

AWS Solutions Architect

Клауд сургалт



Н. Ганжигүүр
Fibo Cloud

Танилцуулга

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

Багшийн танилцуулга



Ганжигүүр (Жигүүр)

- Solutions Architect @Fibo Cloud
- Software Engineer - 10 жил
- Cloud Engineer - 6 жил
- AWS Mongolia User Groups 2019~
- Blogging: www.awsmongolia.com
- Сургалт: Байгууллага, хувь хүн

Certs:

- AWS Solutions Architect Professional
- AWS Developer Associate
- AWS Solutions Architect Associate
- Cisco Certified Network Associate
- Google Cloud Engineer

Клауд мэргэжилтнүүдийг олноор бий болгох

Сургалтын зорилго

- Cloud computing fundamentals
- AWS cloud platform
- Practical solutions
- Think with Cloud:
- Core cloud services - 100%
- Certification - 50%
- Practical - 30%
- Not be afraid of AWS - 100%

Сургалтын явц



1. Танхим + Онлайн
2. 12 хичээл (30 цаг)
3. 21 хоног
4. Батламж

Solutions Architect ГЭЖ ХЭН БЭ?

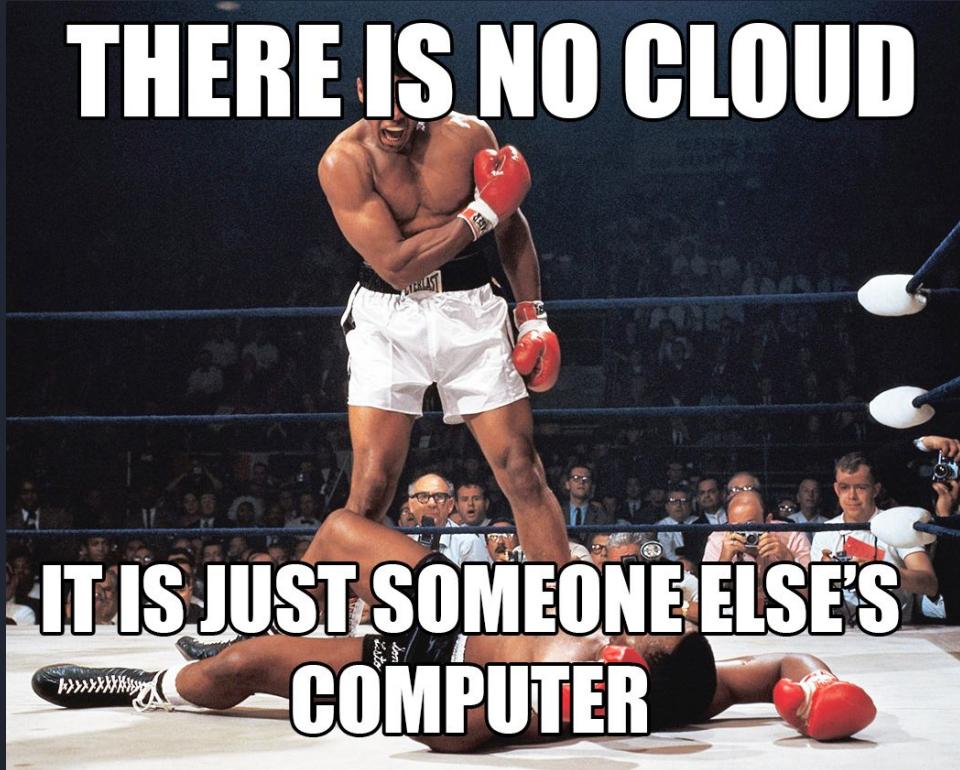
Өгөгдсөн нөөц (**Мөнгө, хүний нөөц, нөхцөл байдал**)-г ашиглан тухайн IT-н асуудлыг хамгийн **найдвартай, хямд, үр дүнтэй** аргаар шийдвэрлэх шийдлийг гаргадаг инженер.

Ямар мэдлэг хэрэгтэй вэ?

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

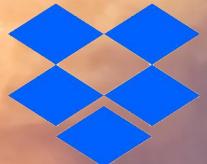
Cloud computing

Үүлэн технологи





Google Drive



Dropbox



iCloud

З тусдаа янзаар тайлбарлая

A. Жирийн хэрэглэгч

Хаа нэгтээ байгаа хэн нэгний компьютерийг интернетээр дамжуулж хэрэглэ.
Өгөгдөл хадгалж, бодлого бодуулж болно.

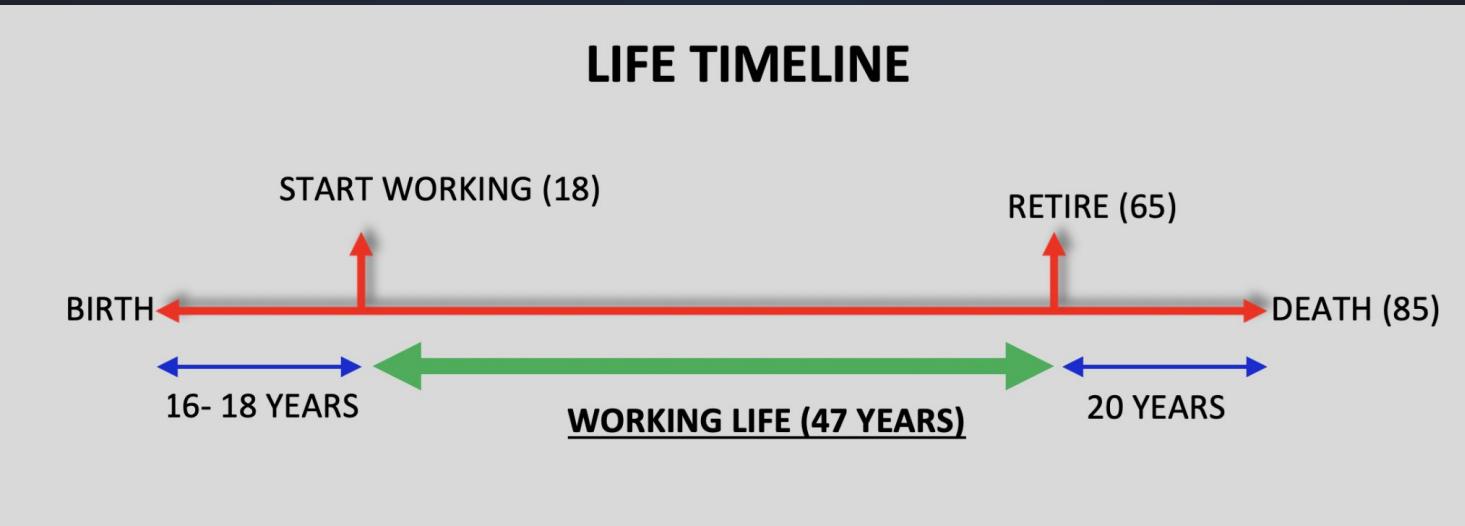
B. Програм хөгжүүлэгч

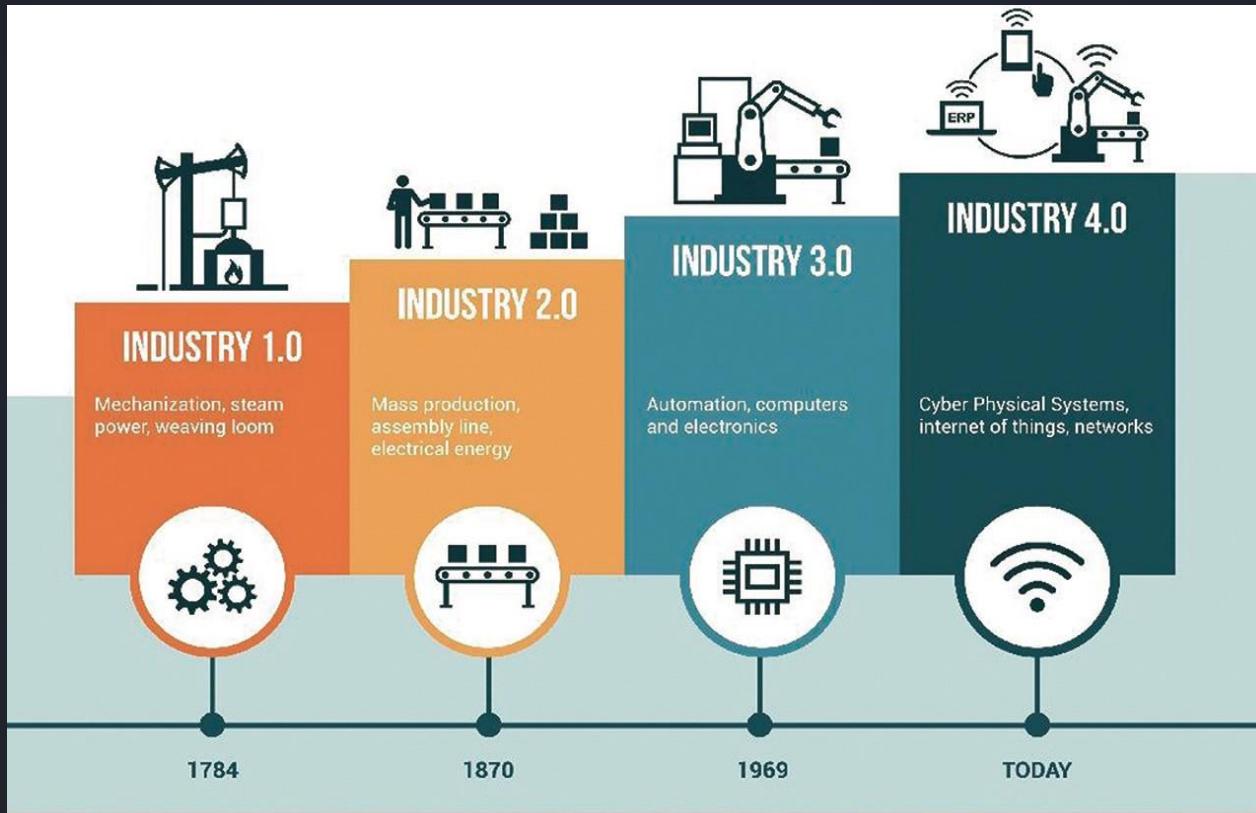
Програм бүтээхэд шаардлагатай бэлэн үйлчилгээнүүдийг аргыг нь олоод ашиглаад яв.
AI, Machine Learning, Storage, Compute, Container, Database...

