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CLOUD
EDUCATION

AWS Solutions Architect

Клауд сургалт

Д. Лхагватөгөлдөр
Fibo Cloud

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Танилцуулга

- Нэр
- Ажилладаг газар
- Сургалтад сууж буй зорилго
- Яагаад AWS гэж?

Багшийн танилцуулга

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Лхагватөгөлдөр (Төгөлдөр)

- Cloud Engineer @Fibo Cloud
- Software Engineer - 5 жил
- Cloud Engineer - 2 жил

Certs:

AWS Solutions Architect Associate

aws CERTIFIED

Клауд мэргэжилтнүүдийг олноор бий болгох

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Сургалтын зорилго

- Cloud computing fundamentals
- AWS cloud platform
- Practical solutions

All-in-one
More than certification course

Сургалтын явц

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aws partner network

Standard Consulting Partner

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1. Танхим + Онлайн
2. 12 хичээл (30 цаг)
3. 28 хоног
4. Батламж

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Solutions Architect гэж хэн бэ?

Өгөгдсөн нөөц (**Мөнгө, хүний нөөц, нөхцөл байдал**)-г ашиглан тухайн IT-н асуудлыг хамгийн **найдвартай**, **хямд**, **үр дүнтэй** аргаар шийдвэрлэх шийдлийг гаргадаг инженер.

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Ямар мэдлэг хэрэгтэй вэ?

Компьютерийн систем
Компьютерийн сүлжээ
Өгөгдөл хадгалалт
Өгөгдлийн сан
Систем архитектур
Системийн урсгал
Бизнес загвар
Систем хөгжүүлэлт

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Cloud computing

Үүлэн технологи

Клауд гэж юу вэ?

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Google Drive
Dropbox
iCloud

3 тусдаа янзаар тайлбарлая

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А. Жирийн хэрэглэгч

Хаа нэгтээ байгаа хэн нэгний компьютерийг интернетээр дамжуулж хэрэглэ.

Өгөгдөл хадгалж, бодлого бодуулж болно.

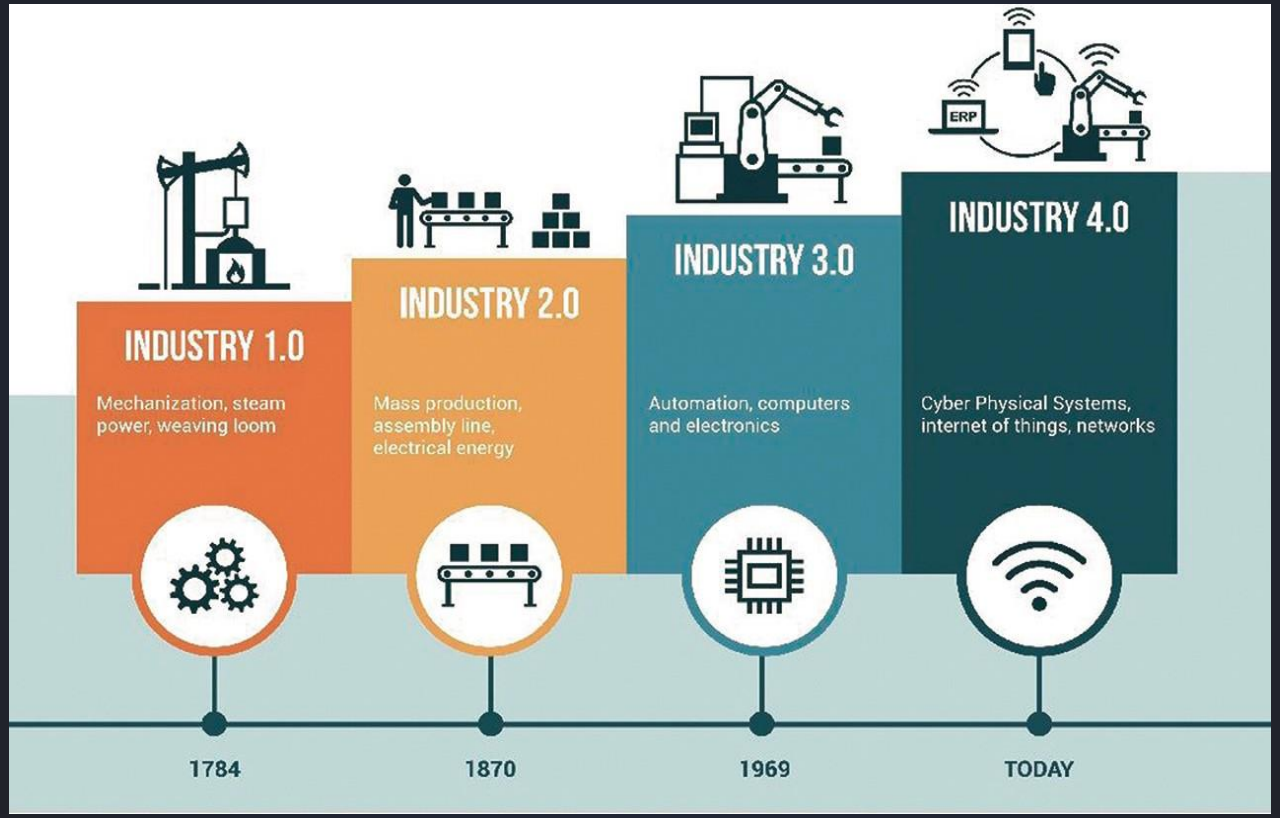
Б. Програм хөгжүүлэгч

Програм бүтээхэд шаардлагатай бэлэн үйлчилгээнүүдийг аргыг нь олоод ашиглаад яв.

AI, Machine Learning, Storage, Compute, Container, Database…

В. Клауд систем хөгжүүлэгч

Storage, Network, Compute, Software гээд маш олон өөр салбар шинжлэх ухаан байдаг.
Тухайн асуудлыг яаж хамгийн үр дүнтэй байлгах вэ гэдэг асуултын хариуг л хайна.


ERP
INDUSTRY 1.0
Mechanization, steam power, weaving loom
INDUSTRY 2.0
Mass production, assembly line, electrical energy
INDUSTRY 3.0
Automation, computers and electronics
INDUSTRY 4.0
Cyber Physical Systems, internet of things, networks
1784
1870
1969
TODAY

Definition about Cloud Computing

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"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, Co-founder, CEO and Chairman of Apple Inc.

"The end of 'Fashion-IT' — customers will only pay for value and not technology. – Sunny Ghosh, Director and CEO of Wolf Frameworks

"Cloud computing is a great euphemism for centralization of computer services under one server."~ Evgeny Morozov, author and technology skeptic

"The cloud services companies of all sizes…The cloud is for everyone. The cloud is a democracy."~ Marc Benioff, Founder, CEO and Chairman of Salesforce

"Cloud is about how you do computing, not where you do computing." ~ Paul Maritz, CEO of VMware

"With AWS a new server can be up and running in three minutes (it used to take Eli Lilly seven and a half weeks to deploy a server internally) and a 64-node Linux cluster can be online in five minutes (compared with three months internally)…The deployment time is really what impressed us."~ Dave Powers, Associate Information Consultant at Eli Lilly and Company.

"Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction." ~ National Institute of Standards and Technology, USA

"If someone asks me what cloud computing is, I try not to get bogged down with definitions. I tell them that, simply put, cloud computing is a better way to run your business." ~ Marc Benioff, Founder, CEO and Chairman of Salesforce

Definition about Cloud Computing

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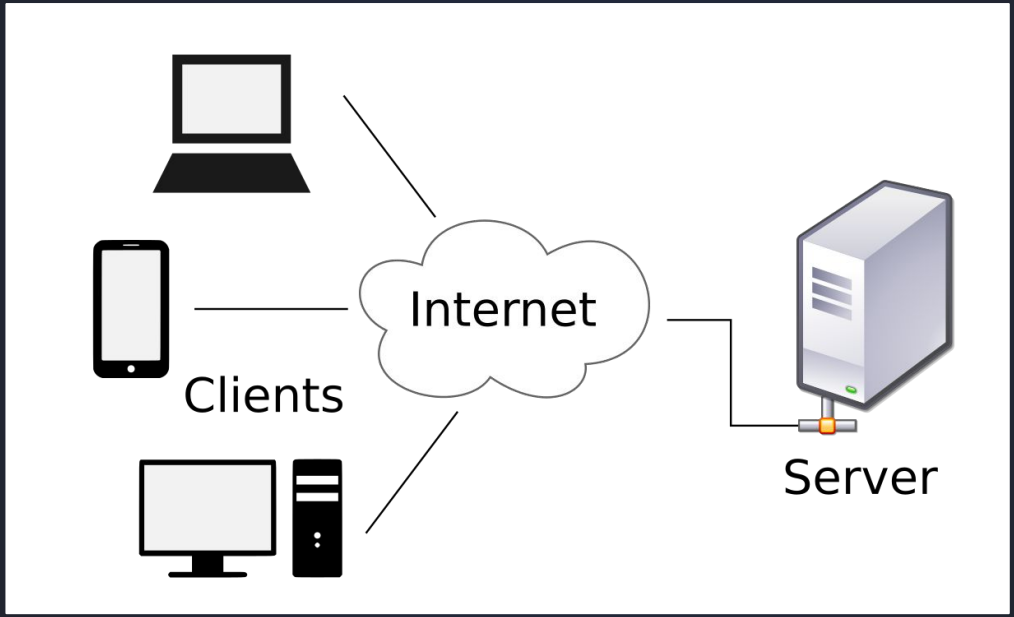
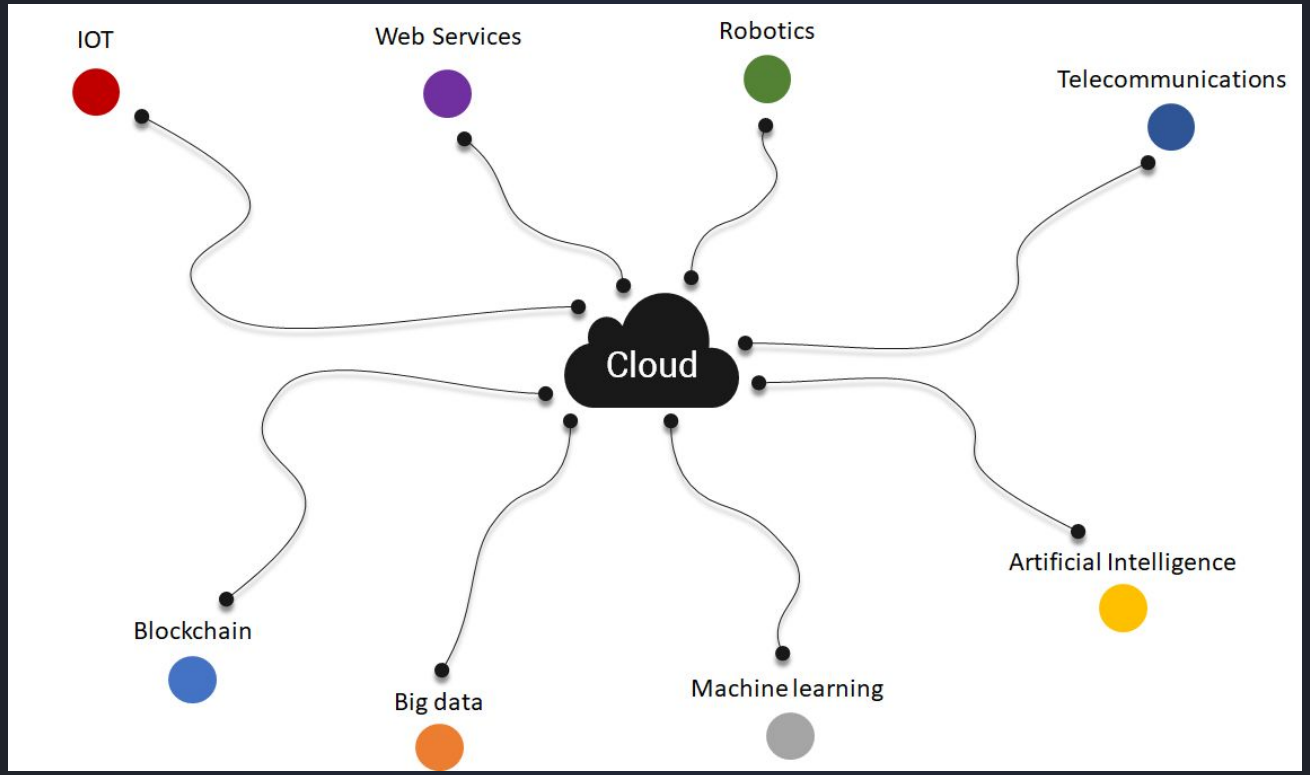
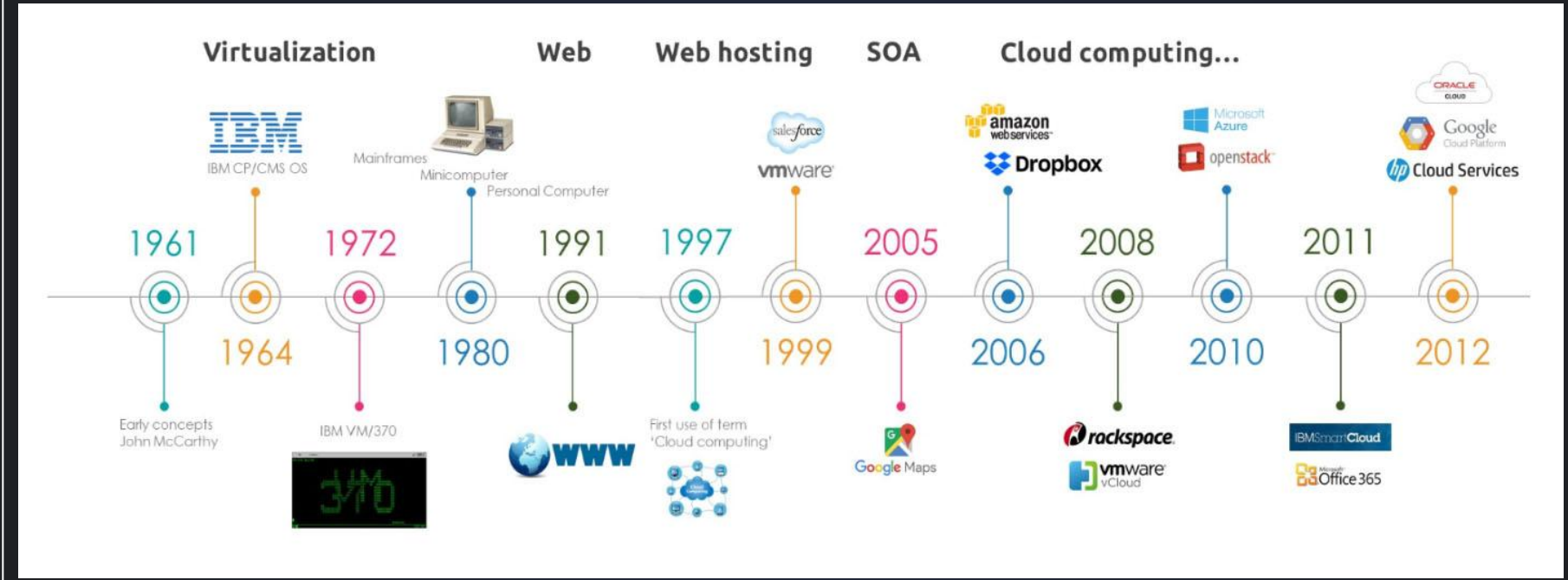
"Cloud is about how you do computing, not where you do computing." ~ Paul Maritz, CEO of VMware


