributes to devices at scale
Monitor devices to track usage and status, using pre-built or custom-built reports

ROBOTICS

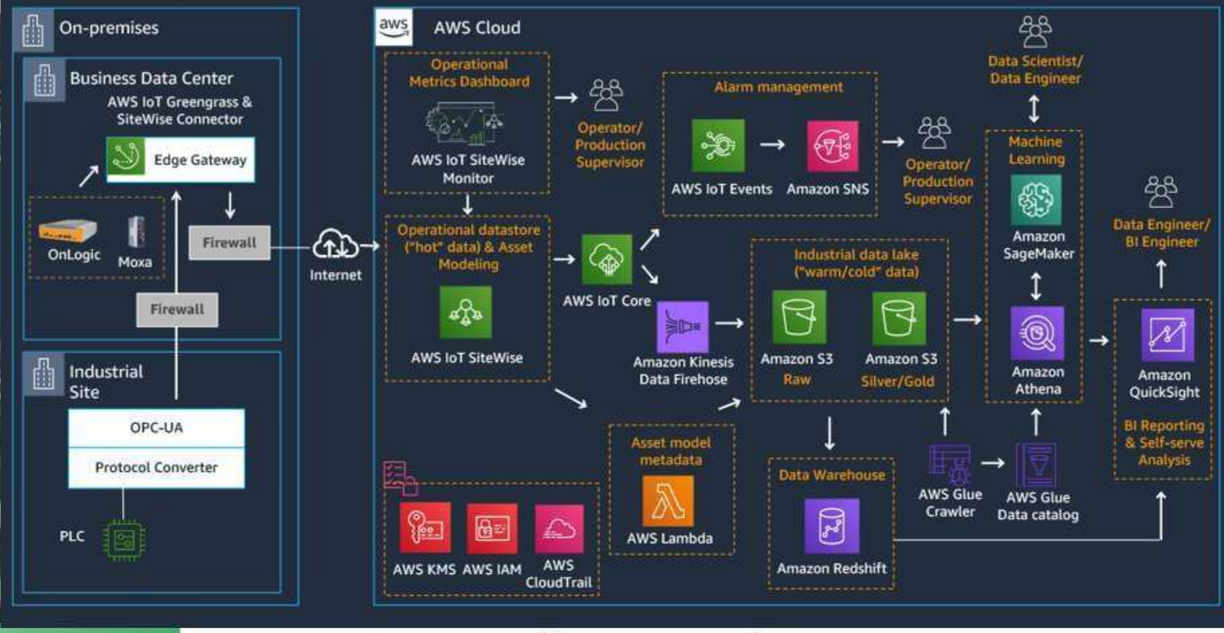

Input
Bring your robot and simulation applications
AWS RoboMaker
Fully managed simulation service
Run simulations
Create and run one or multiple simulation jobs with scalable managed infrastructure
Interact with simulations
Bring your tool of choice to visualize and interact with running simulations
Capture logs and data in Amazon CloudWatch and Amazon S3

SATELLITE


AWS Ground Station
Fully managed ground station as a service
On-board & schedule
Register and on-board satellites. Identify contact windows and schedule a satellite contact
Command, control & downlink
Command, control and downlink data using AWS Ground Station during scheduled times
Receive data
Receive satellite data into Amazon VPC
Process & distribute
Process data in AWS Cloud and distribute with AWS Global Infrastructure

ARTIFICIAL INTELLIGENCE AND ITS ALLIANCE WITH MECHANICAL ENGINEERING.