B. 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.

Философи





Definition about Cloud Computing

"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 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 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

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

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

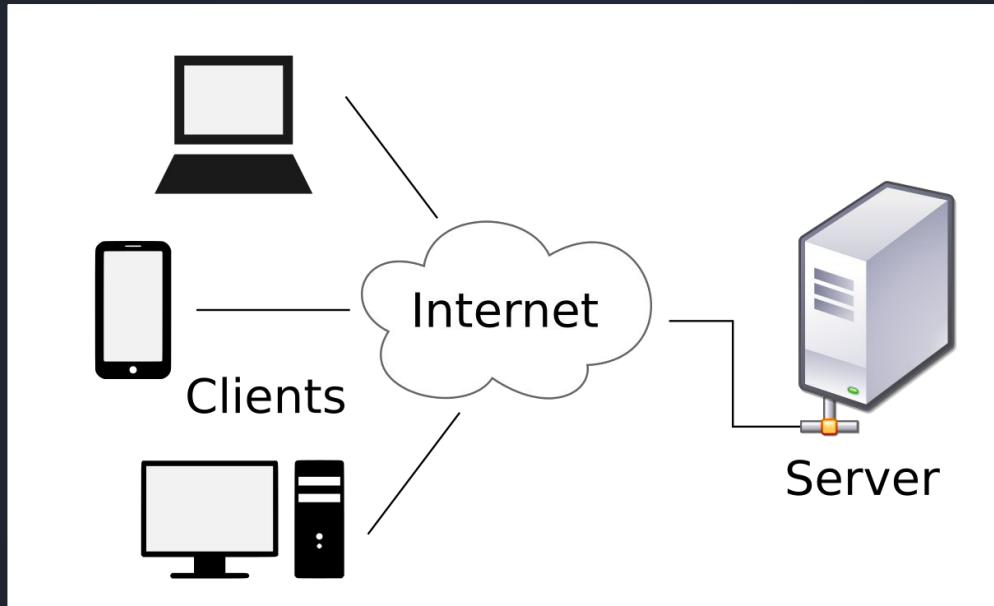
"If someone asks me what cloud computing is, I try not to get bogged down with definitions. I tell them that, simply put, cloud computing is a better way to run your business." ~ Marc Benioff, Founder, CEO and Chairman of Salesforce

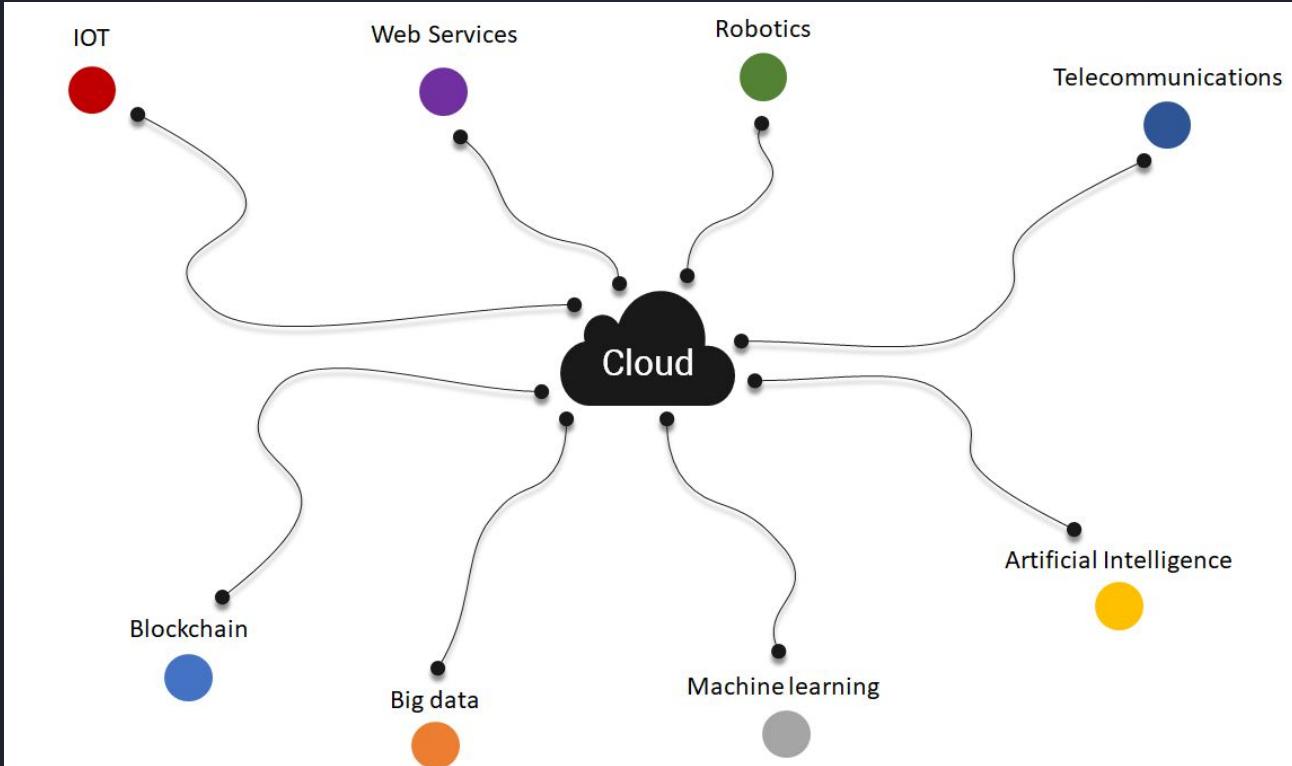
"Cloud computing is a great euphemism for centralization of computer services under one server."~ Evgeny Morozov, author and technology skeptic

"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.

Definition about Cloud Computing

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





Timeline

Virtualization



IBM CP/CMS OS

1961

Early concepts
John McCarthy

1964



IBM VM/370

Mainframes



Minicomputer

Personal Computer

1972

1980

Web



www

Web hosting



salesforce

vmware

1997

First use of term
'Cloud computing'



Cloud computing

1999

SOA



amazon
webservices



Dropbox

2005

2006

rackspace



vmware
vCloud



Azure



openstack

2008

2010

ibm smartcloud



Office 365

Cloud computing...



Google
Cloud Platform

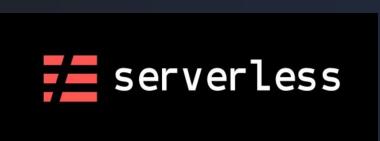
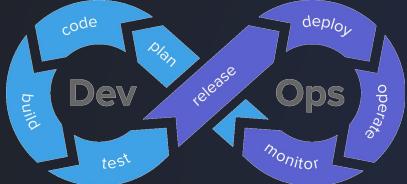


hp Cloud Services

2011

2012

Last decade



GitLab



Cloud Computing Drives IT Architecture Evolution



The New Generation
of IT Architecture

Business
Category and
Industry

Application
System

Support Platform

Traditional Business

CRM / ERP / OA / ...

Agile Business

E-commerce / Internet /
Finance / ...

Legacy Application

Monolithic Architecture /
SOA

Cloud Native Application

Microservices
Architecture

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

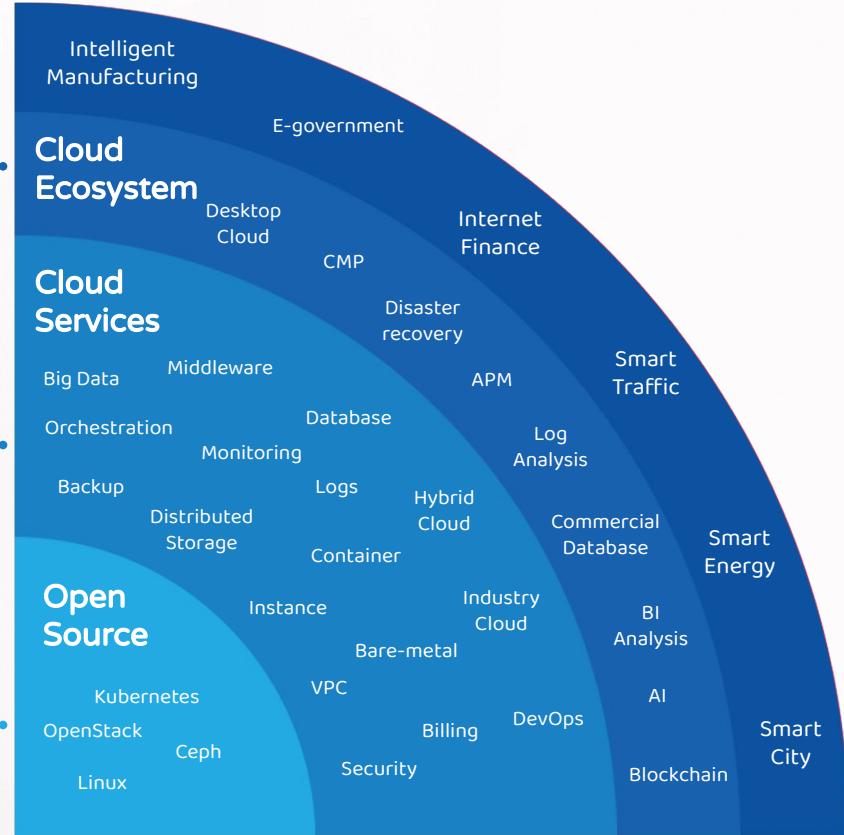
Build an application-centric Open Cloud Ecosystem that enables end to end business application scenarios

Application Centric Cloud Services

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

Productionization 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

Tips to Choose the Best Cloud Model for Your Business



Public

- . Cost-effective
- . Easy deployments
- . On-demand scalability
- . Reliability
- . Continuous uptime
- . Zero maintenance



Private

- . Higher level of data security and safety
- . Less risky
- . Compliance
- . Reliability
- . Agility
- . Efficiency

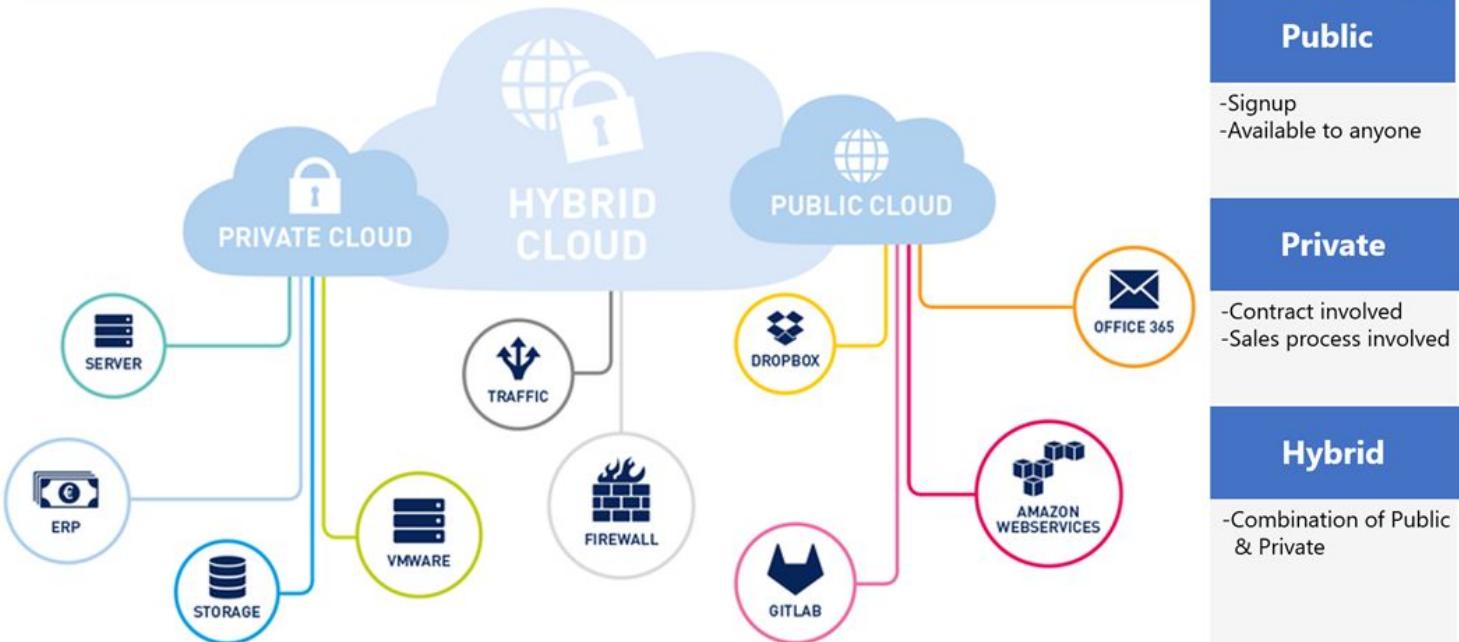


Hybrid

- . Secure and safe
- . Cost-effective
- . Flexible and scalable
- . Easy transition