Internet
Clients
Server


IOT
Web Services
Robotics
Telecommunications
Cloud
Artificial Intelligence
Blockchain
Big data
Machine learning

Timeline


Virtualization
Web
Web hosting
SOA
Cloud computing...
IBM
IBM CP/CMS OS
Mainframes
Minicomputer
Personal Computer
salesforce
vmware
amazon web services
Dropbox
Microsoft Azure
openstack
ORACLE CLOUD
Google Cloud Platform
Cloud Services
1961
1964
1972
1980
1991
1997
1999
2005
2006
2008
2010
2011
2012
Early concepts
John McCarthy
IBM VM/370
VM
WWW
First use of term
'Cloud computing'
Google Maps
rackspace
vmware vCloud
IBM SmartCloud
Microsoft Office 365

Last decade

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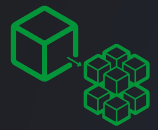
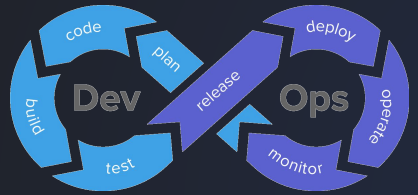
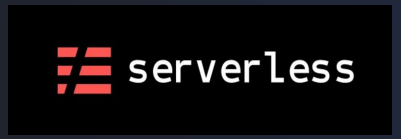






Cloud Computing Drives IT Architecture Evolution

The New Generation of IT Architecture

Business Category and Industry

- Traditional Business
  - CRM / ERP / OA / ...
- Agile Business
  - E-commerce / Internet / Finance / ...

Application System

- Legacy Application
  - Monolithic Architecture / SOA
- Cloud Native Application
  - Microservices Architecture

Support Platform

- Traditional Architecture
  - Server
  - Storage
  - Network
- Cloud Computing Architecture
  - IaaS+ & PaaS
  - Container
  - IaaS
  - SDC & SDN & SDS

Next Generation of Application Centric Cloud Computing

Open Cloud Ecosystem

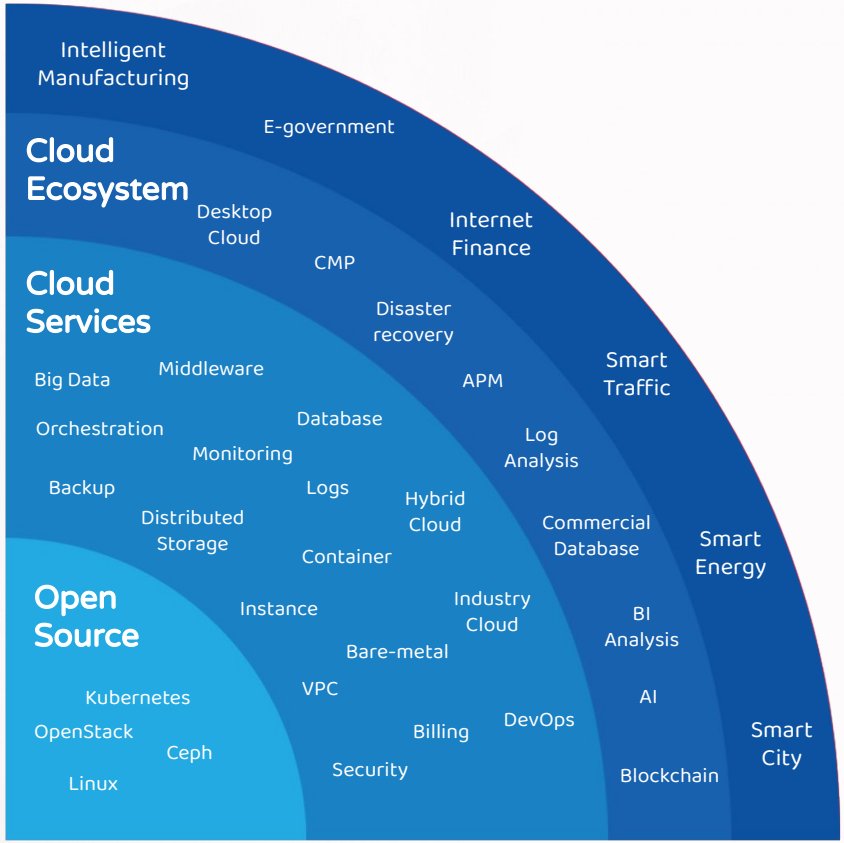
Build an application-centric Open Cloud Ecosystem that enables end to end business application scenarios

Application Centric Cloud Services

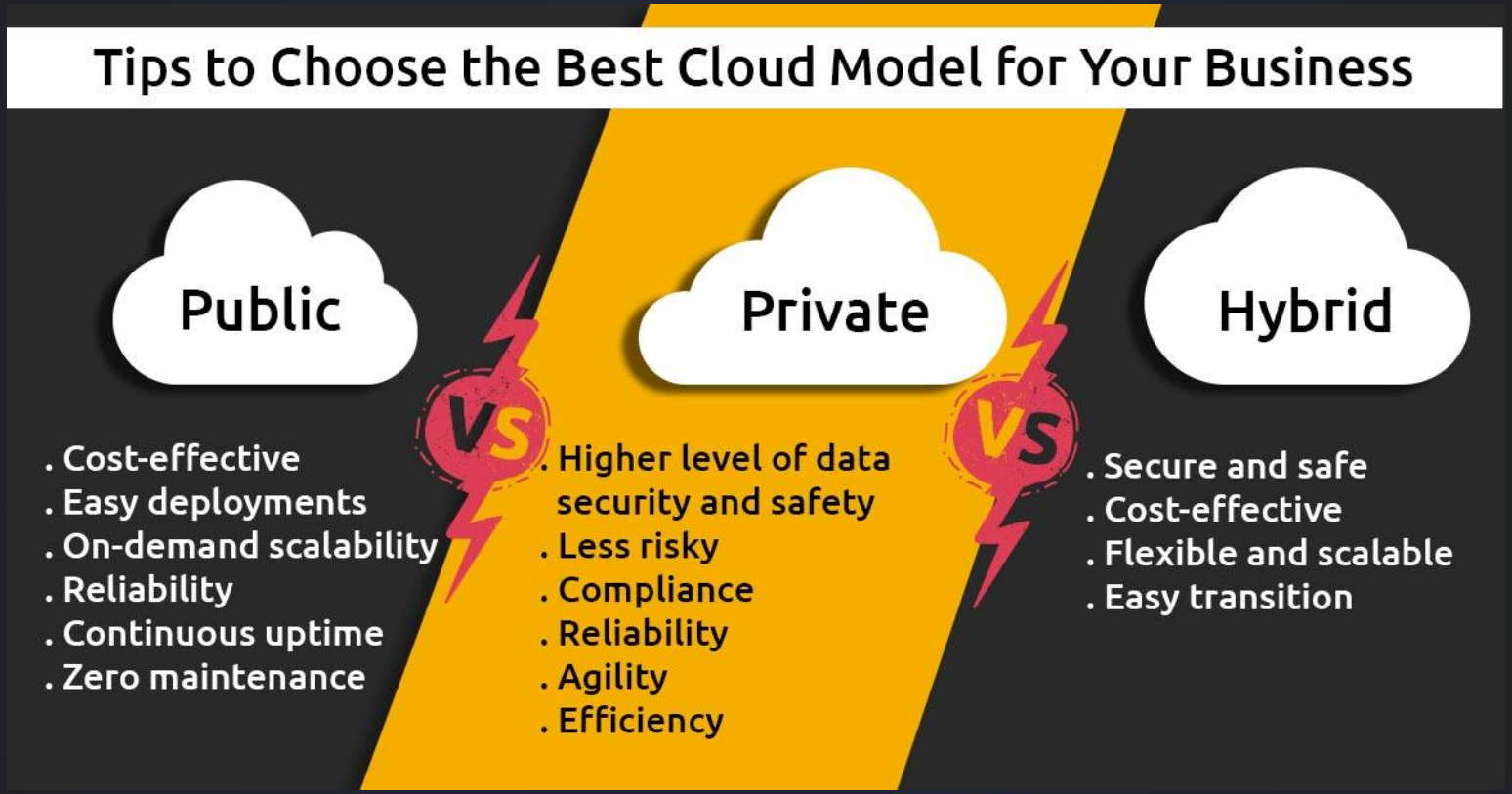
Build a composable software infrastructure that provides agile on-demand cloud services for applications.

Productization based on Open Source

Production ready enterprise stability and security. Avoid vendor lock-in, adherence to common standards, compatibility based on open source projects.



Deployment Models



Deployment Models

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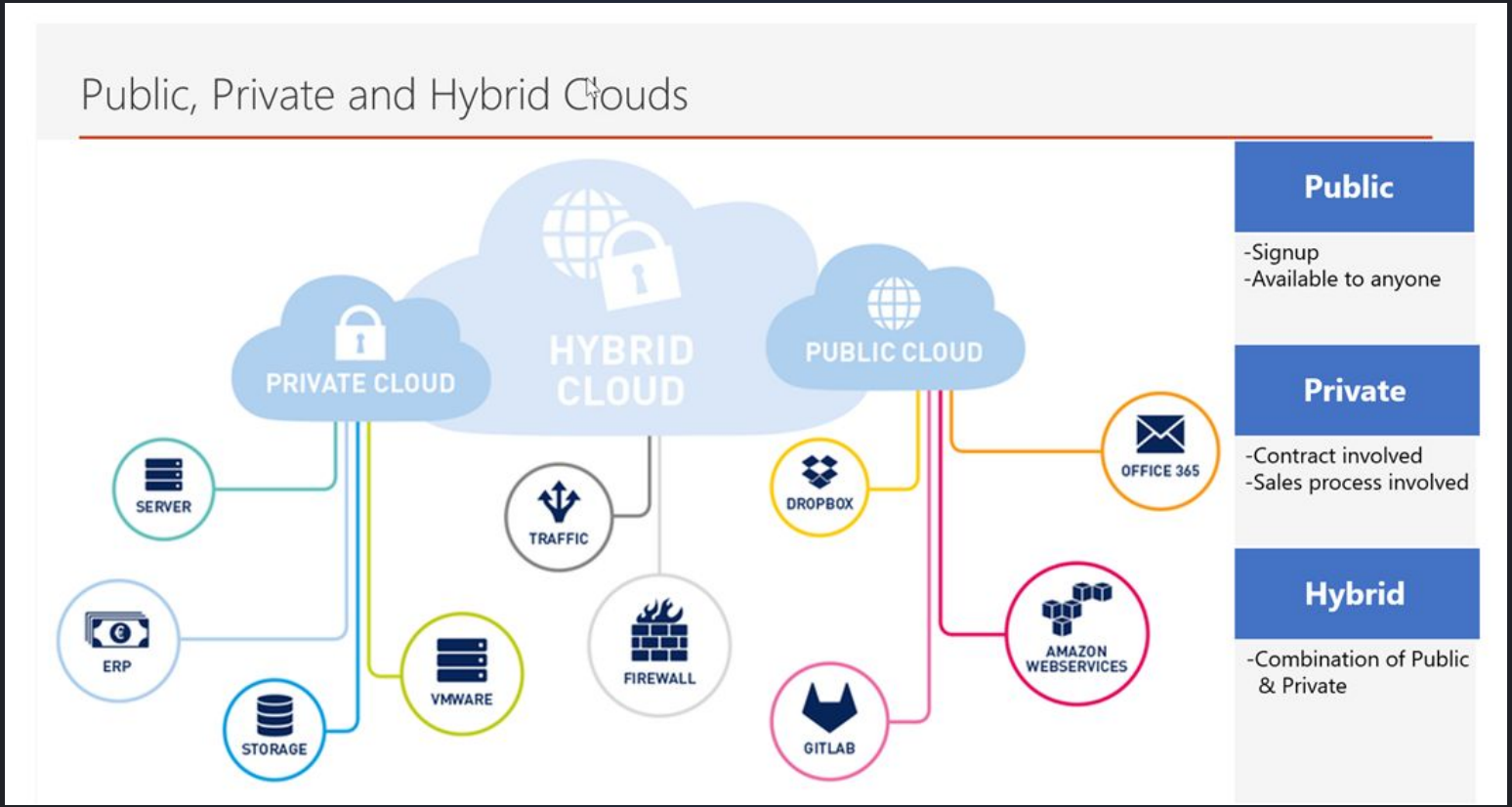