Connected Factory Solution Architecture for real-time data

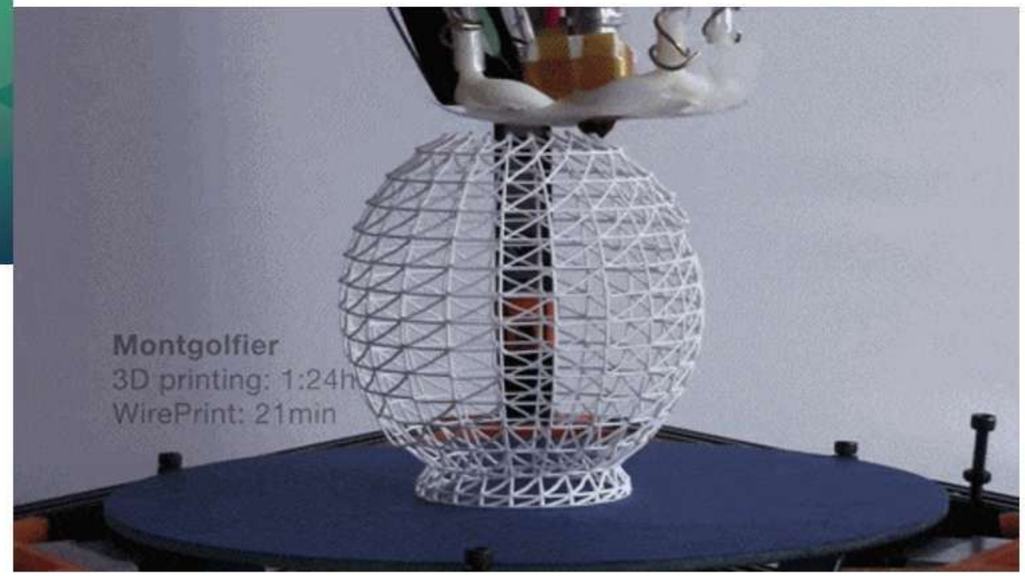


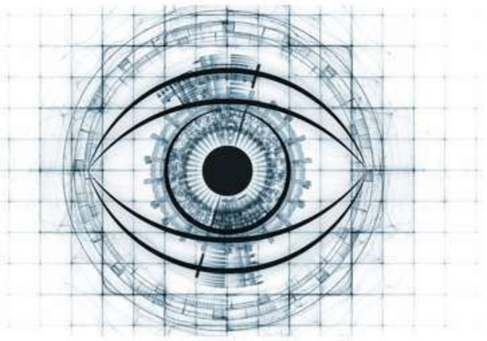
Introducing the AWS Industrial Software Competency Program

aws

Learn More »

https://youtu.be/VJHhiwj4vEk





Industry 1.0
Mechanization, water power, steam power

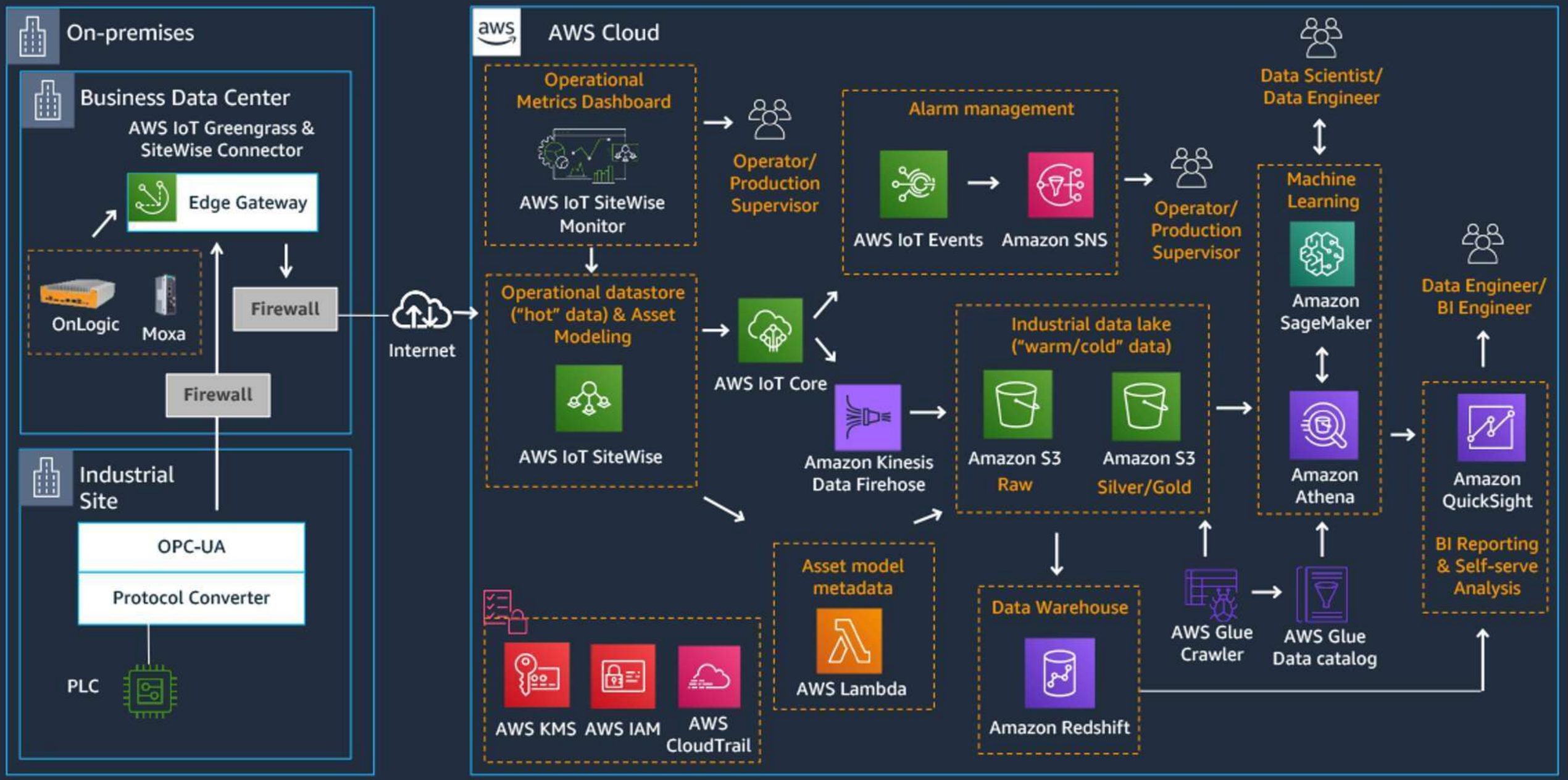
Industry 2.0
Mass production, assembly line, electricity