Deployment Models

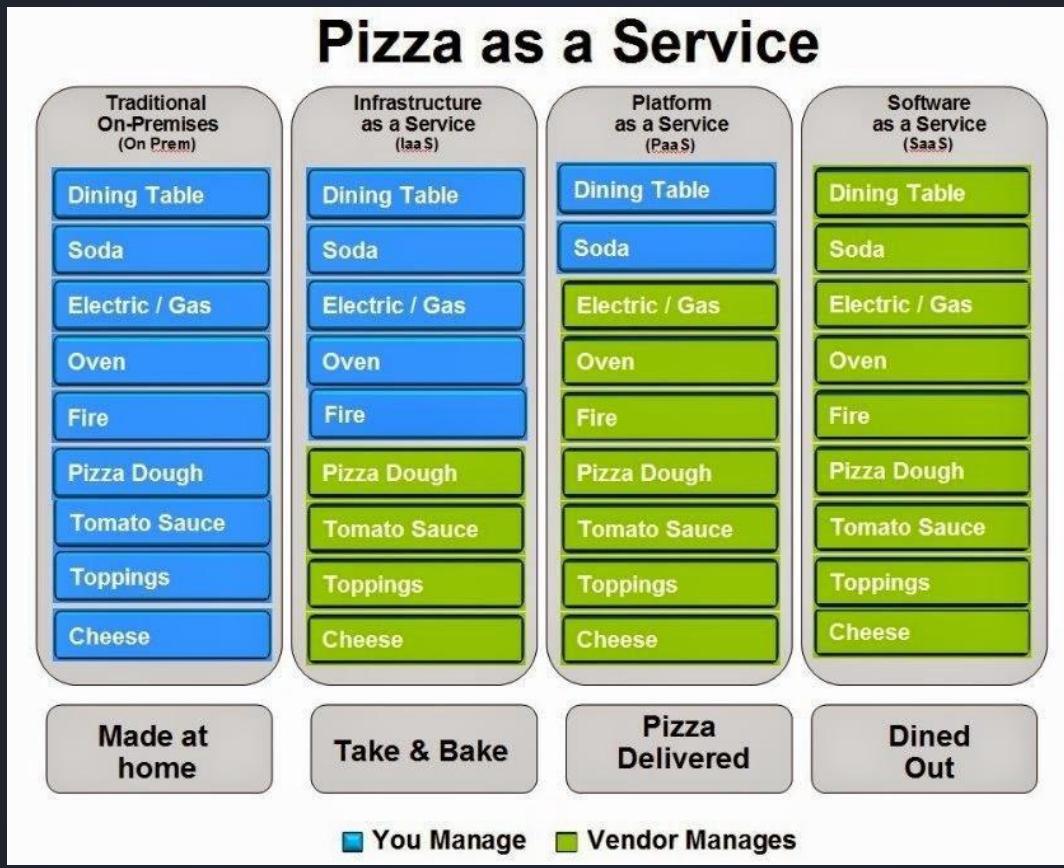
Public, Private and Hybrid Clouds



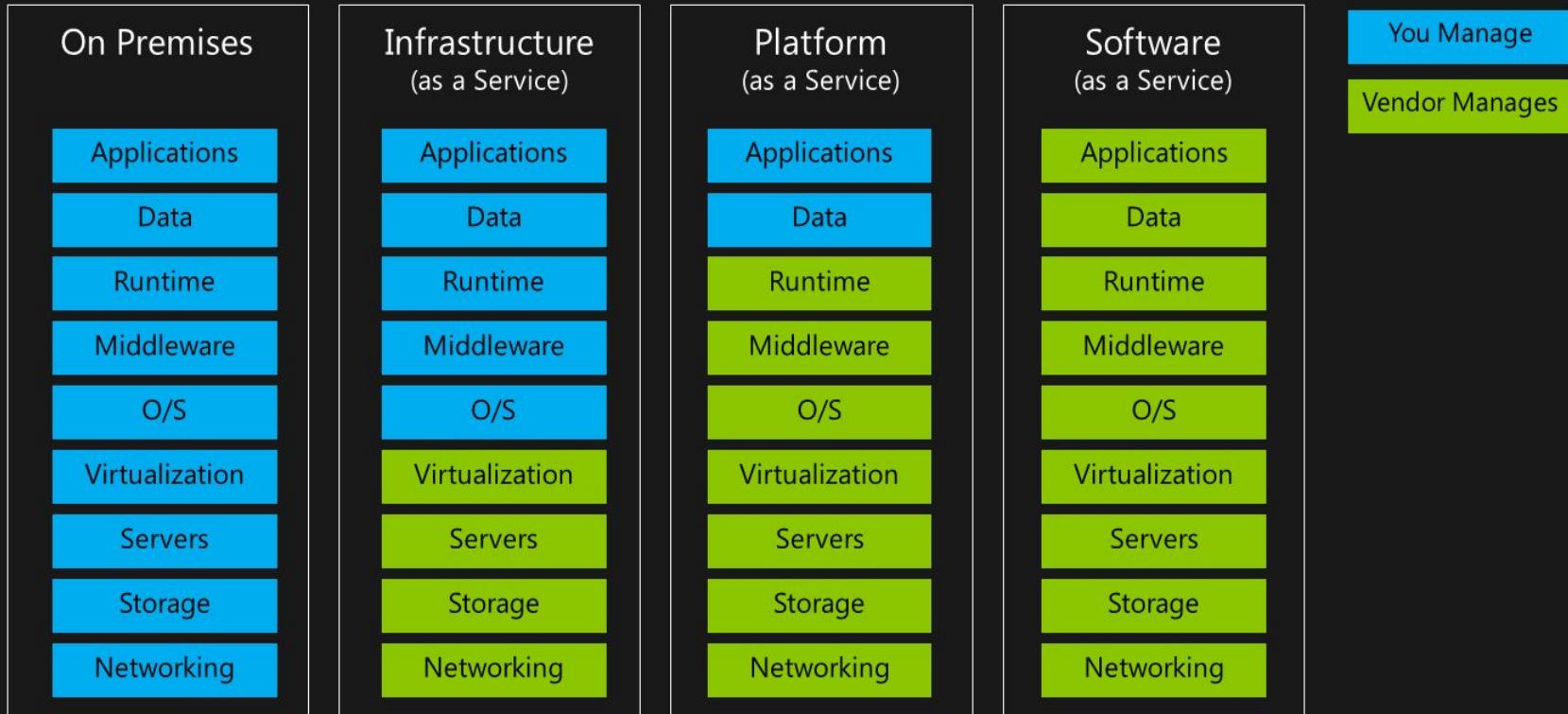
Service Models

IaaS	PaaS	BaaS	SaaS
 Amazon EC2	 HEROKU	 Firebase	 zendesk
 DigitalOcean	 salesforce	 Skygear	 PayPal
 rackspace® <small>the open cloud company</small>	 Parse Server	 f	
⋮	⋮	⋮	⋮

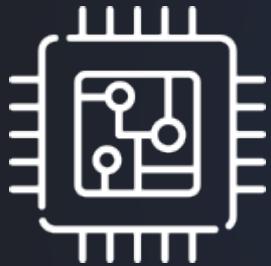
Service Models



Service Models



3 main domains



Compute



Network



Storage

Benefits of Cloud computing

Public cloud

Problems of Traditional architecture

1. Cost & Time

- a. Renting or setting up 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



What is SLA

Measured relative to “100% operational”