Service Models

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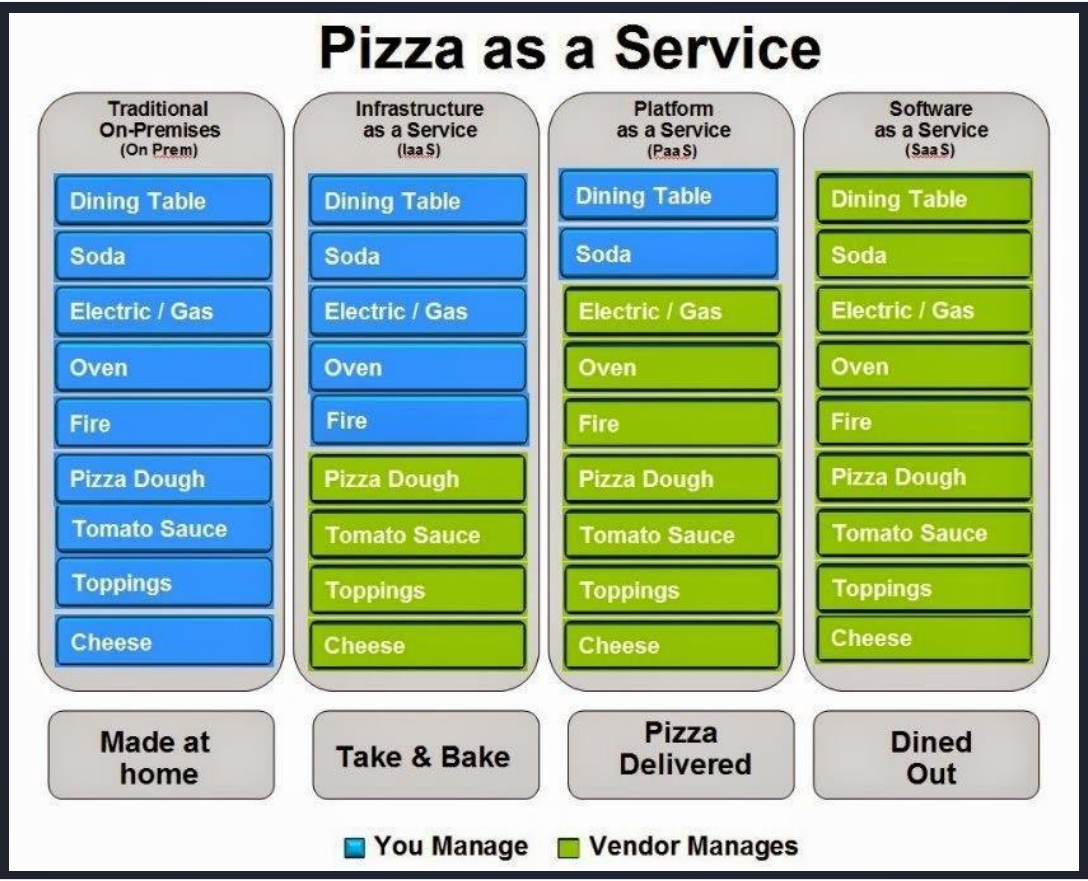
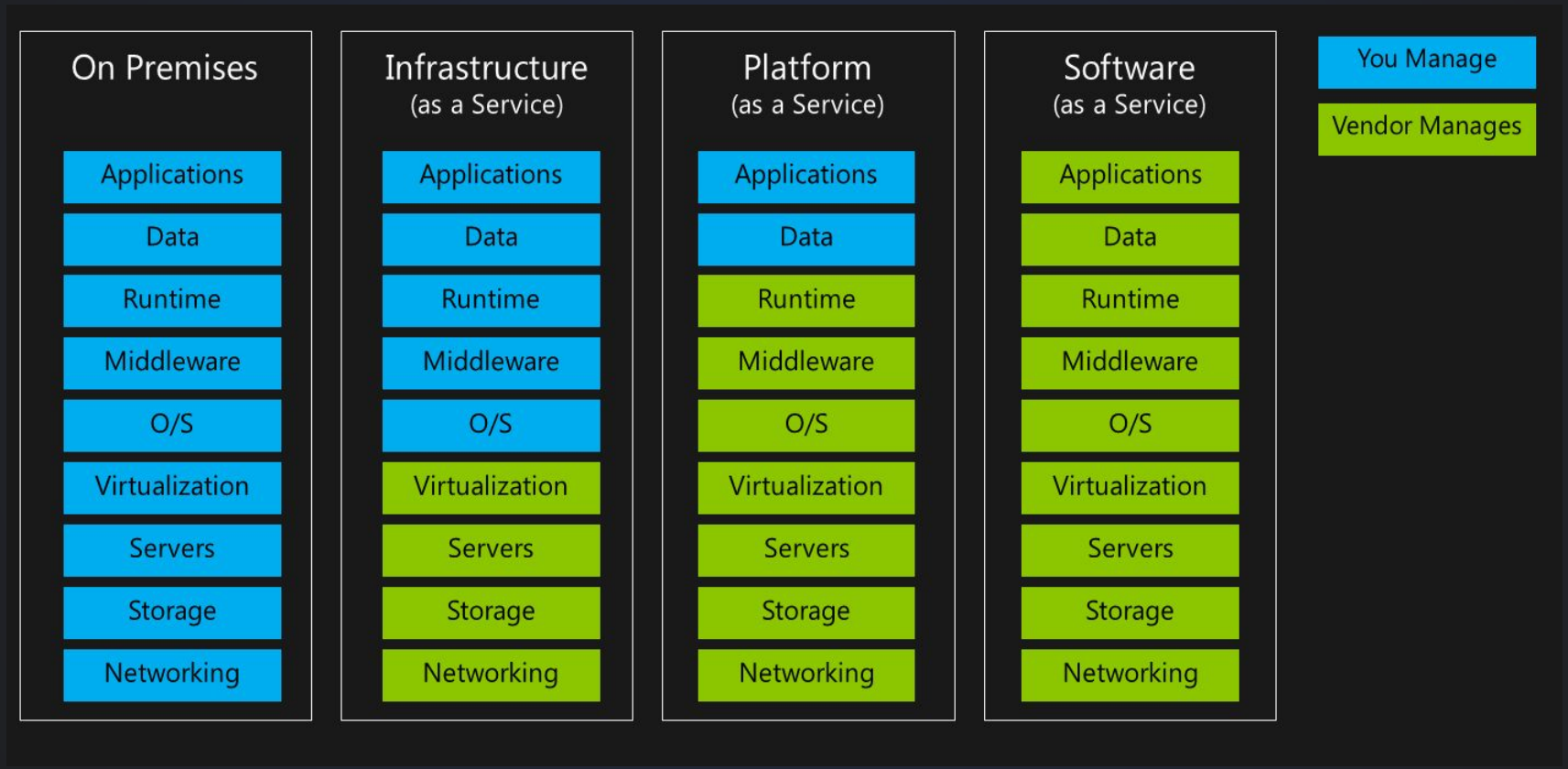
IaaS	PaaS	BaaS	SaaS
Amazon EC2	HEROKU	Firebase	zendesk
DigitalOcean	salesforce	Skygear	PayPal
rackspace the open cloud company		Parse Server	
⋮	⋮	⋮	⋮

Service Models



Service Models

FIBO CLOUD EDUCATION



3 main domains

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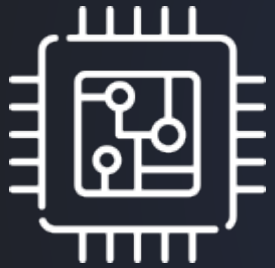

Compute

Network

Storage

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Benefits of Cloud computing

Public cloud

Problems of Traditional architecture

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1. Cost & Time
   a. Renting or setupping a Datacenter
   b. Manpower
   c. Cooling, Power supply, Maintenance
   d. Replacing hardware takes time
   e. 24/7 monitoring
2. In the future
   a. Disaster
   b. Innovation

Traditional	Cloud
Physical space Cabling Cooling Power Networking /Internet/ Racks Servers Storage Labor Maintenance of physical equipment	$0 to get started... Managed services No maintenance for physical equipment

SLA

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What is SLA

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Measured relative to “100% operational”

Availability % = (Uptime/Total operating time) * 100

Availability	Downtime	Classification
99.9%	8.76 hours/year	High availability
99.99%	52.6 minutes/year	Very high availability
99.999%	5.26 minutes/year	Highest availability
99.9999%	31.5 second/year	Disaster tolerant

Shared Responsibility Model

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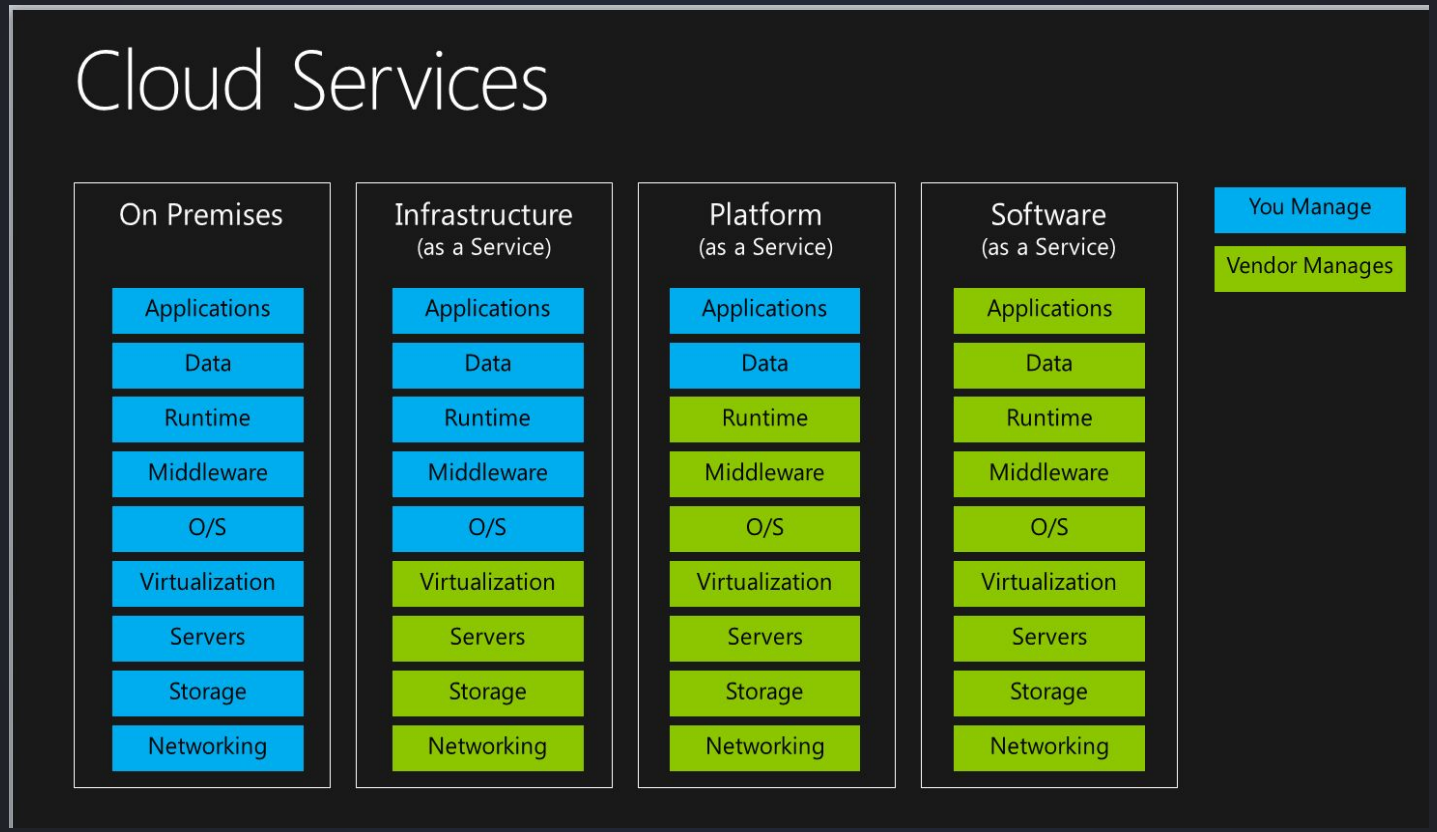