Industry 3.0
Computer and automation

Industry 4.0
Cyber physical systems

Industry 5.0
Mass customization & cyber phisical cognitive systems

Connected Factory Solution Architecture for real-time data



AWS for Industrial

Accelerate design, optimize operations, reinvent supply chains, and transform your business with AWS.

Get Started with AWS

Accelerate time to results

VOLKSWAGEN GROUP

Volkswagen Group on AWS

Optimize operations

Carrier

Carrier and AWS Transform the Cold Chain

New revenue streams

INVISTA™

INVISTA Transforms Operations by Optimizing Manufacturing Outcomes on AWS

More sustainable operations

vector

Vector and AWS join forces to accelerate the future of energy

Reinventing drug manufacturing and supply chains

Harnessing the power of AI, IoT, and ML to scale production globally

Smart factories for small and large molecule drugs

IoT and computer vision provide data on materials and machines along the drug production process

Machine learning predicts and resolves issues before they happen

Insight centers give real-time views of production to empower data-driven decision making

Holistic view of data

Improves input and output supply chains to eliminate bottlenecks

Interconnected global network

Data collection, analysis, and response can be controlled across every factory

Real-time visibility of distribution allows new treatments to be scaled quickly

Lifesaving treatments reach more patients

Enhanced production quality, fewer drug shortages, and reduced time to patient

The Internet of Things on AWS – Official Blog

Connected Factory Solution based on AWS IoT for Industry 4.0 success

nnouncement

Partner Solutions

accenture · Cognizant · Crowley Carbon · Deloitte. · falkonry · HITACHI Inspire the Next · NavVis · wipro · TensorIoT

Deployment partners

accenture · Cognizant · Deloitte. · Infosys · HITACHI Inspire the Next · TATA Consultancy Services · wipro · Crevavi · GFT · KLIKA TECH Global IoT Solutions · PROLIM · trek10 · Ter