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

Availability

99.9%

99.99%

99.999%

99.9999%

Downtime

8.76 hours/year

52.6 minutes/year

5.26 minutes/year

31.5 second/year

Classification

High availability

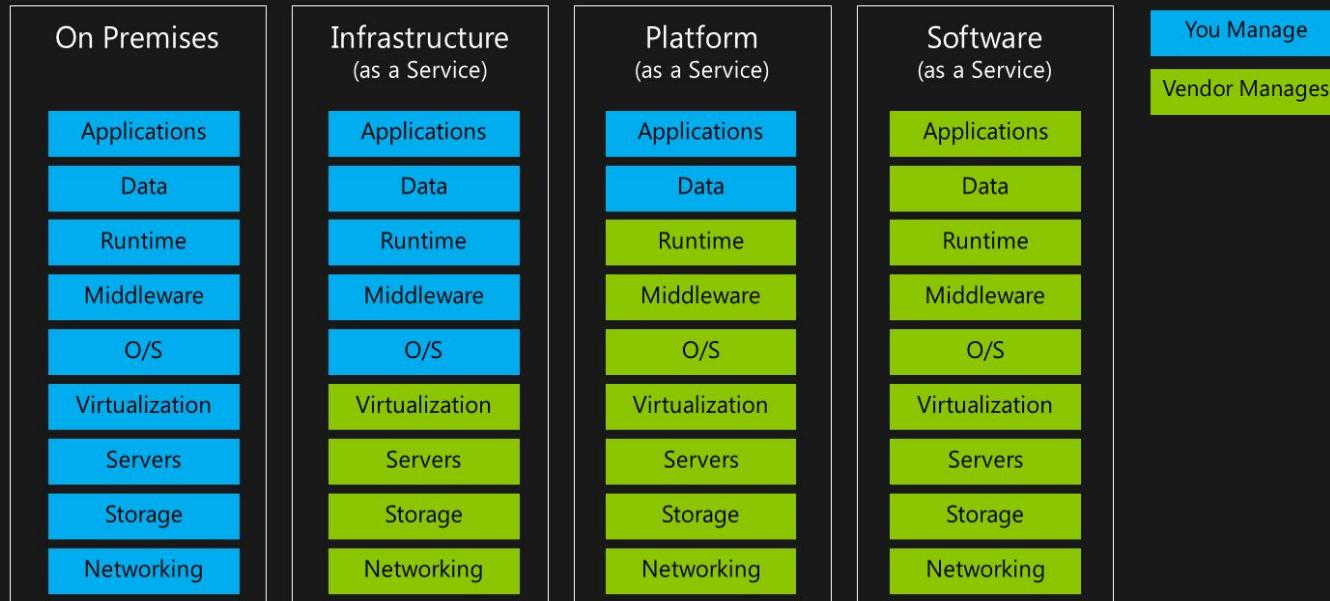
Very high availability

Highest availability

Disaster tolerant

Shared Responsibility Model

Cloud Services

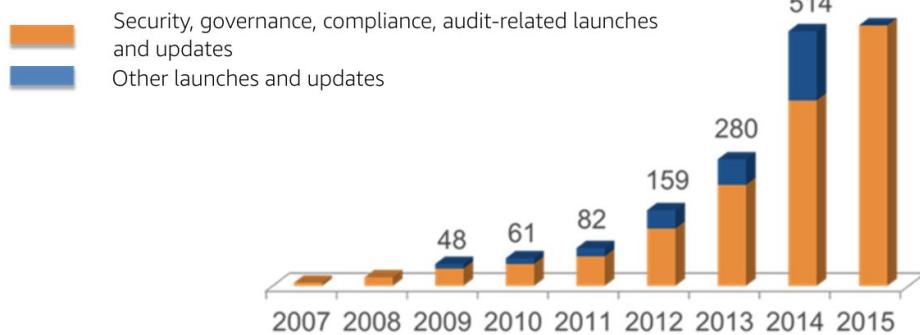


Security - Public cloud is more secure than customer data centers

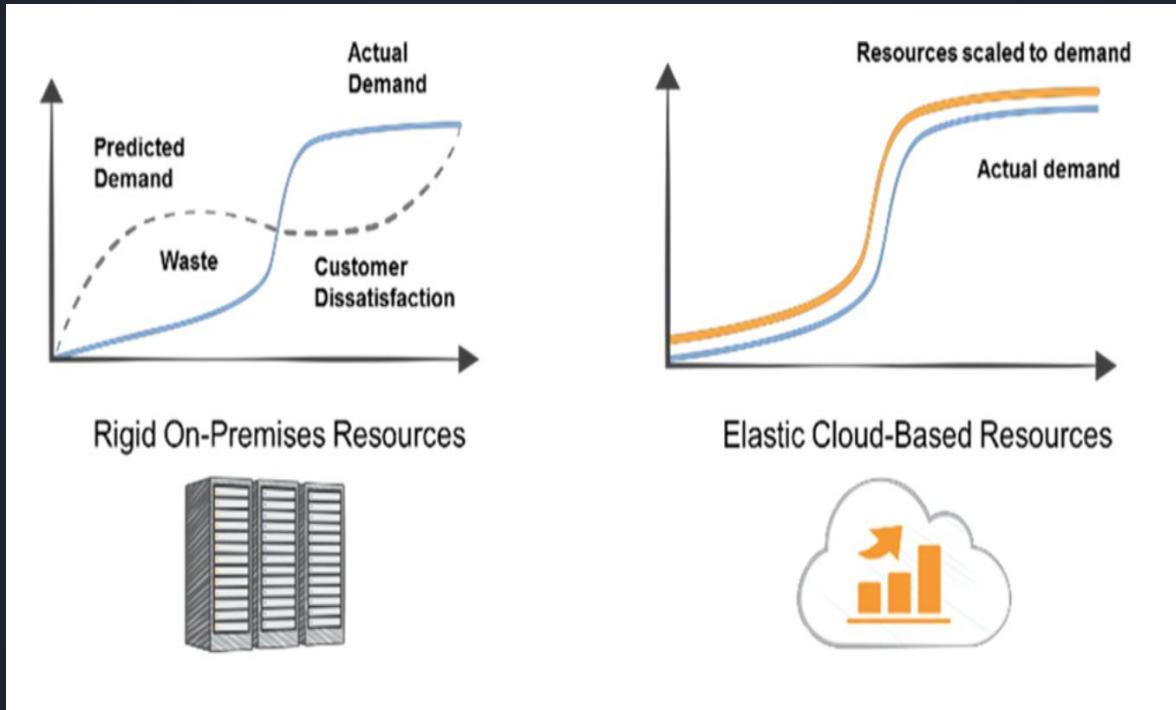
72% of organizations feel the public cloud is more secure than what they can deliver in their own datacenter and are moving data to the cloud

Source: Oracle and KPMG Cloud Threat Report 2020

- Security launches and updates



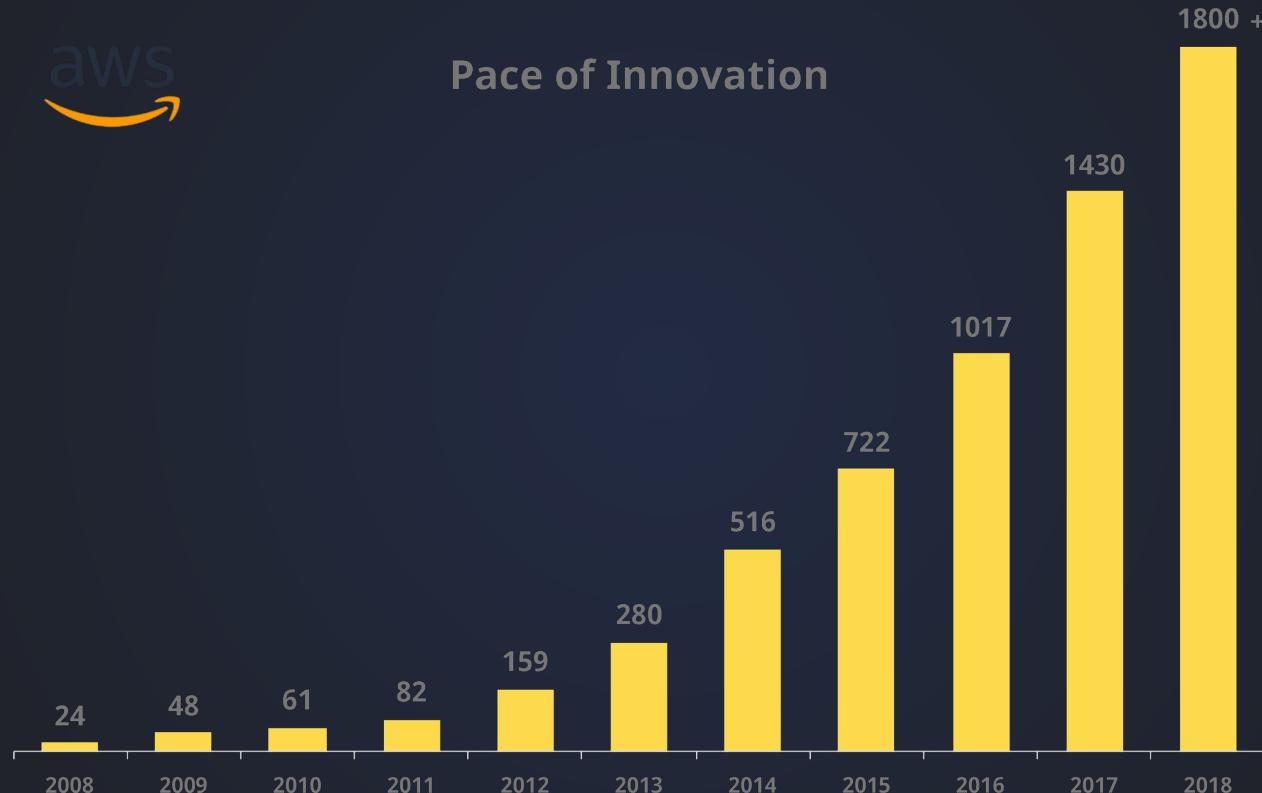
Elasticity



Innovation



Pace of Innovation



Source: Zehra Syeda-Sarwat

Shared economy



Full of managed services



200+ services in 25 categories



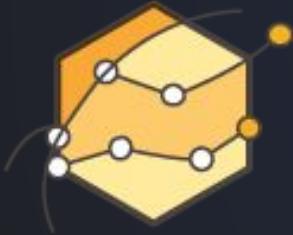
200+ services in 21 categories



137 services in 23 categories

Time to market

Productivity



Go global in minutes



Automation & Agility



Cost



No upfront cost



Pay what you use

Conclusion

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



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

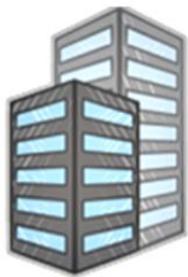
Drawbacks

1. Ping
2. Knowledge
3. Legal framework
4. All managed services are not stable!

Where to use AWS



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

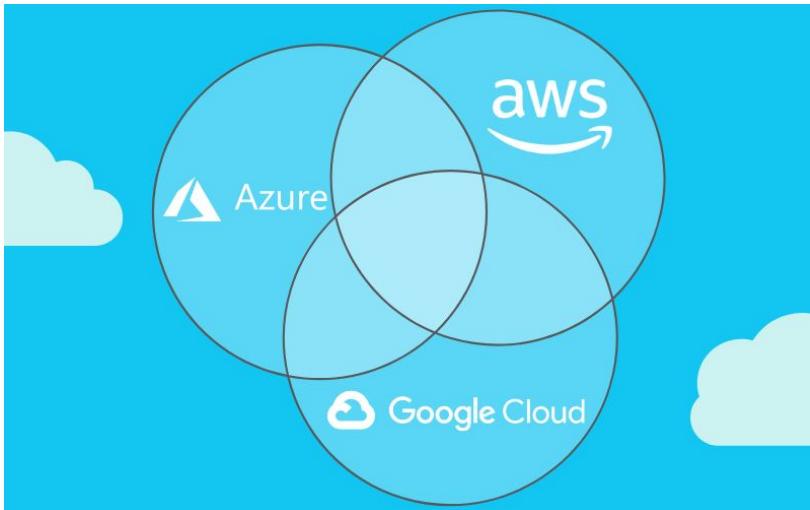
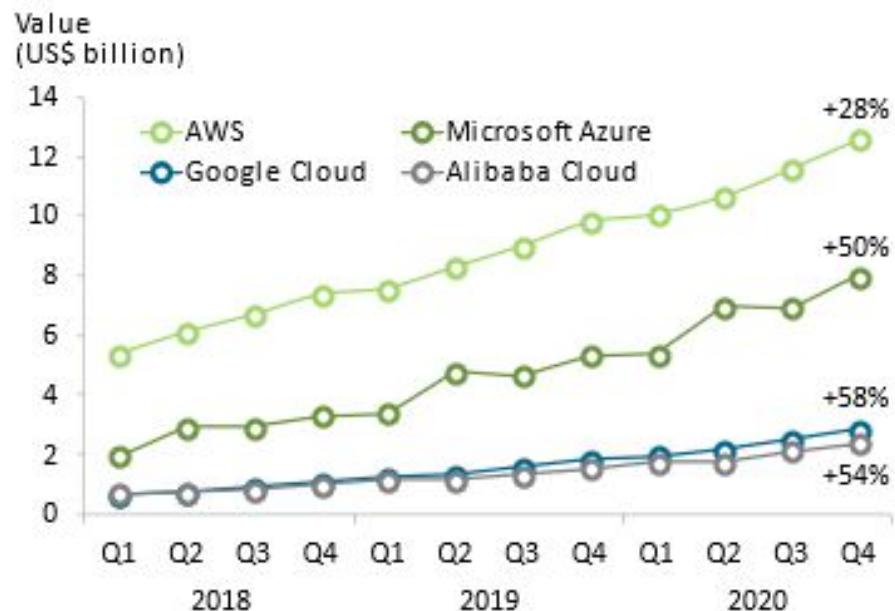


Figure 1. Magic Quadrant for Cloud Infrastructure and Platform Services



Top four cloud service providers: Q1 2018 to Q4 2020



Note: percentages show year-on-year growth

Source: Canalys estimates, February 2021

The top four cloud service providers accounted for 65% of total cloud spend in Q4 2020