Security - Public cloud is more secure than customer data centers

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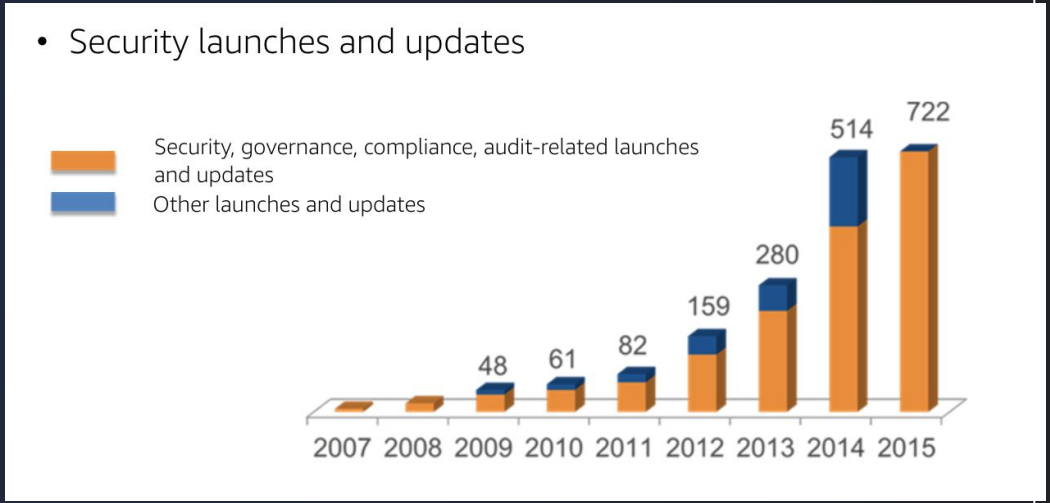
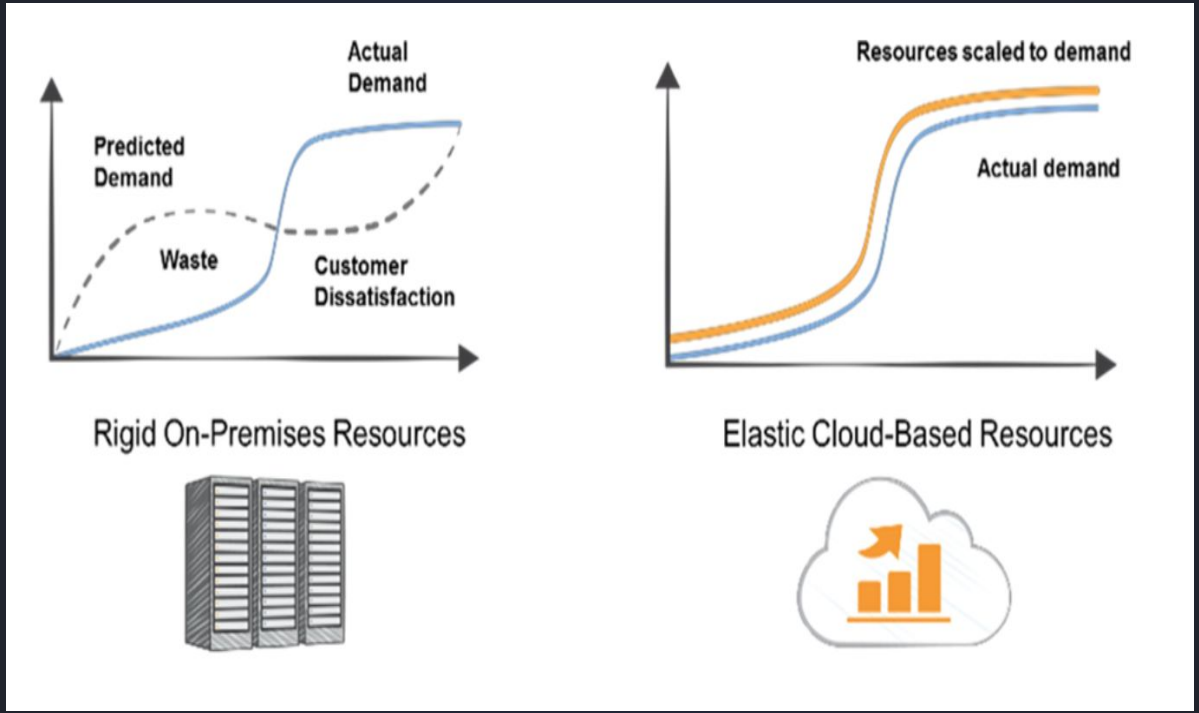
72% of organizations feel the public cloud is more secure than what they can deliver in their own datacenter and are moving data to the cloud

Source: Oracle and KPMG Cloud Threat Report 2020



Elasticity


Actual
Demand
Predicted
Demand
Waste
Customer
Dissatisfaction
Rigid On-Premises Resources
Resources scaled to demand
Actual demand
Elastic Cloud-Based Resources

Innovation

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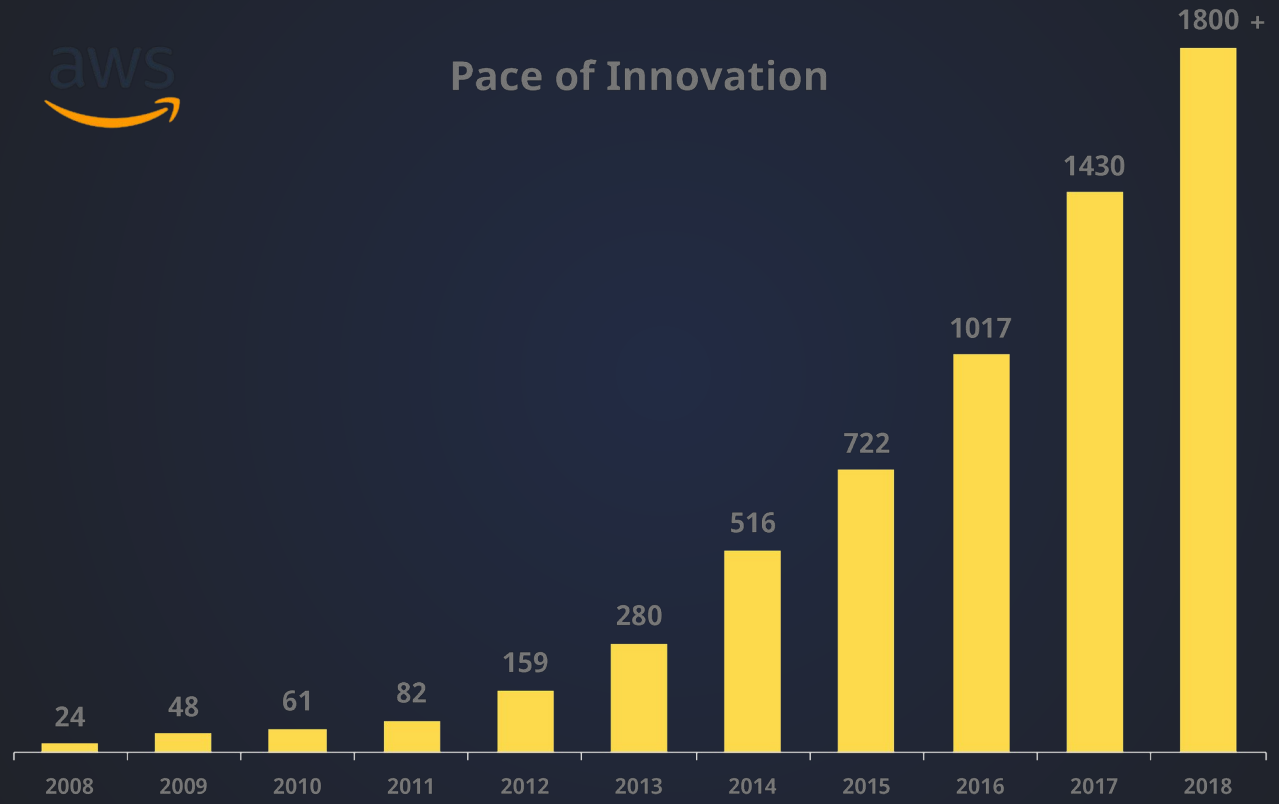

Source: Zehra Syeda-Sarwat

Shared economy

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Full of managed services

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aws

200+ services in 25 categories

Azure

200+ services in 21 categories

Google Cloud

137 services in 23 categories

Time to market

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Productivity

Go global in minutes

Automation & Agility

Cost

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No upfront cost

Pay what you use

Conclusion

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1. On-Demand
2. Instant usage
3. Right size
4. Pay what you use
5. Good interface & Experience

→

1. Agility
   a. No upfront cost
   b. Flexible
2. Productivity
   a. Managed services
   b. Automation
3. Cost
   a. Pay what you use
4. Scalability & HA
   a. Stop guessing capacity
   b. Go global in minutes

Cloud migration

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1. Судалгаа

- Уламжлалт системүүдийн шинжилгээ
- Клауд орчны судалгаа шинжилгээ
- Технологийн архитектур, стандарт
- TCO, ROI анализ
- Хууль эрх зүйн орчин
- Эрсдлийн шинжилгээ
- Клауд рүү шилжих боломжтой системүүдийг ангилах
- Proof-of-Concept туршилтыг хийж, зарим системүүдийг шилжүүлэх

2. Эхлэл

- On-prem системүүдийг клауд орчинд шилжүүлж ажиллуулна
- Мэдээллийн аюулгүй байдлын комплаенс хэрэгжүүлэх
- Хариуцаж ажиллах мэргэжилтнүүдийг бэлтгэх, томилох
- Шинээр хөгжүүлж буй системүүдийг Cloud-Native болгон хөгжүүлэх
- Microservices болон CI/CD гэх мэт клауд аргачлалууд нэвтрүүлэх

3. Өргөтгөх

- Бизнесийн чухал системүүдийг Hybrid, Multi-cloud болгон найдвартай байдлыг нэмэгдүүлэх
- Хүний нөөцийг чадавхжуулах, сертификаттай болгох
- Клауд орчинд ажиллах стандарт, журмыг дагаж мөрдөх
- Клауд орчинд зарцуулах хөрөнгө оруулалтыг нэмэгдүүлэх
- Уламжлалт системүүдийн код refactor хийх

4. Автоматжуулах

- Зардлыг хамгийн бага байлгах архитектурыг хэрэгжүүлэх
- Хүний оролцоо хамгийн бага байхаар автоматжуулалтыг хийх
- DevOps tool-үүдийг өргөн хүрээнд хэрэгжүүлж бизнесийн үр ашгийг нэмэгдүүлэх

Where to use AWS

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1. Web, mobile & social applications

2. Business applications

3. Big data & High performance computing

4. Backup, archive and disaster recovery

SOME COMPARISONS

Today cloud market is worth - 130 billion USD

Gartner chart

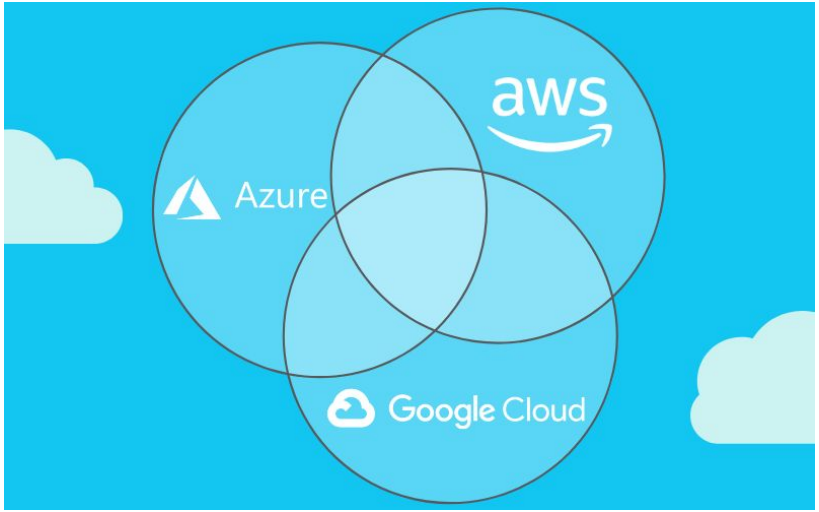
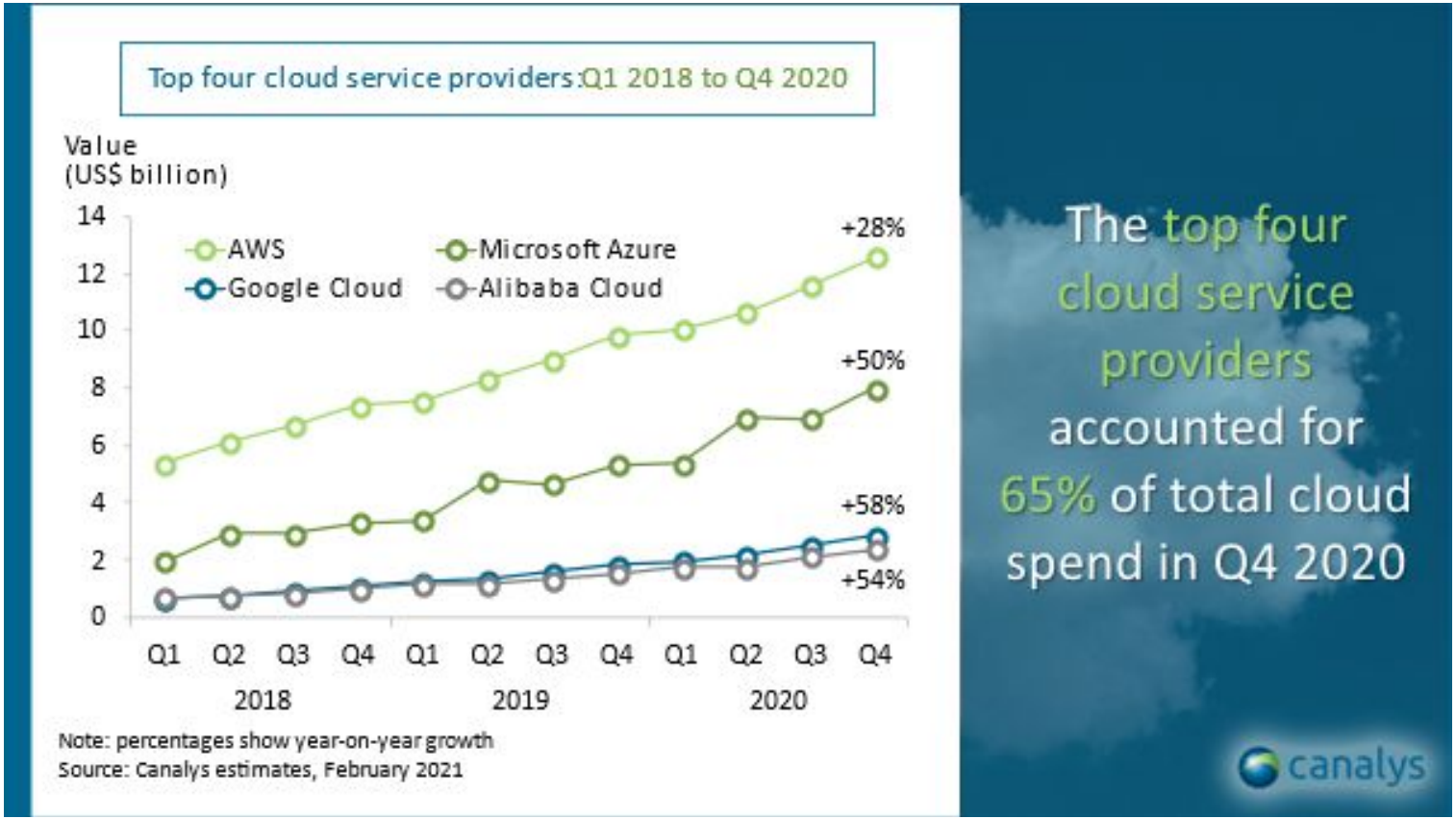