Edge applications

Cirrus Link Solutions · inductive automation. · kep

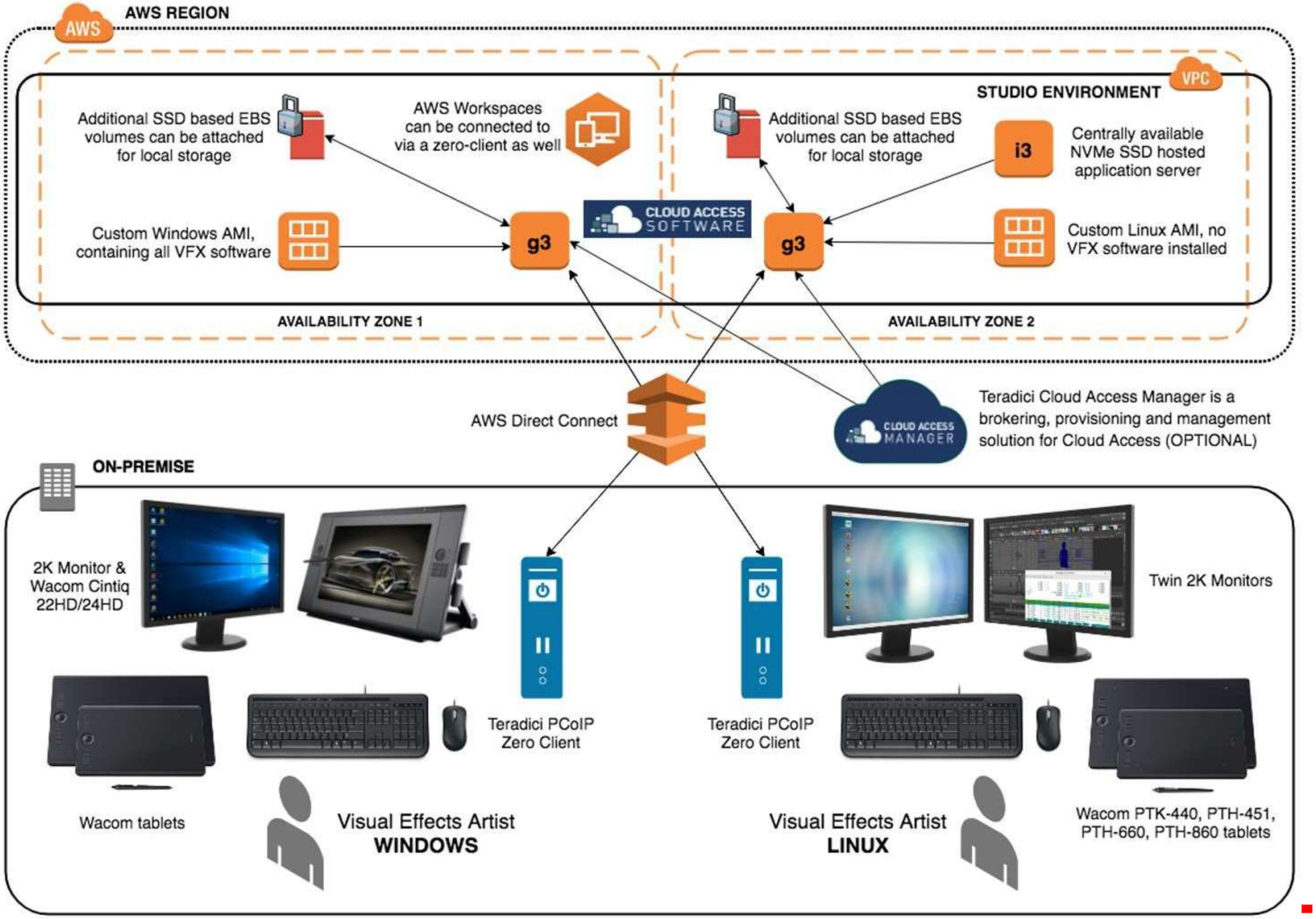
Qualified hardware

ADLINK Leading Edge Computing · ADVANTECH · Lenovo · MOXA

How Grocery Retailers Grow With Hybrid Architecture Best Practices

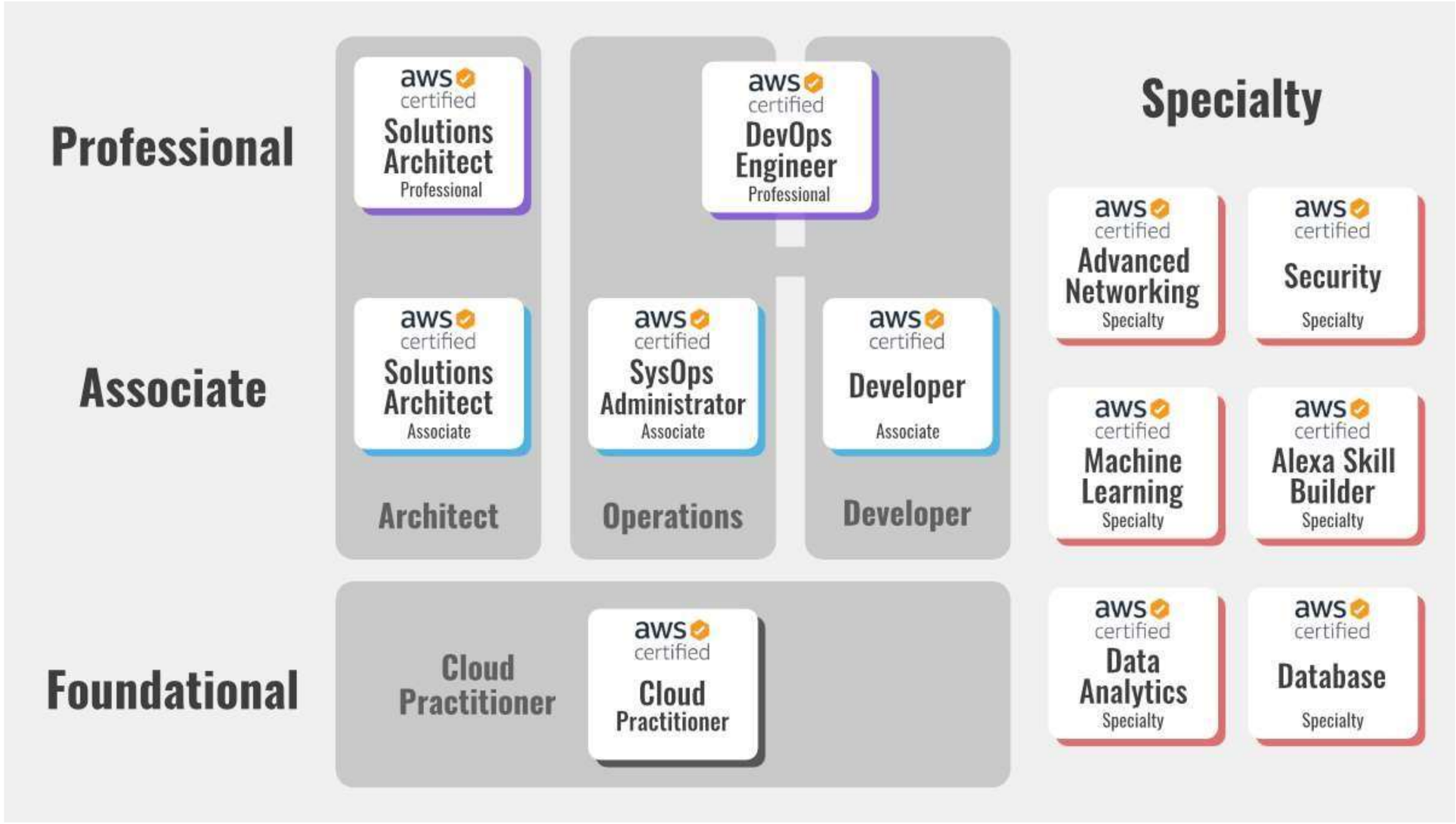
by Ben Moses | on 05 JUL 2022 | in Amazon Athena, Amazon CloudWatch, Amazon Elastic Container Service, Amazon QuickSight, Amazon SageMaker, Amazon Simple Storage Service (S3), AWS CLI, AWS Cloud WAN, AWS Direct Connect, AWS Management Console, AWS Outposts, AWS Systems Manager, AWS Transfer Family, AWS Transit Gateway, Industries, Retail

Building a GPU workstation for visual effects with AWS



Global Certification

AWS CERTIFICATION STACK



GOOGLE CERTIFICATION STACK

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Foundational

Cloud Digital Leader

Associate

Cloud Engineer

Professional

Cloud Architect

Cloud Developer

Cloud DevOps Engineer

Data Engineer

Cloud Security Engineer

Cloud Network Engineer

Collaboration Engineer

Machine Learning Engineer

AZURE CERTIFICATION STACK