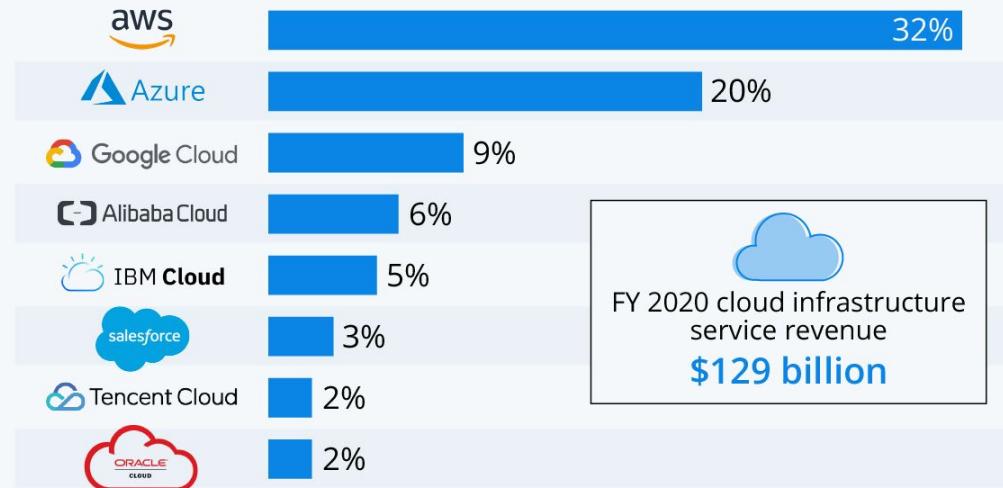
Amazon - 45.4 billion
2020 Q4 revenue

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



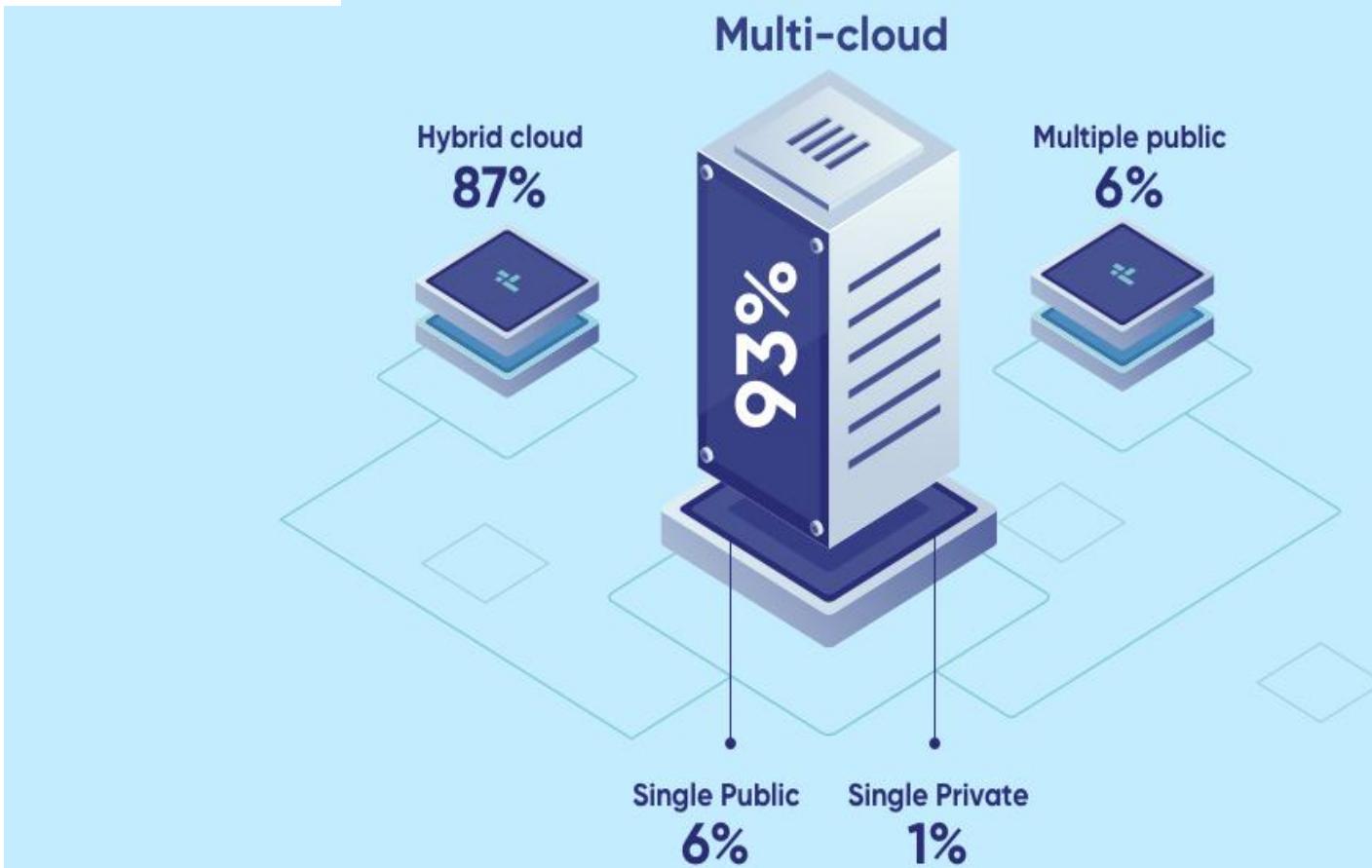


RightScale - State of the cloud reports

Enterprise Cloud Strategy

% of enterprise respondents

2020 Feb source by Flexera



Cloud Spend by Organization Size

% of all respondents

SMB 2021



SMB 2020



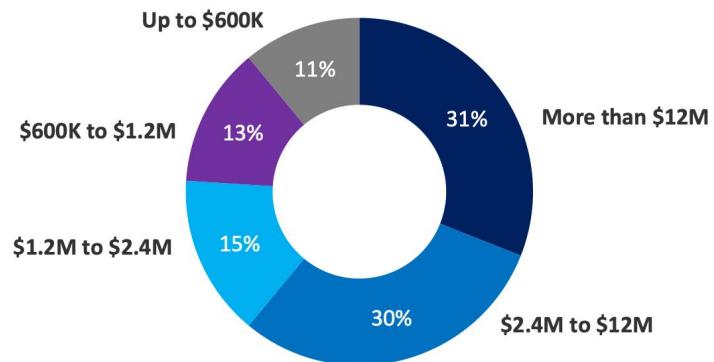
■ Up to \$600K ■ \$600K to \$1.2M ■ \$1.2M to \$2.4M ■ \$2.4M to \$12M ■ More than \$12M