Figure 1. Magic Quadrant for Cloud Infrastructure and Platform Services



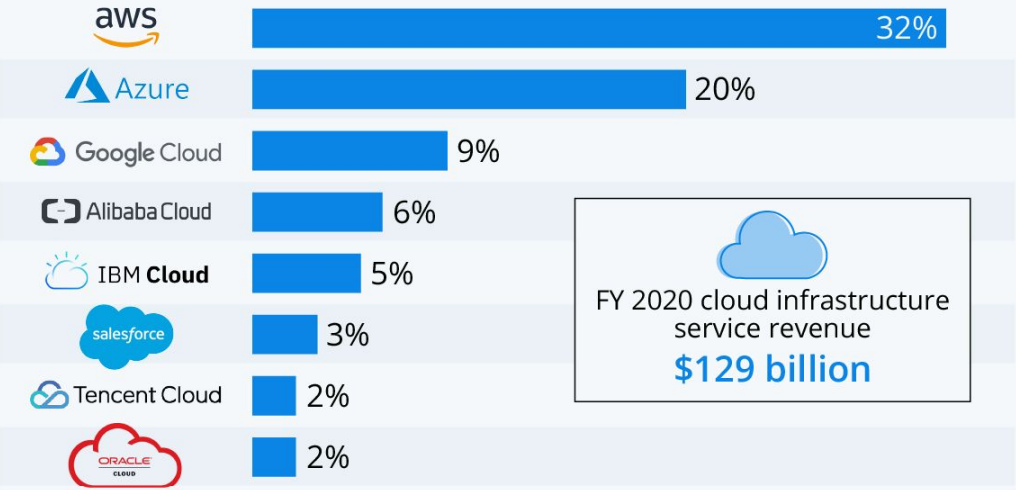
Amazon - **45.4 billion 2020 Q4** revenue

Microsoft - **59 billion 2020 Q4** revenue

Google - **13 billion 2020 Q4** revenue

Amazon Leads $130-Billion Cloud Market

Worldwide market share of leading cloud infrastructure service providers in Q4 2020*



* includes platform as a service (PaaS) and infrastructure as a service (IaaS) as well as hosted private cloud services