N=750

Source: Flexera 2021 State of the Cloud Report N=750

Annual Public Cloud Spend

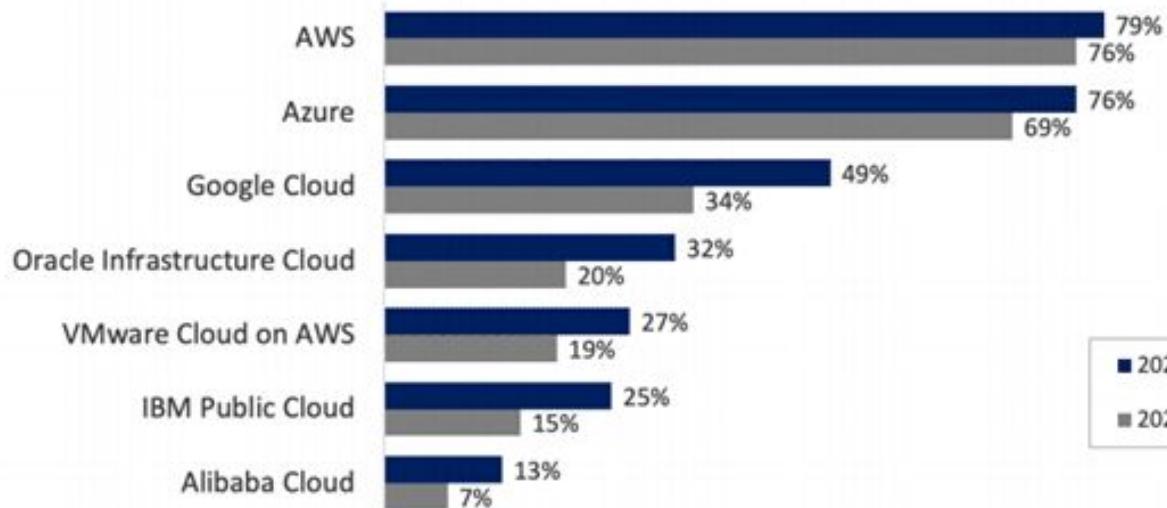
% of all respondents



Source: Flexera 2021 State of the Cloud Report

Public Cloud Adoption for Enterprises YoY

% of enterprise respondents

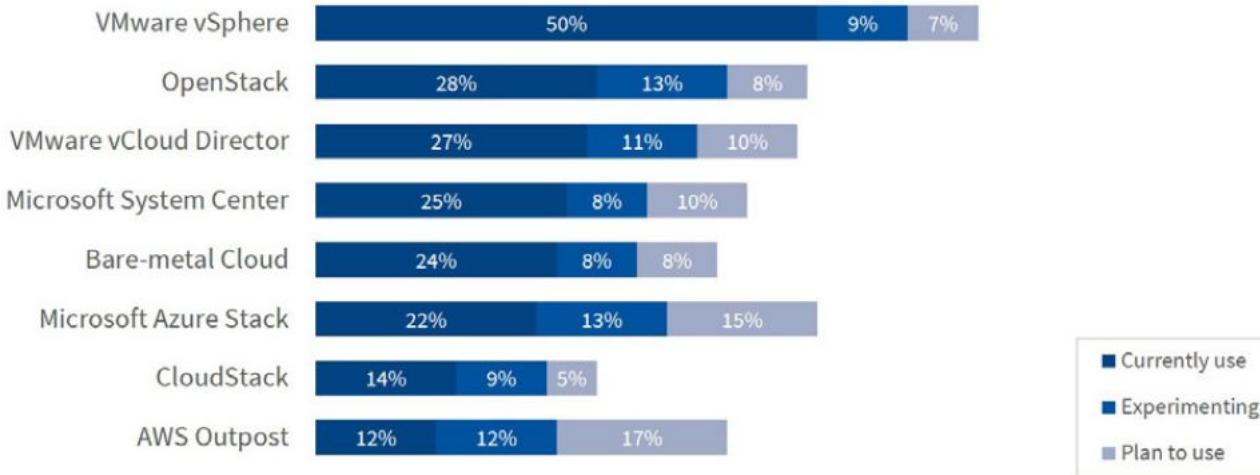


N=637

Source: Flexera 2021 State of the Cloud Report

Private Cloud Adoption

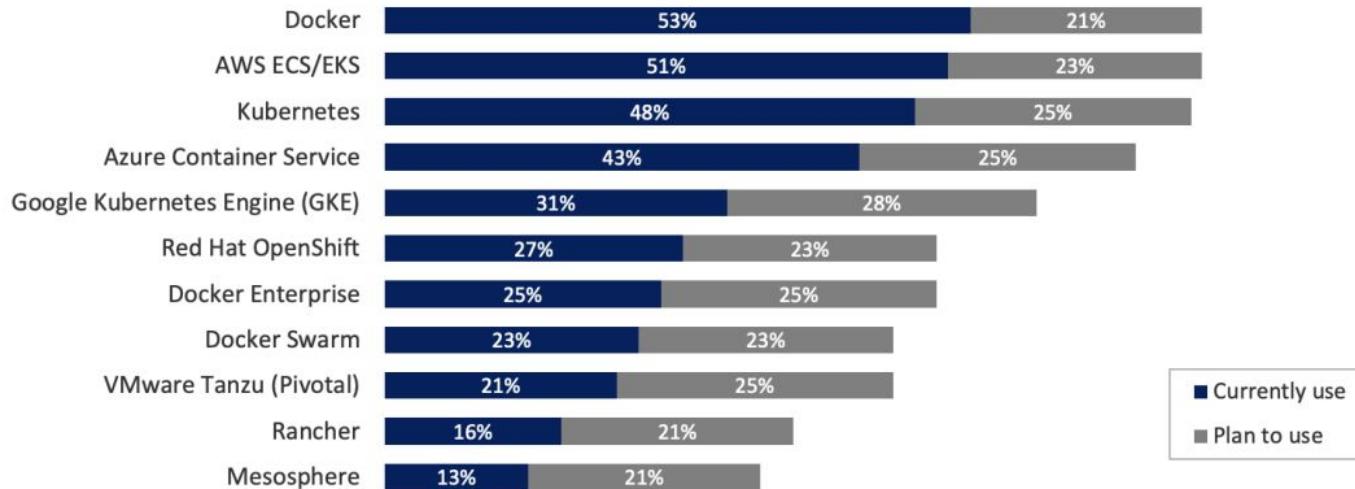
% of All Respondents



Source: RightScale 2019 State of the Cloud Report from Flexera

Container Tools Used

% of all respondents

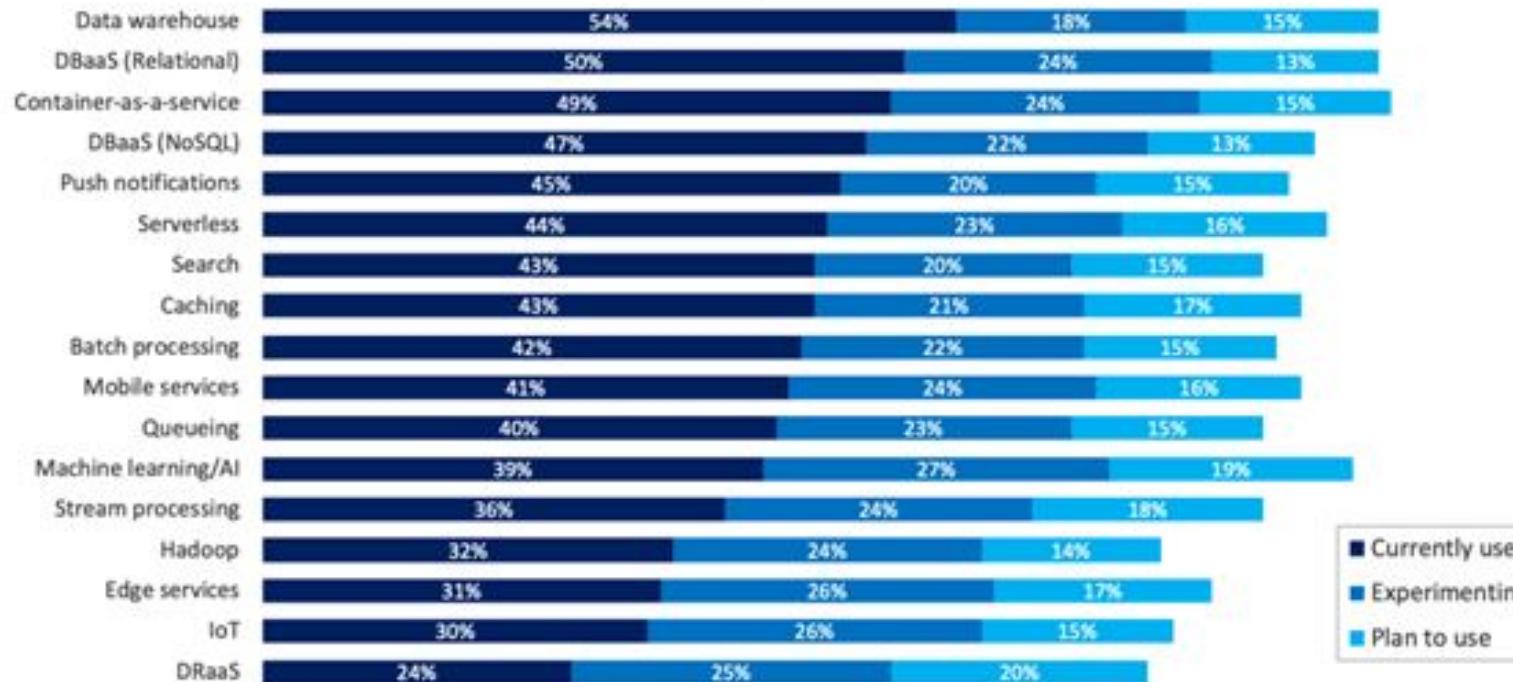


N=750

Source: Flexera 2021 State of the Cloud Report

Public Cloud Services Used

% of all respondents



N=750

Source: Flexera 2021 State of the Cloud Report

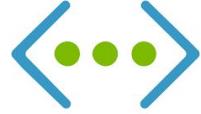
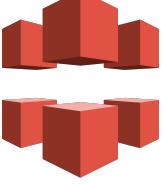
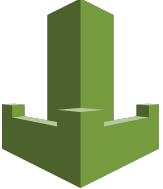
Compute Services

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

Storage & DB Services

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

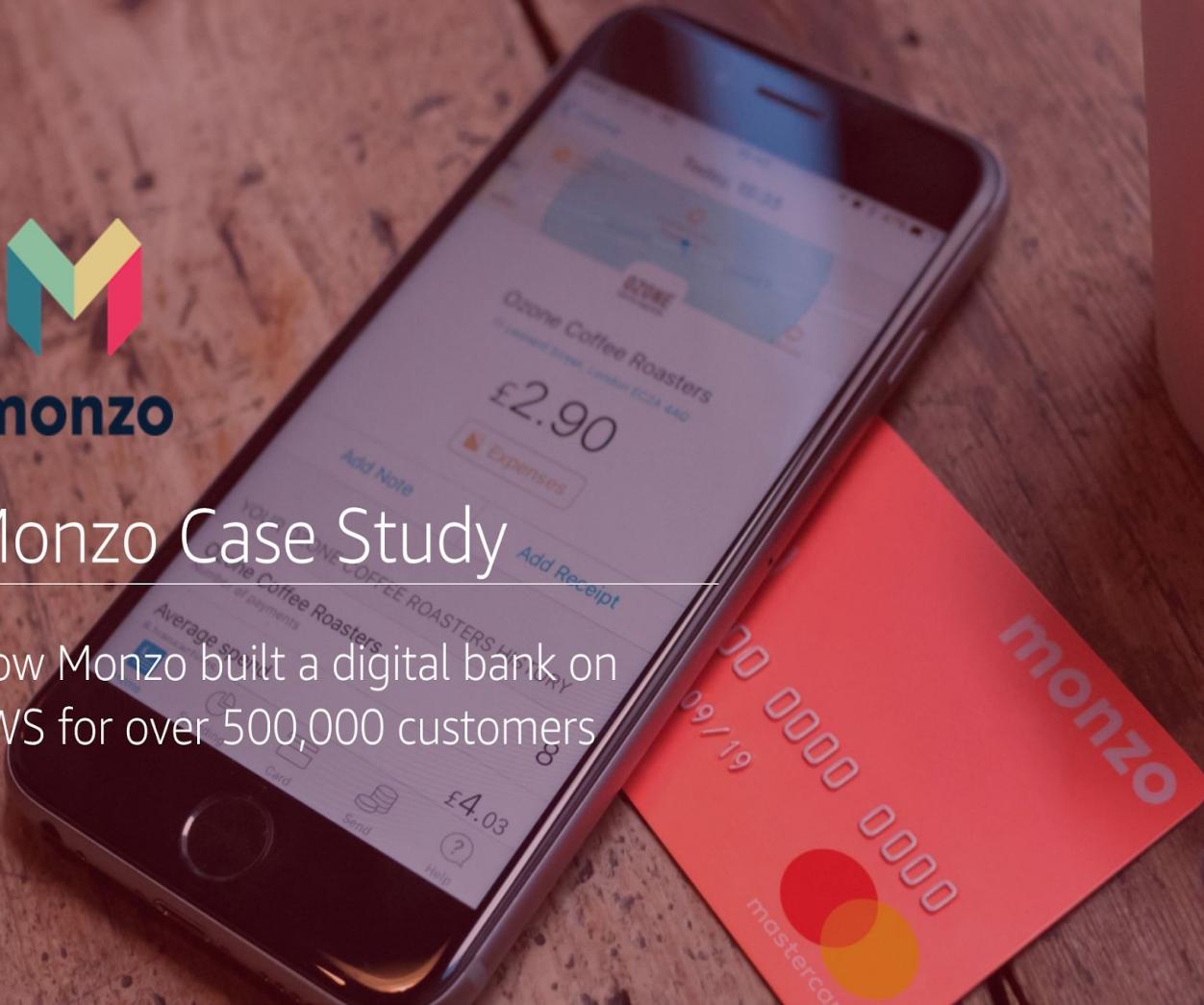
Networking services

			 Google Cloud Platform	Pricing method
Virtual network				It's free
Private network, CDN, SSL				Size/Month
WAF, encryption, Tunneling				Size/Month



Monzo Case Study

How Monzo built a digital bank on AWS for over 500,000 customers



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

- 
- \$365.69 billion
 - 70,000,000 credit cards account
 - One of the biggest digital bank in USA

Capital One bank: Digital Transformation

Mission: Innovative Technology Company

- Deep Technical
- Open source culture
- Agile devops
- Microservices
- Big/fast data



NETFLIX





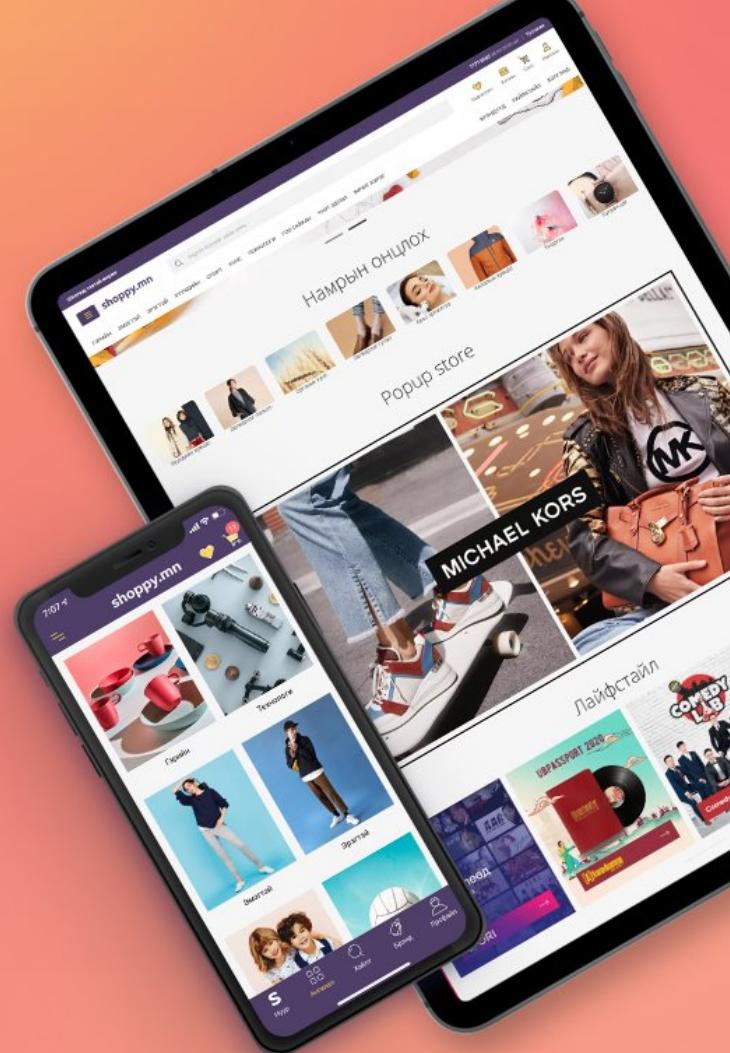
A CLOUD GURU



Easy booking, Cheap tickets.

- Flight source: 12 different flight system
- Worldwide: Mongolia, S.Korea, USA

Z24: Global Online Travel Agency from Mongolia





UFE Mongolia Goes Online in 10 Days with AWS

2020

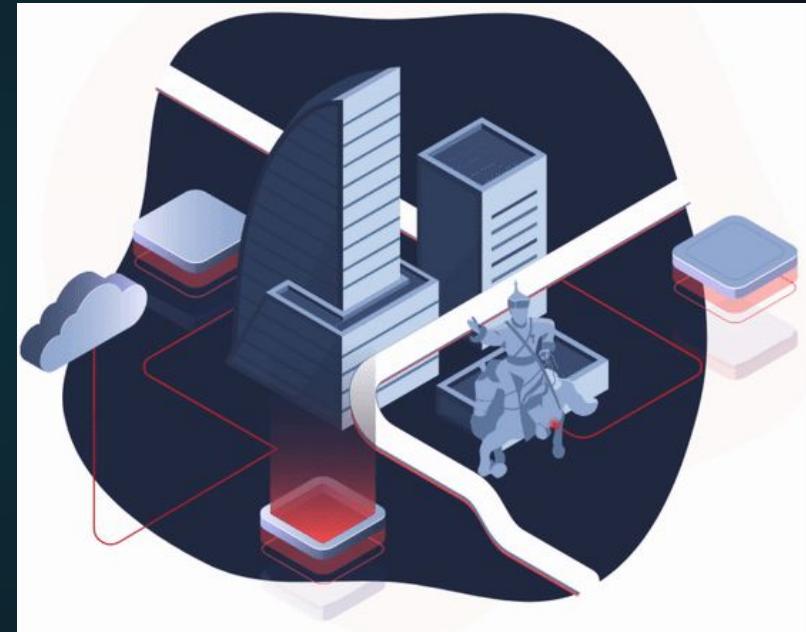


“

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

Private Cloud



Why Private cloud



Resource efficiency



Accelerate innovation



Avoid vendor lock-in

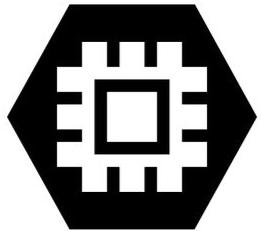
SOME USE CASES



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.