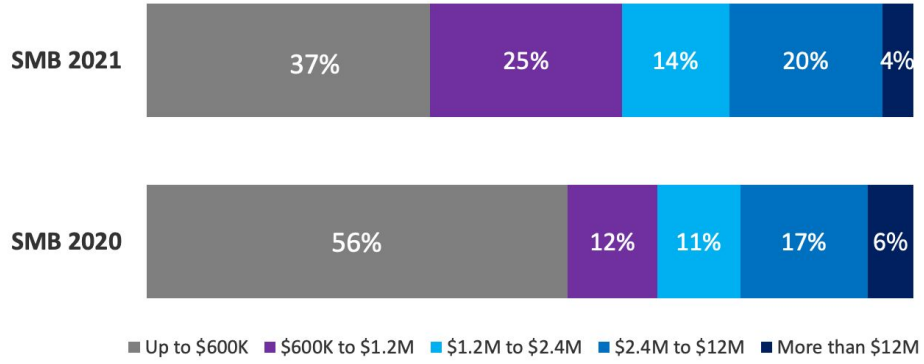
Source: Synergy Research Group

statista

RightScale - State of the cloud reports

Cloud Spend by Organization Size

% of all respondents

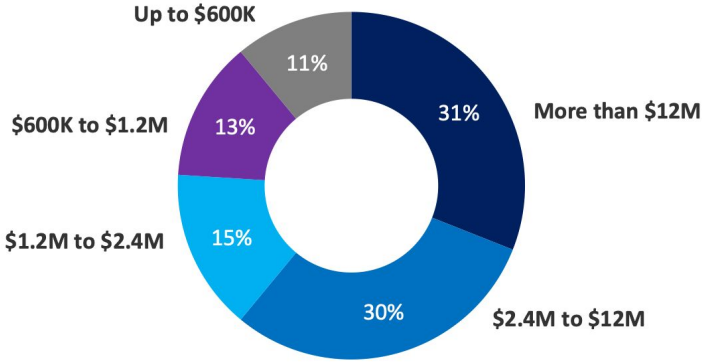


N=750

Source: Flexera 2021 State of the Cloud Report

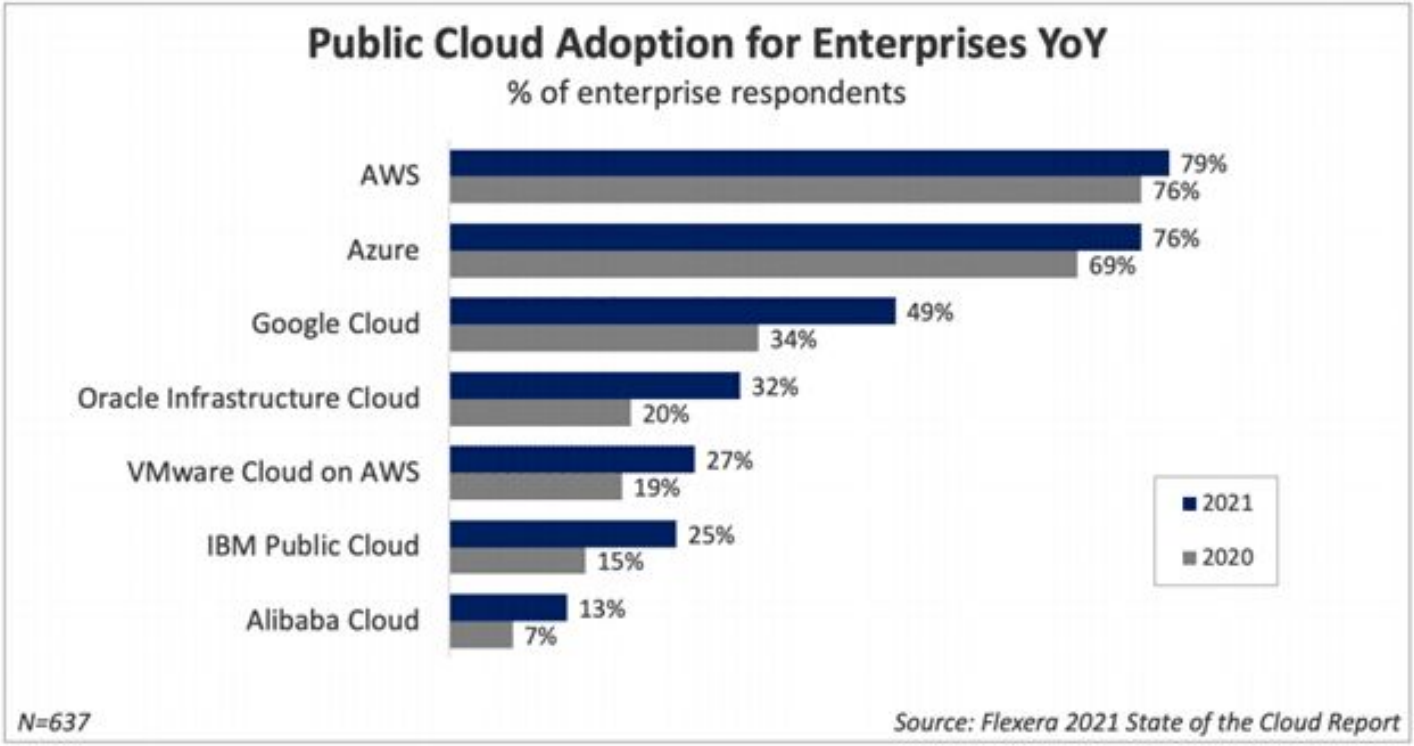
Annual Public Cloud Spend

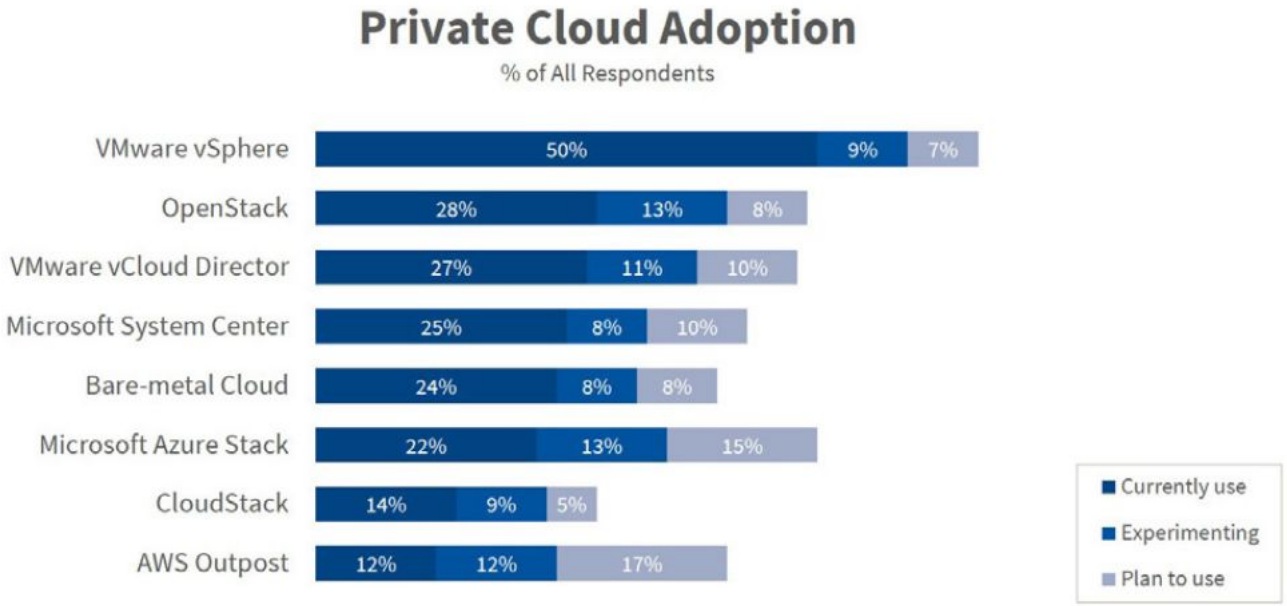
% of all respondents



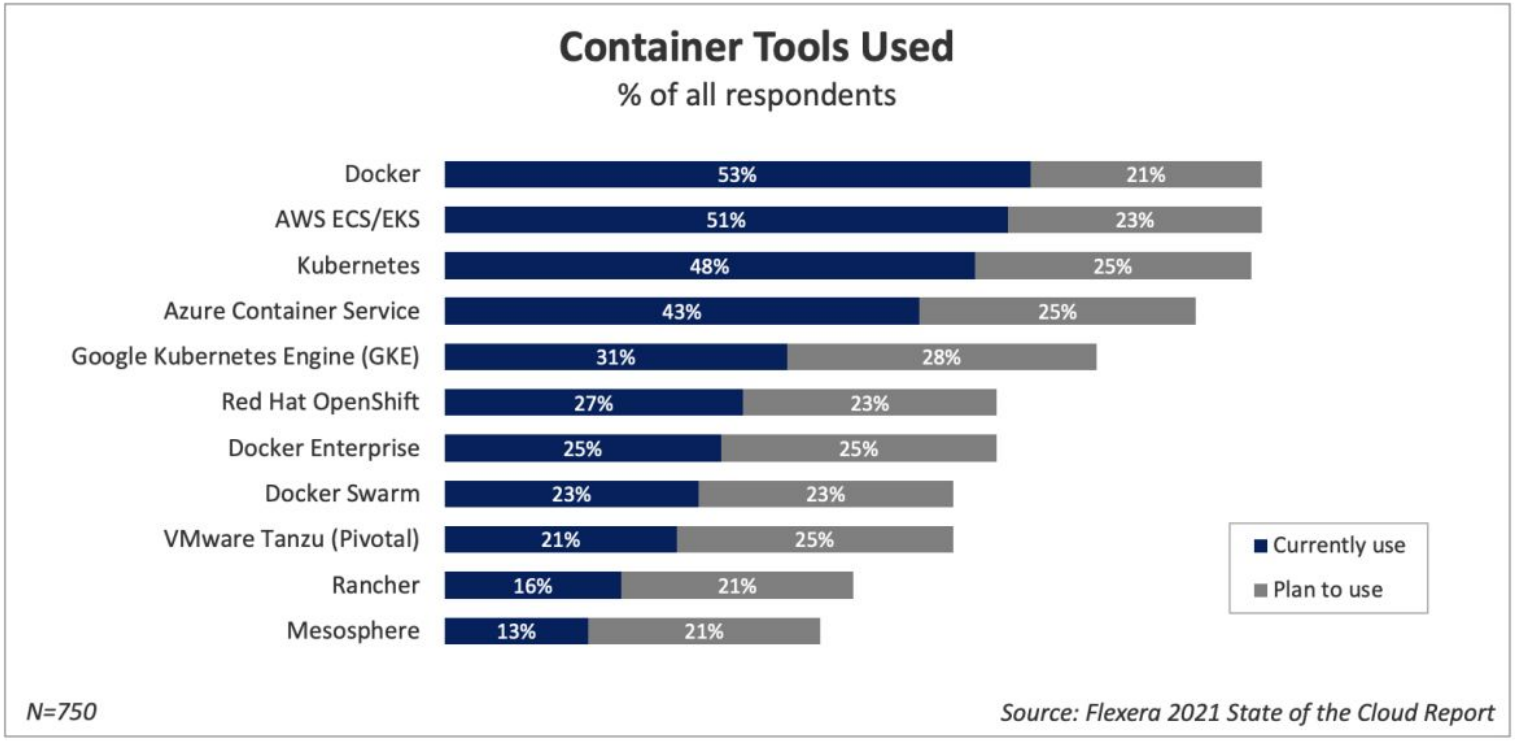
N=750

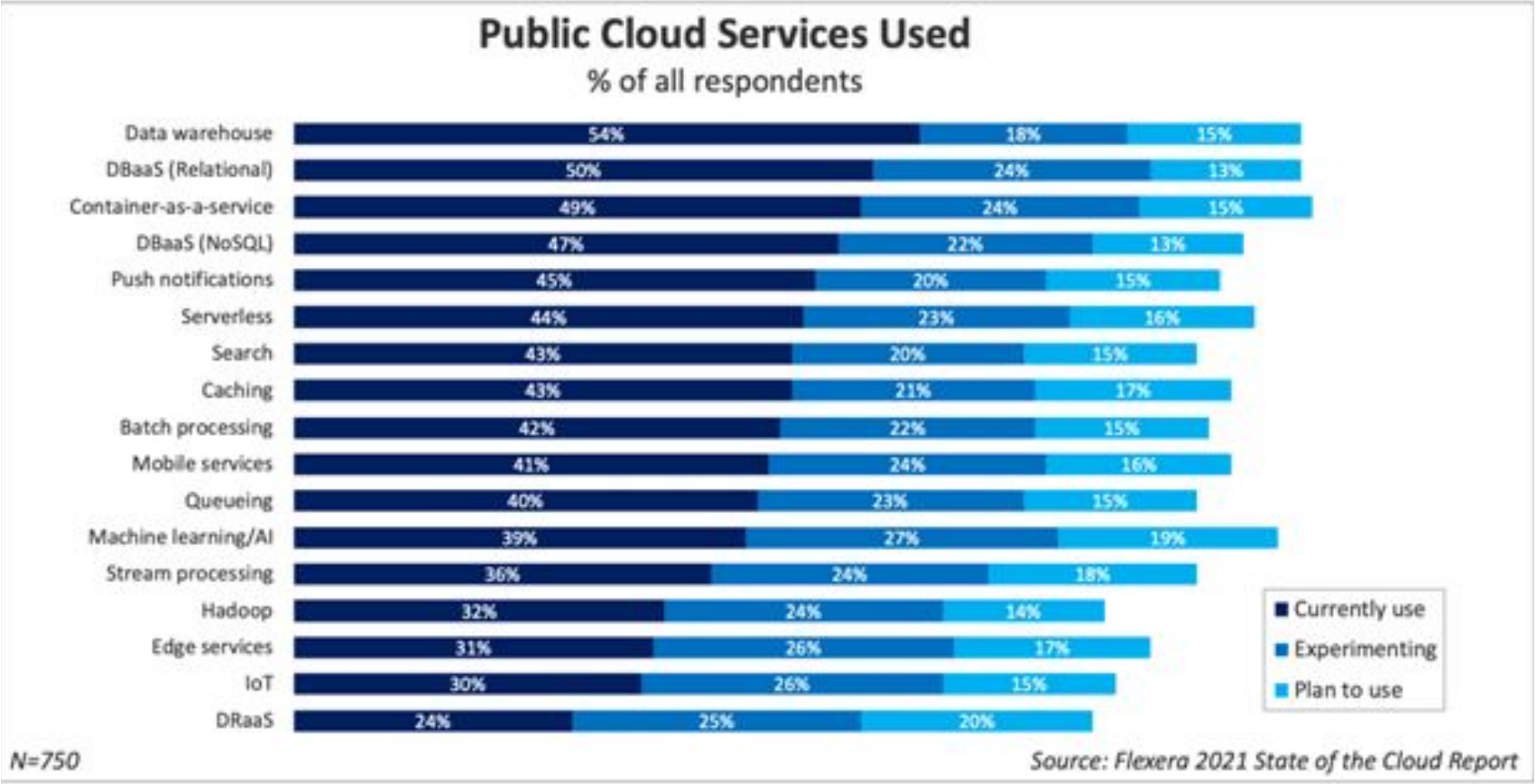
Source: Flexera 2021 State of the Cloud Report


Public Cloud Adoption for Enterprises YoY
% of enterprise respondents
AWS
79%
76%
Azure
76%
69%
Google Cloud
49%
34%
Oracle Infrastructure Cloud
32%
20%
VMware Cloud on AWS
27%
19%
IBM Public Cloud
25%
15%
Alibaba Cloud
13%
7%
2021
2020
N=637
Source: Flexera 2021 State of the Cloud Report



Source: RightScale 2019 State of the Cloud Report from Flexera


Container Tools Used
% of all respondents
Docker
53%
21%
AWS ECS/EKS
51%
23%
Kubernetes
48%
25%
Azure Container Service
43%
25%
Google Kubernetes Engine (GKE)
31%
28%
Red Hat OpenShift
27%
23%
Docker Enterprise
25%
25%
Docker Swarm
23%
23%
VMware Tanzu (Pivotal)
21%
25%
Rancher
16%
21%
Mesosphere
13%
21%
Currently use
Plan to use
N=750
Source: Flexera 2021 State of the Cloud Report


Public Cloud Services Used
% of all respondents
Data warehouse 54% 18% 15%
DBaaS (Relational) 50% 24% 13%
Container-as-a-service 49% 24% 15%
DBaaS (NoSQL) 47% 22% 13%
Push notifications 45% 20% 15%
Serverless 44% 23% 16%
Search 43% 20% 15%
Caching 43% 21% 17%
Batch processing 42% 22% 15%
Mobile services 41% 24% 16%
Queueing 40% 23% 15%
Machine learning/AI 39% 27% 19%
Stream processing 36% 24% 18%
Hadoop 32% 24% 14%
Edge services 31% 26% 17%
IoT 30% 26% 15%
DRaaS 24% 25% 20%
Currently use
Experimenting
Plan to use
N=750
Source: Flexera 2021 State of the Cloud Report

Compute Services

	aws	Azure	Google Cloud Platform	Pricing method
Virtual server /IaaS/	Amazon EC2			Per hour & per minute
Container service /PaaS/	Elastic Beanstalk		App Engine	Per hour & per minute
Function service /FaaS/	Amazon Lambda		Google Cloud Functions	Per request

Storage & DB Services

	aws	Azure	Google Cloud Platform	Pricing method
Object storage	Amazon S3	Storage	Google Cloud Storage	Size/Month
Block storage	Amazon EBS	Azure Disk		Size / per hour
Relational DBaaS	Amazon RDS	SQL		Per hour

Networking services

	aws	Azure	Google Cloud Platform	Pricing method
Virtual network	VPC			It's free
Private network, CDN, SSL			Google global cache	Size/Month
WAF, encryptio, Tunneling				Size/Month

Monzo - case study

Monzo has grown from an idea to a fully regulated bank on the AWS Cloud. A bank that “lives on your smartphone,” Monzo has already handled £1 billion worth of transactions for half a million customers in the UK. Monzo runs more than 400 core-banking microservices on AWS, using services including Amazon Elastic Compute Cloud (Amazon EC2), Amazon Elastic Block Store (Amazon EBS), and Amazon Simple Storage Service (Amazon S3).

Monzo was founded in 2015 by a small team of entrepreneurs from the technology and banking industries. It now has half a million users and 300 employees, with more than £1 billion [US$1.38 billion] in transactions so far.

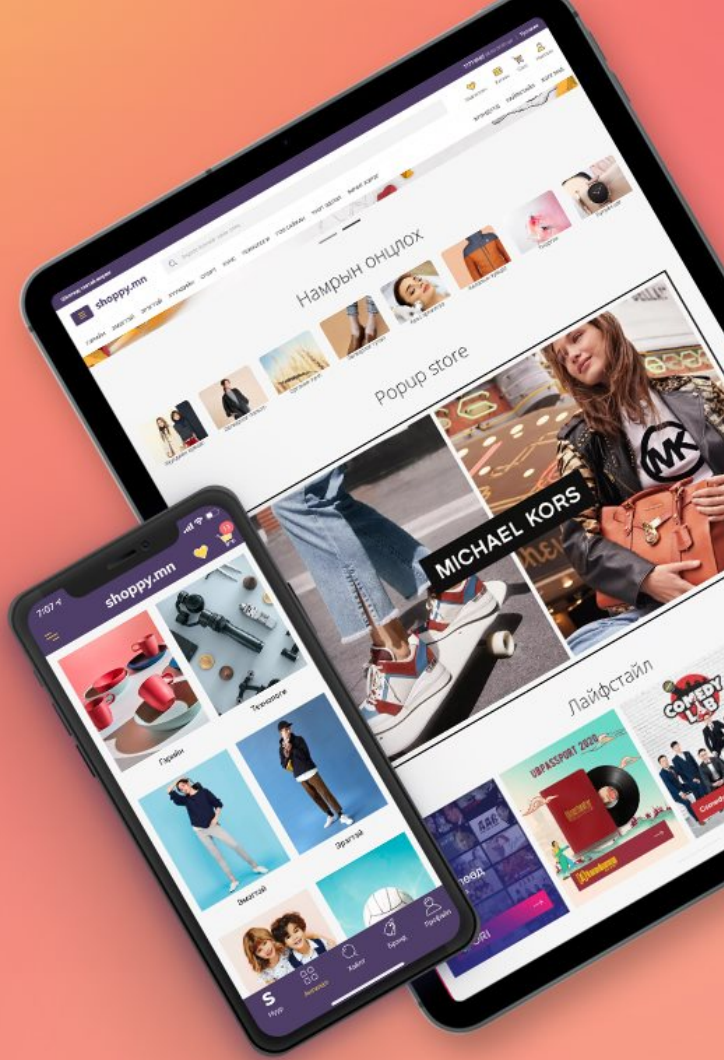
- Five people manage banking infrastructure for half a million customers
- Real-time statements instead of the 48-hour delays typical of big banks
- Becomes a fully regulated bank in the UK within three years
- Migrates to multi-account setup in less than a day

NETFLIX
Panasonic

A CLOUD GURU

shoppy.mn

дэлхийн брендүүд нэг дор



UFE Mongolia Goes Online in 10 Days with AWS

2020

> **The University had years and years of content. The challenge was how to move it to the new system. Using AWS, it took us only three days."**

Ankhtuya Dorisuren
Vice President, UFE

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Private Cloud

Why Private cloud

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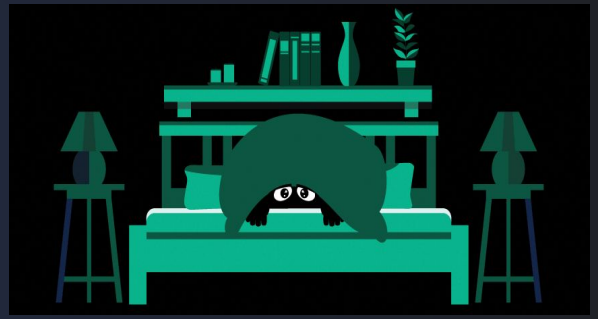
Resource efficiency

Accelerate innovation



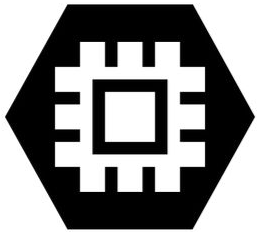
Avoid vendor lock-in

SOME USE CASES

TELECOM/NFV - 86% of telecoms say Private cloud is important to their business in order to virtualize their networks and implement edge computing to achieve agility significant cost savings.

HPC - CERN runs one of the largest private cloud (over 300,000 cores) to process data from the Large Hadron Collider, giving the resources they need to unleash the secrets of the universe.

E-COMMERCE - Walmart moved their global e-commerce platform to private cloud, powering desktop, mobile, tablet and kiosk users. Today Walmart runs over 250,000 cores of private cloud.



COMPUTING RESOURCE

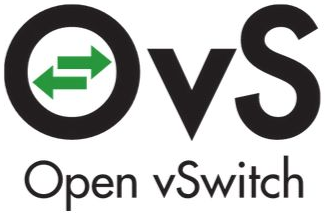
Virtualization

STORAGE RESOURCE

Software defined storage

NETWORKING RESOURCE

VXLAN or GRE



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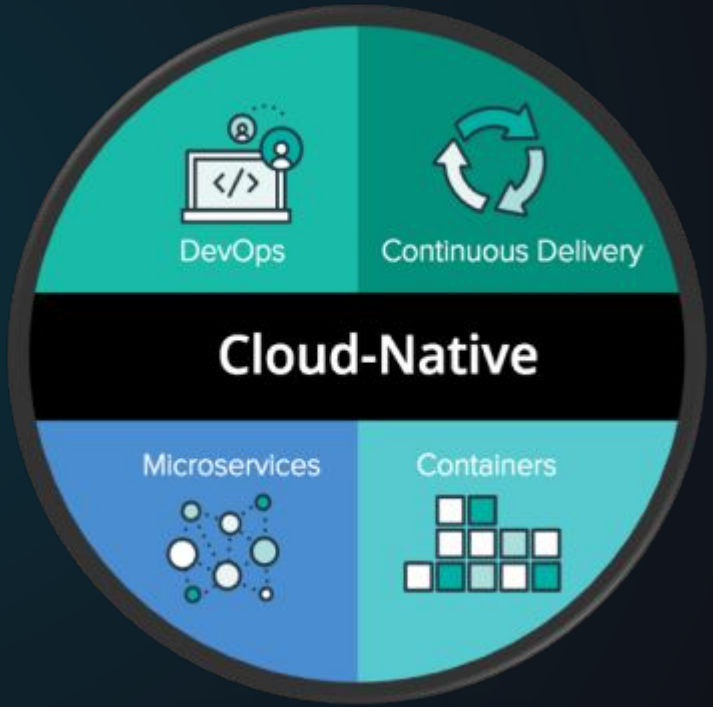
Cloud Native App



Cloud is more than the infrastructure

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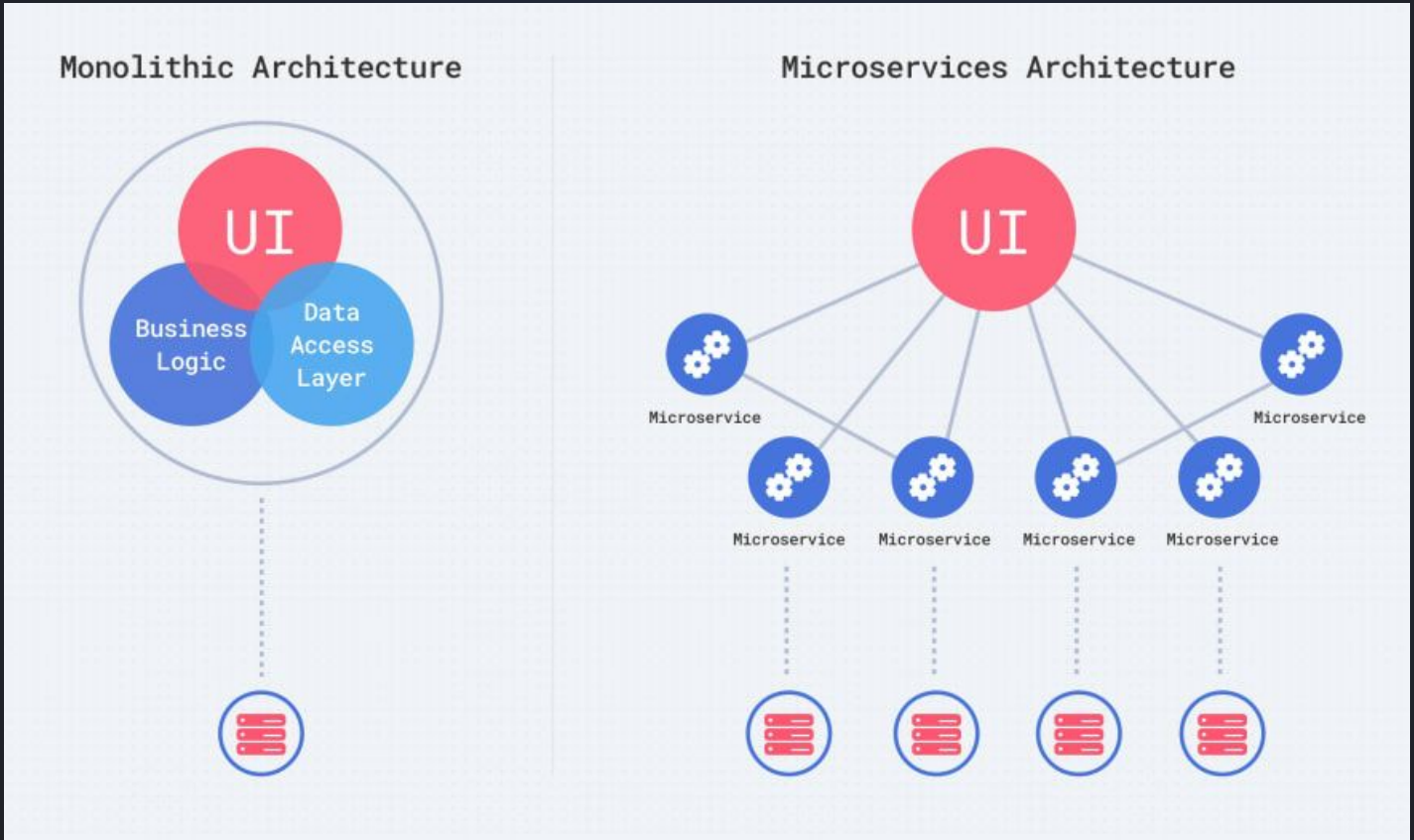

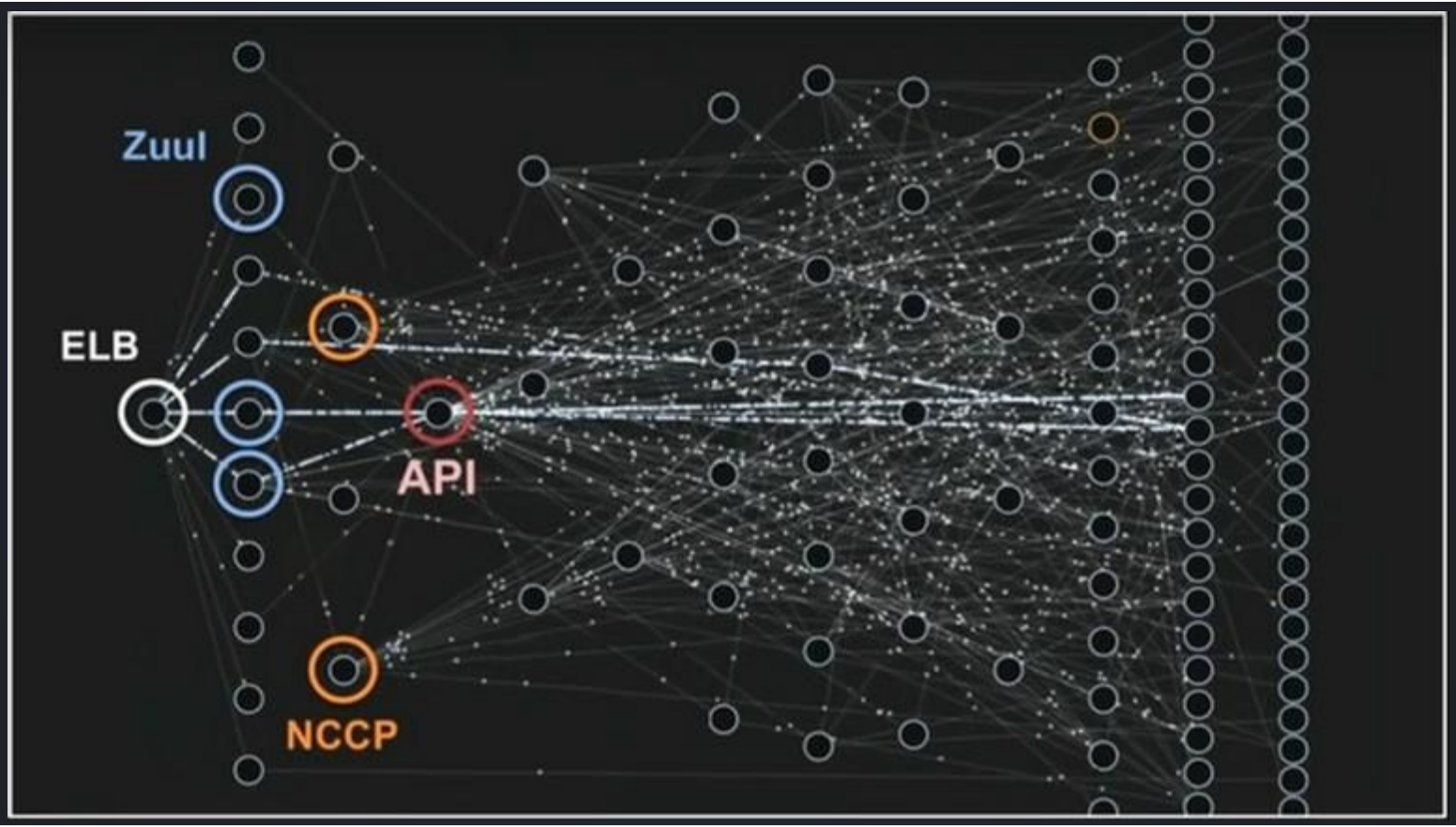
Zuul
ELB
API
NCCP

Container orchestration

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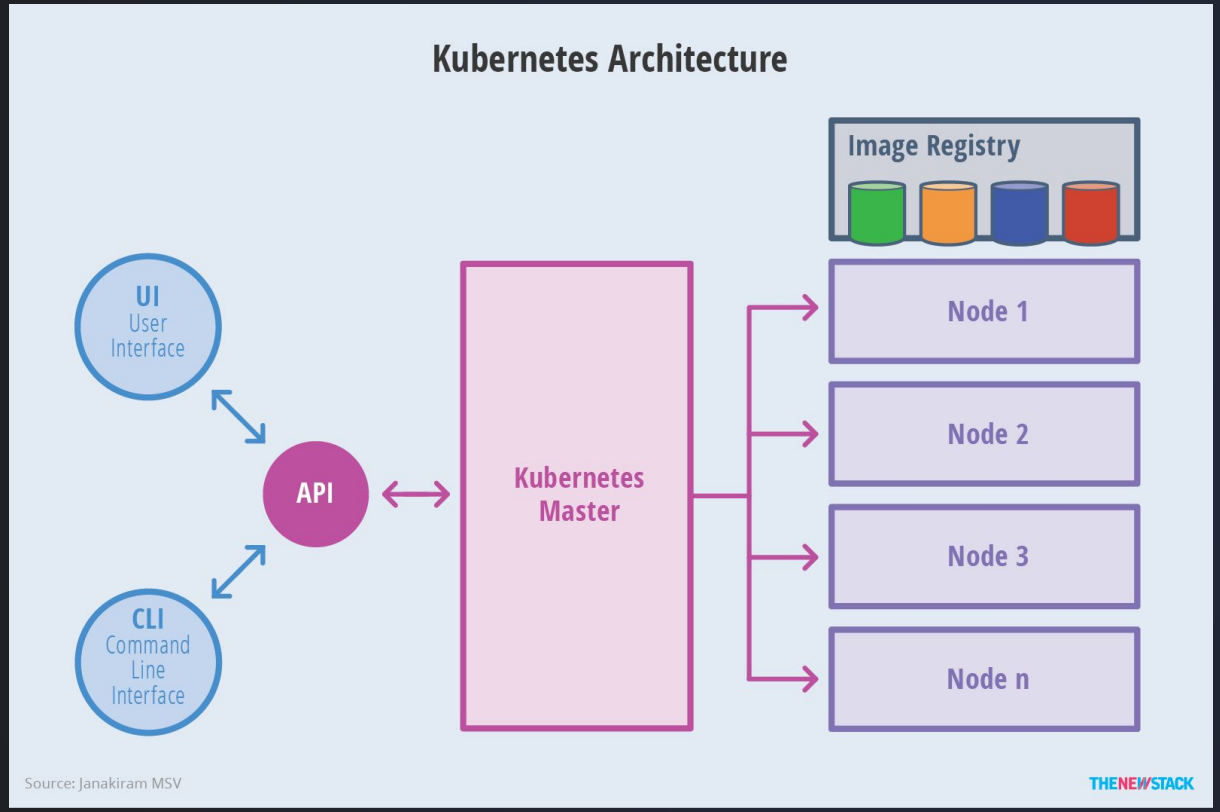

- Design for automation
- CI/CD
- Scale up/down
- Monitoring
- Auto recovery
- Roll-back
- Load-balance across

In the future, all the code you ever write will be business logic…

Cloud engineer today

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Most Valuable IT Certifications, 2020 (Source: Global Knowledge Study, 15 Top-Paying Certifications for 2020)	
Certification	Annual Salary
1. Google Certified Professional Cloud Architect	$ 175,761
2. AWS Certified Solutions Architect – Associate	$ 149,446
3. CISM - Certified Information Security Manager	$ 148,622
4. CRISC - Certified in Risk and Information Systems Control	$ 146,480
5. PMI® Project Management Professional	$ 143,493
6. CISSP - Certified Information Systems Security Professional	$ 141,452
7. CISA - Certified Information Systems Auditor	$ 132,278
8. AWS Certified Cloud Practitioner	$ 131,465
9. VCP6-DCV: VMware Certified Professional 6 - Data Center Virtualization	$ 130,226
10. ITIL® Foundation	$ 129,402
11. Microsoft Certified: Azure Fundamentals	$ 126,652
12. Microsoft Certified: Azure Administrator Associate	$ 125,993
13. CCA-N: Citrix Certified Associate – Networking	$ 125,264
14. CCNP Routing and Switching	$ 119,178
15. CCP-V: Citrix Certified Professional – Virtualization	$ 117,069

Source: Forbes.com

Cloud Engineer = Batman 😎

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- Architecture
- Automation
- Software Development / Deployment
- Network
- Security
- Storage
- Database
- Highly availability

New generation of “IT”
(Tech wizard for leading your business successful)

Төмрөнд биш хүнд хөрөнгө оруулалт хийцгээе...

History of AWS

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AWS EC2 Business Model Canvas

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KEY PARTNERS

- Hardware vendors
- Data center building
- Open Source

KEY ACTIVITIES

- Highly automated fulfillment
- Optimization

KEY RESOURCES

- Hardware
- Fulfillment software

VALUE PROPOSITIONS

Rapid self-service provisioning of virtual machines with pay per use billing

CUSTOMER RELATIONSHIPS

- Customer Conference
- Analytics

CHANNELS

- Self-service
- API

CUSTOMER SEGMENTS

Startup Software companies

COST STRUCTURE

- assets such as servers and data centres
- services such as electrical power and telecommunications
- people for developing and managing the systems

REVENUE STREAMS

Hourly fees per virtual machine. The 'bigger' the virtual machine, the higher the hourly rate

© 2014 ClubCloudComputing

Business drivers for migrating to the Cloud

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Business drivers for migrating to the Cloud

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1. Digital transformation - Business speed
2. Agility and staff productivity
3. Improved security and operational resilience
4. Cost reduction

Importance of the Cloud skills

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Top IT skills in 2022
Top IT certification in 2022
Avg tech salary

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Get into AWS

AWS Service Categories

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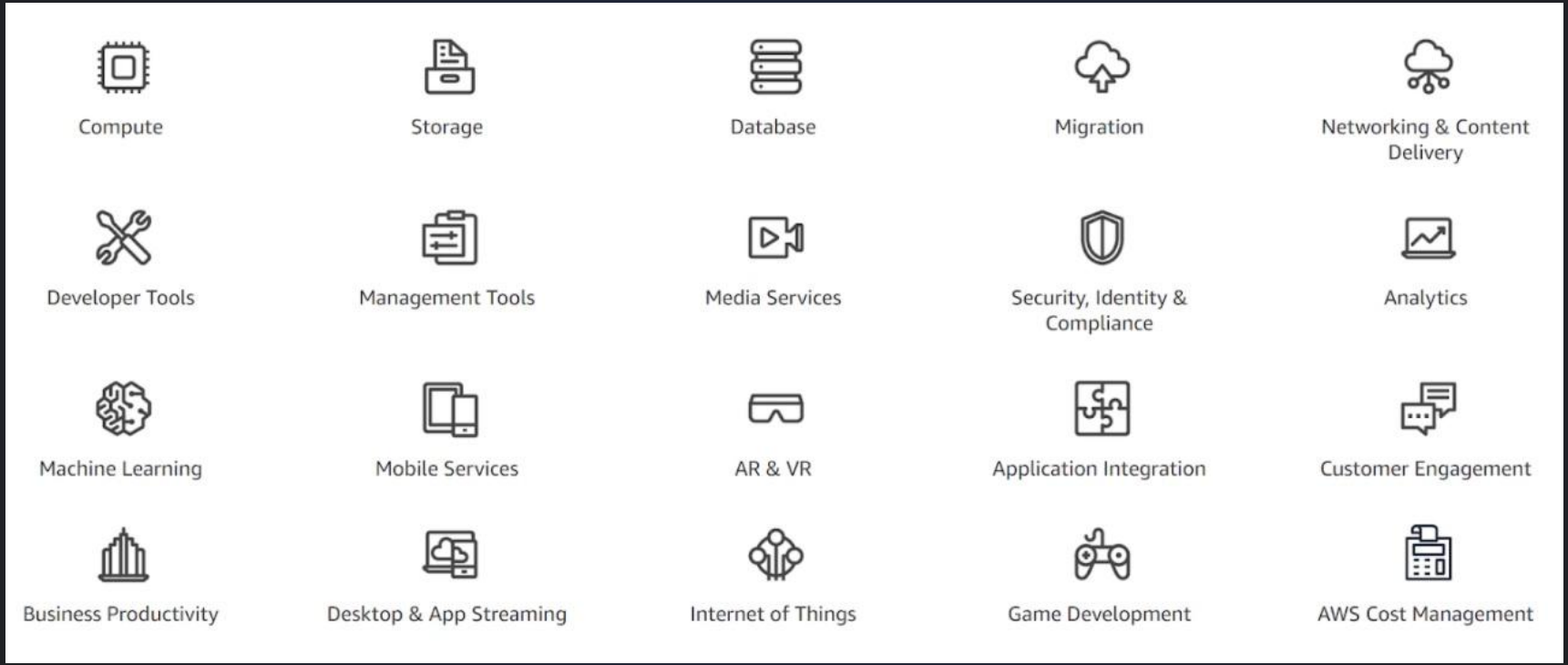

AWS Global Infrastructure

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https://aws.amazon.com/about-aws/global-infrastructure/

Regions & AZs

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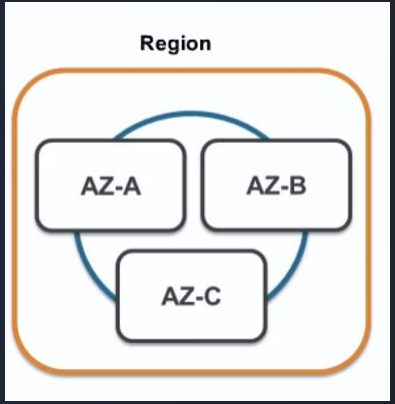
A Region is a geographical area. Each Region consists of 2 (or more) AZs.

Availability Zone = Data Center

Physically isolated (location, power, water supply, facilities...)



Regions

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https://aws.amazon.com/about-aws/global-infrastructure/regions_az/

- us-east-1
- Not all services in all regions
- Northern Virginia

Availability Zones

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https://aws.amazon.com/about-aws/global-infrastructure/regions_az/

- AWS datacenter
- us-east-1a, us-east-1b
- Multi-AZ allows failover configuration
- <10ms latency

Edge locations

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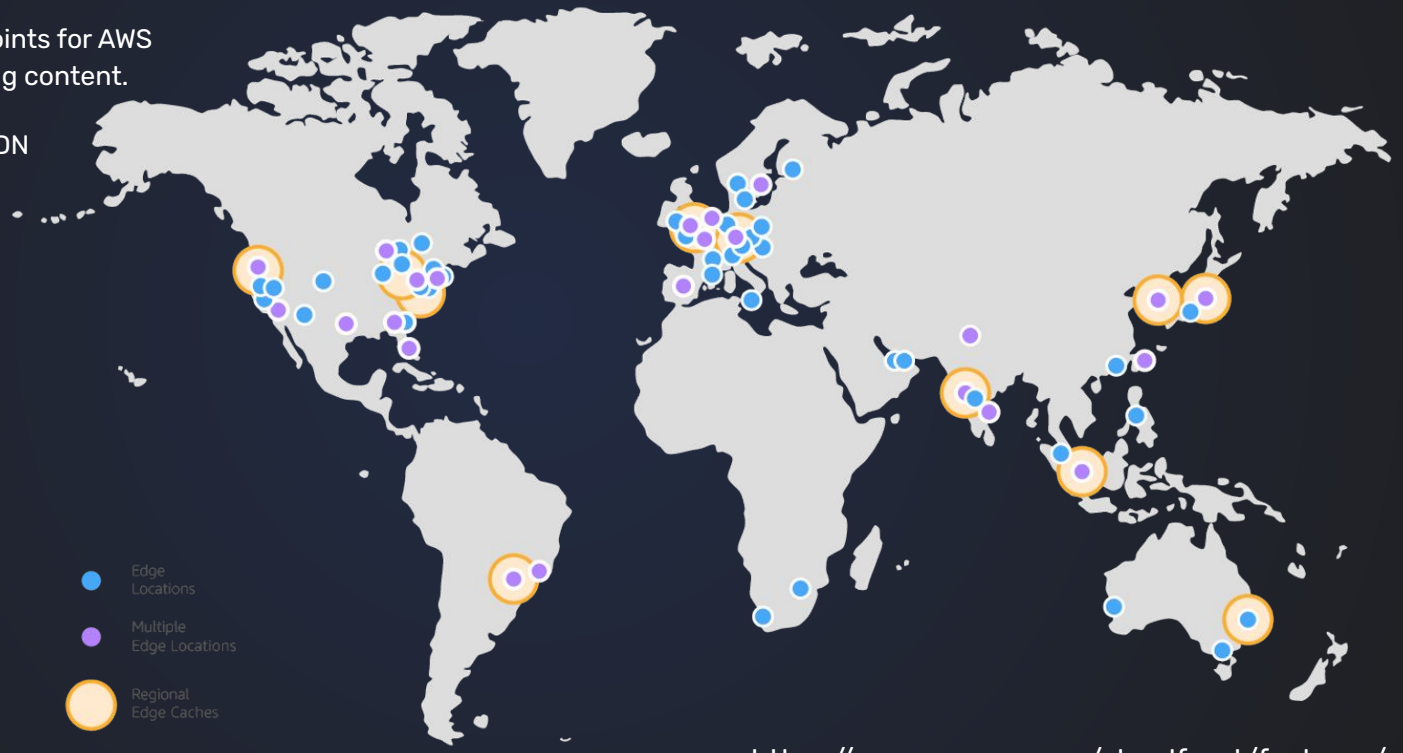
Edge Locations are endpoints for AWS which are used for caching content.

CloudFront = Amazon's CDN



https://aws.amazon.com/cloudfront/features/

Edge locations

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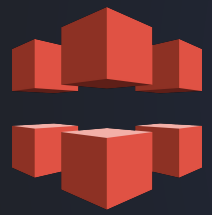
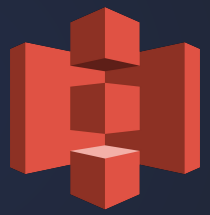
Trusted AWS partner Datacenter



Cloudfront

Route 53



S3 Transfer Acceleration

API Gateway

Leverages low latency usage

Gov Cloud

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- 🇺🇸 FedRAMP High baseline
- 🇺🇸 DOJ's Criminal Justice Information Systems (CJIS) Security Policy
- 🇺🇸 U.S. International Traffic in Arms Regulations (ITAR)
- 🇺🇸 Export Administration Regulations (EAR)
- 🇺🇸 Department of Defense (DoD) Cloud Computing Security Requirements Guide

https://aws.amazon.com/govcloud-us/

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Accessing AWS

Web console

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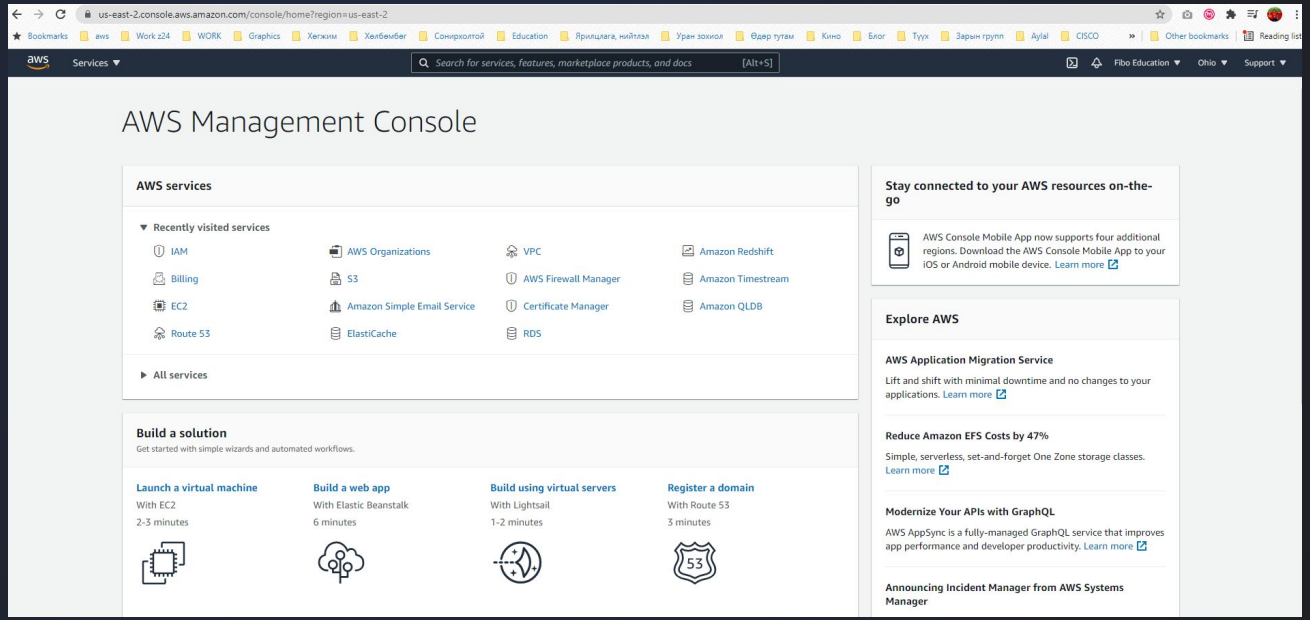
AWS Management Console

- GUI - console.aws.amazon.com
- Get started fast



Command Line Interface

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AWS CLI

- Text based tool you install
- Internet connection to AWS
- CLI for multiple AWS services
- Custom CLI for a single service
- Windows PowerShell tools

https://aws.amazon.com/tools/

AWS SDK

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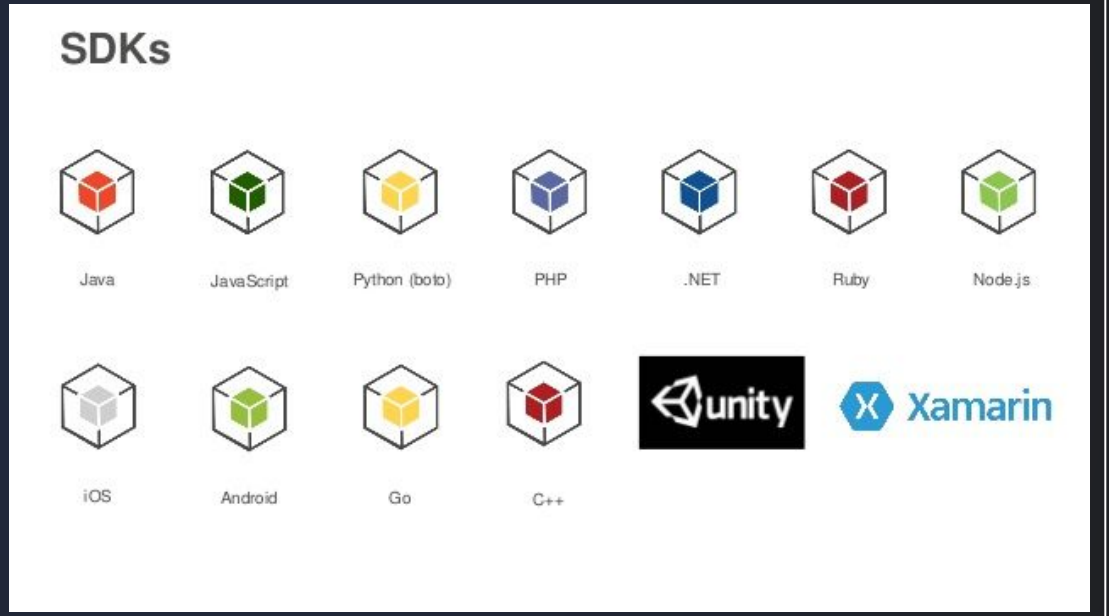
SDK

- Software Development Kits
- Class libraries to your application
- Variety of languages and platform



https://aws.amazon.com/tools/

Хичээл

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- Онолын мэдлэг
- Холбогдох мэдлэг, ойлголтууд
- Практик дасгал
- Нэмэлт техник, ойлолтууд
- Гэрийн даалгавар

- **Python**
- **Web**
- **Rest**
- **Relational Database**
- **Storage**
- **Networking**
- **Virtualization**
- **Linux**

Гэрийн даалгавар

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AWS дээр account үүсгэж надад IAM user үүсгэж өгөх

Email: lkhagvatuguldur@fibo.cloud