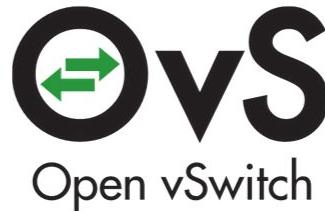
COMPUTING
RESOURCE
Virtualization



STORAGE
RESOURCE
Software defined
storage



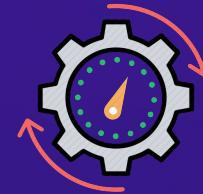
NETWORKING
RESOURCE
VXLAN or GRE





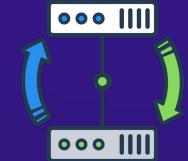
AT&T

5G

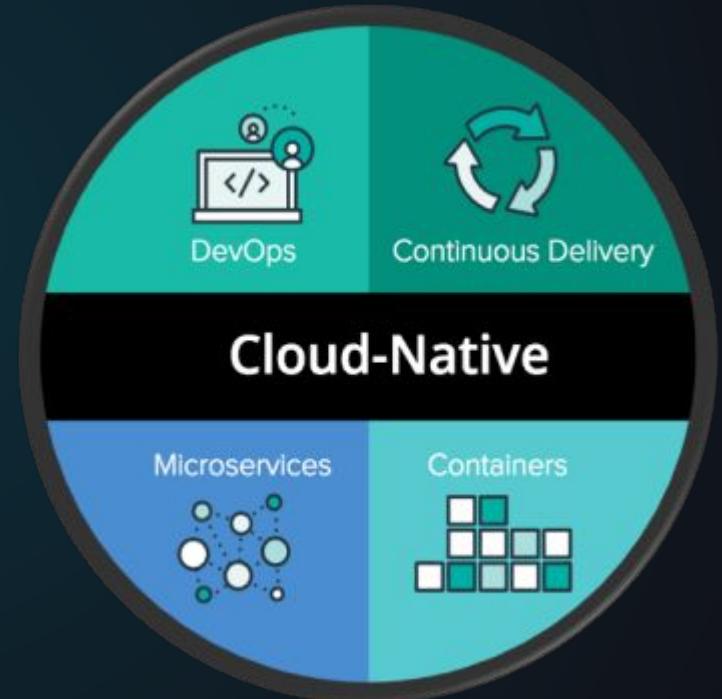


中国移动通信
CHINA MOBILE

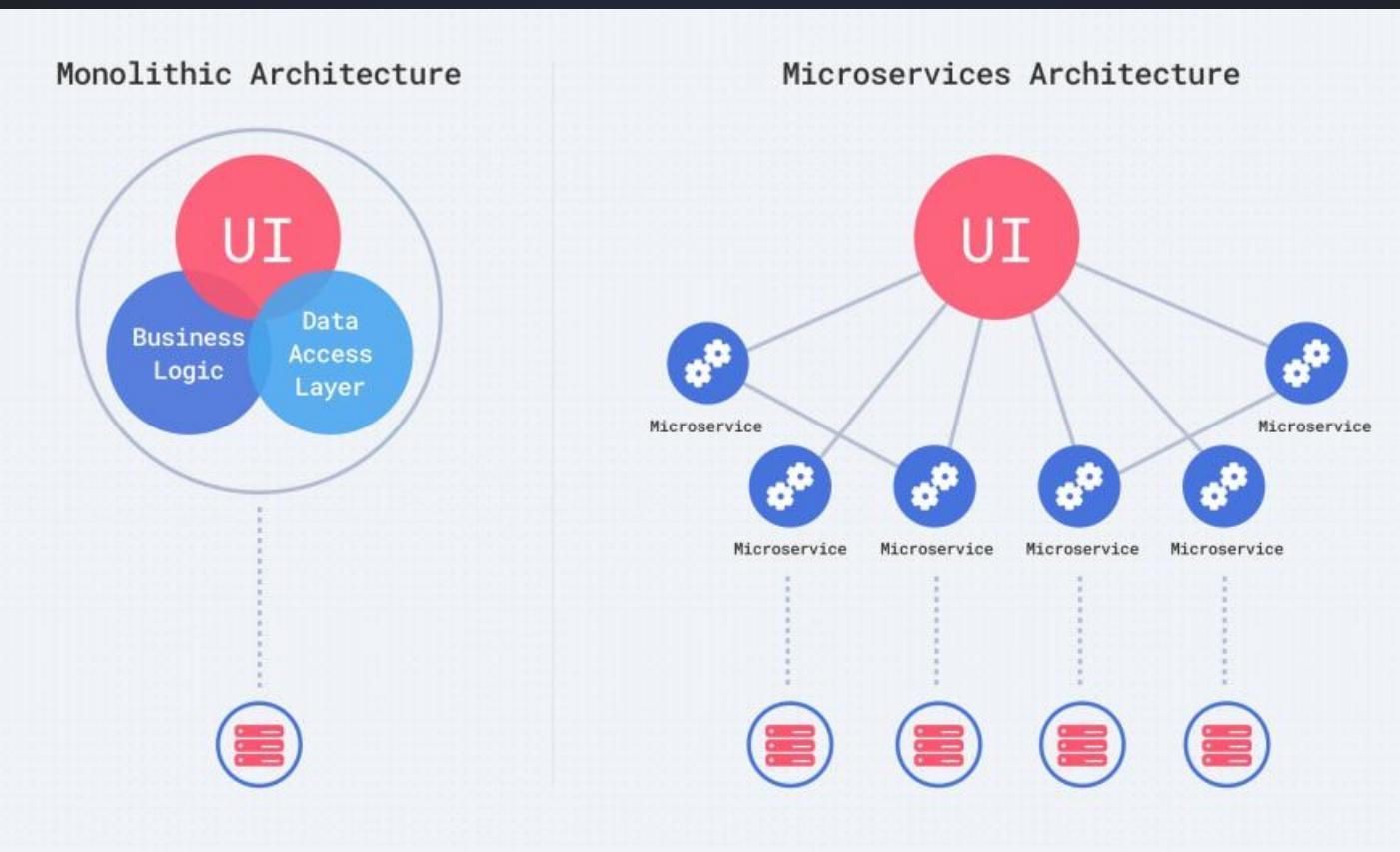
SK Telecom



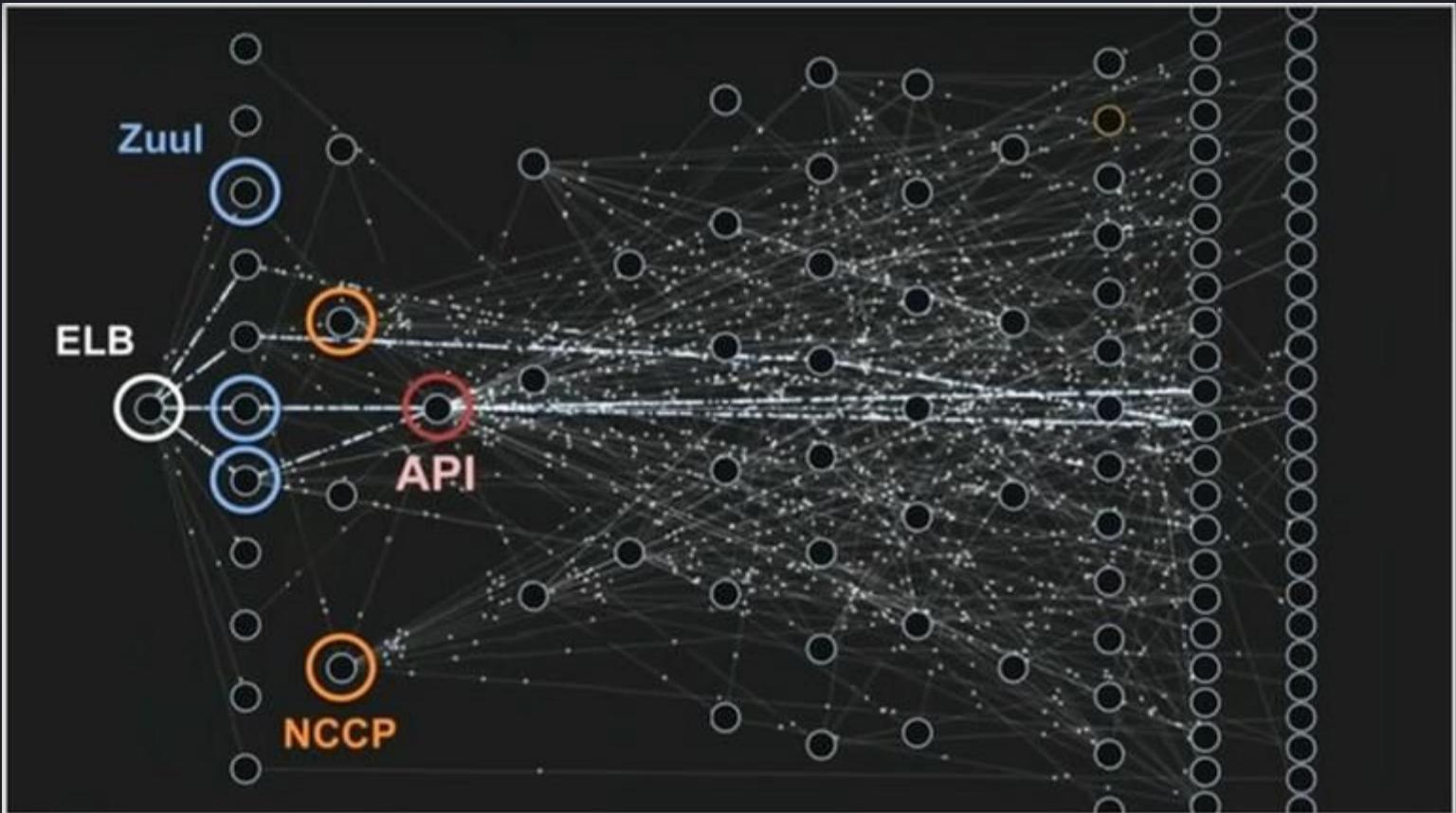
Cloud Native App



Cloud is more than the infrastructure

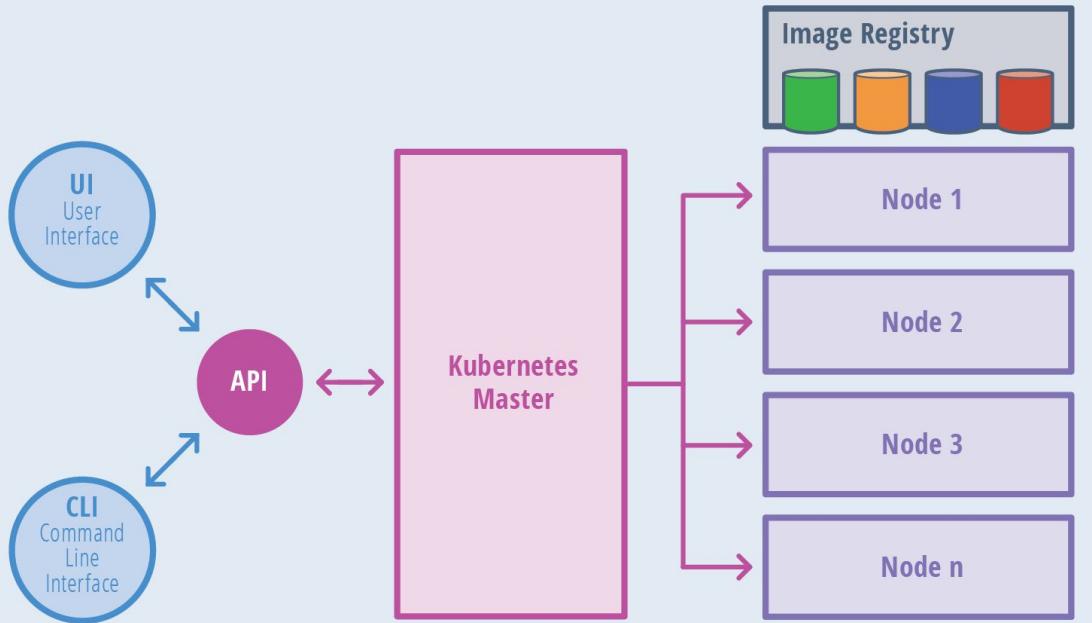






Container orchestration

Kubernetes Architecture



Source: Janakiram MSV

THE NEW STACK

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



aws SUMMIT
DUBAI

Dr. Werner Vogels

CTO, Amazon.com



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

Cloud engineer today

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](https://www.forbes.com/sites/forbestechguide/2020/01/15/the-top-15-most-valuable-it-certifications-in-2020/)

Cloud Engineer = Batman 😎



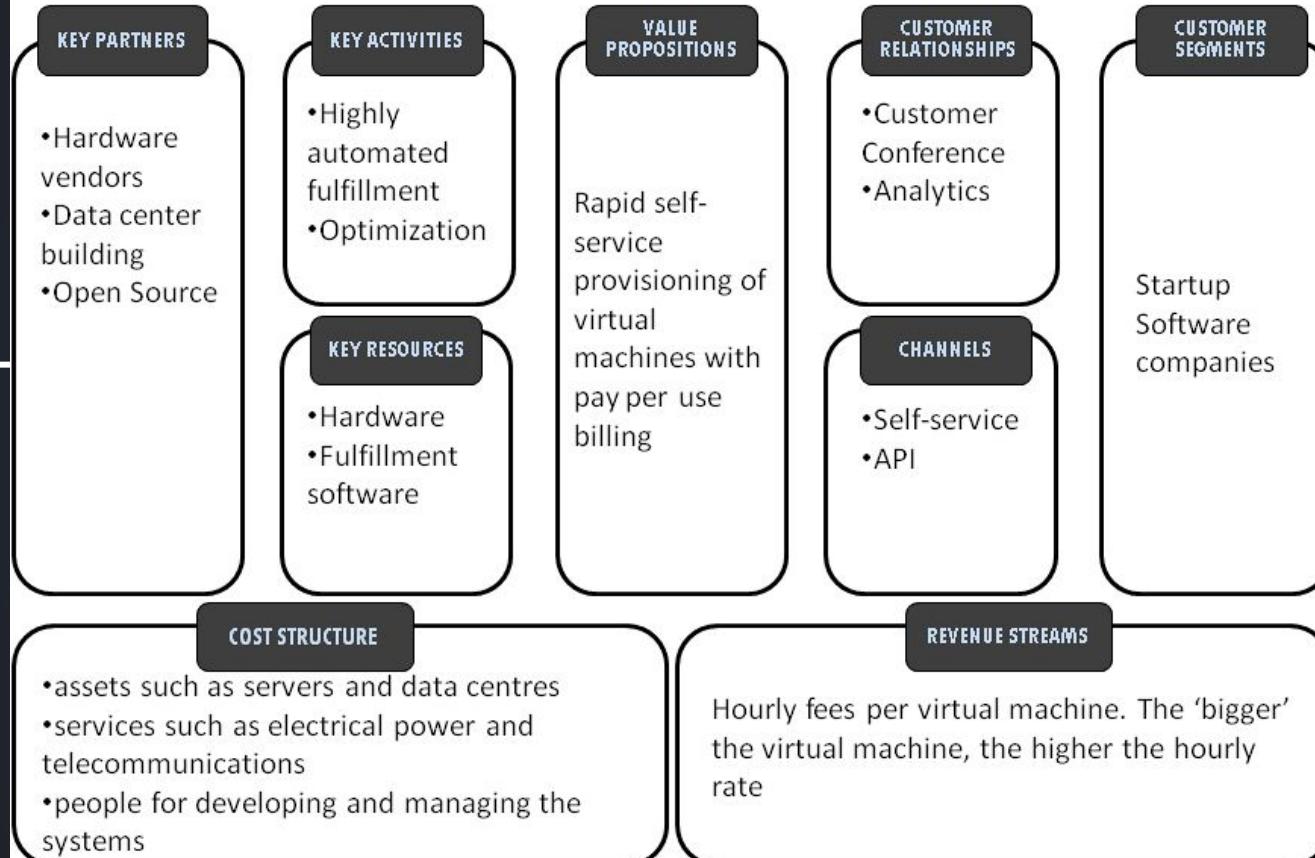
- Architecture
- Automation
- Software Development / Deployment
- Network
- Security
- Storage
- Database
- Highly availability

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

Төмрөнд биш хүнд хөрөнгө оруулалт
хийцгээе...

History of AWS

AWS EC2 Business Model Canvas



Business drivers for migrating to the Cloud



Business drivers for migrating to the Cloud

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

Importance of the Cloud skills



Top IT skills in 2021
Top IT certification in 2021
Avg tech salary

Get into AWS

AWS Service Categories



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



AWS Cost Management

AWS Global Infrastructure

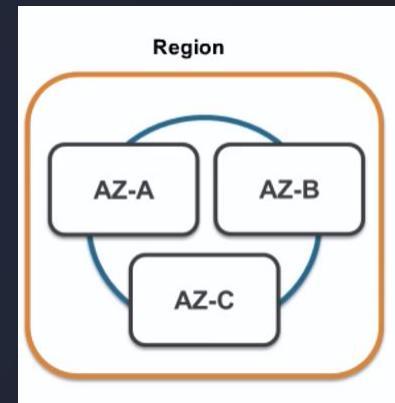


Regions & AZs

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

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

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

Availability Zones

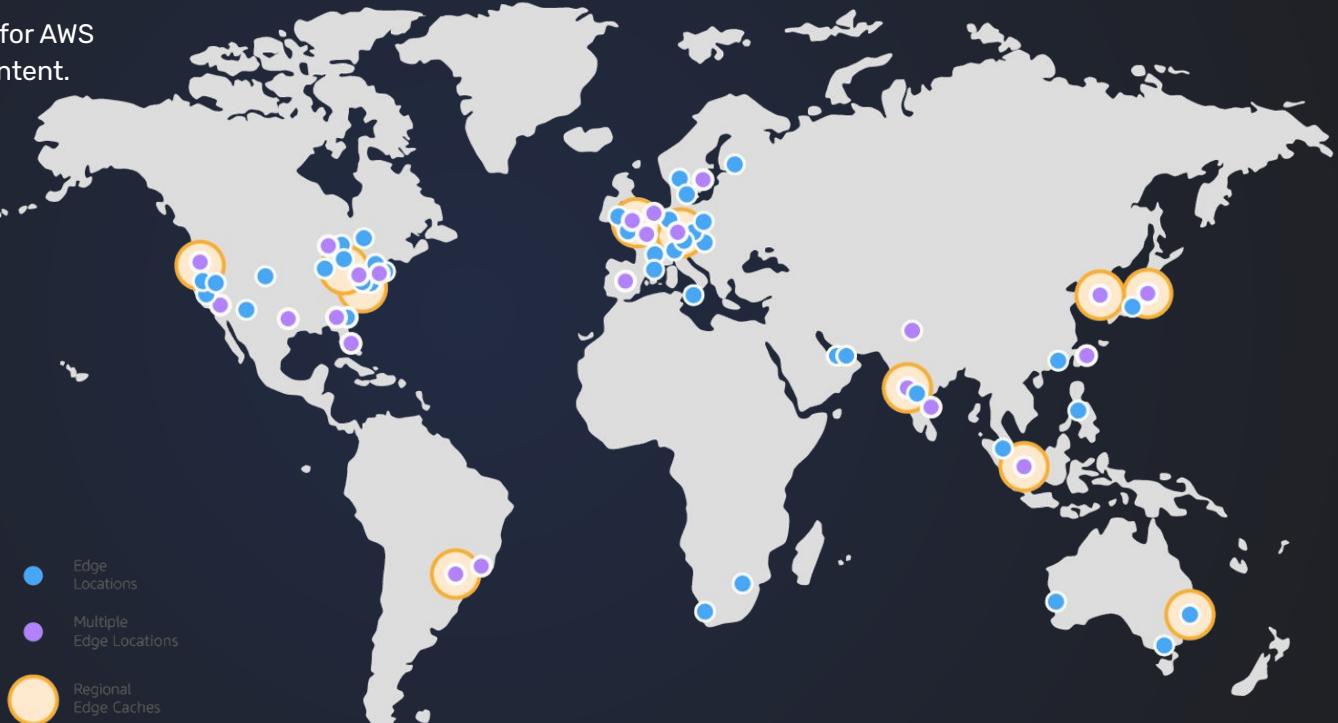
https://aws.amazon.com/about-aws/global-infrastructure/regions_az/

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

Edge locations

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

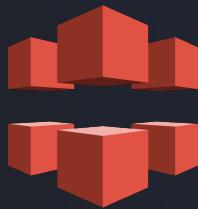
CloudFront = Amazon's CDN



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

Edge locations

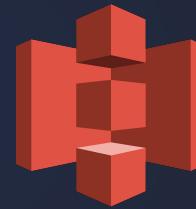
Trusted AWS partner Datacenter



Cloudfront



Route 53



S3 Transfer Acceleration



API Gateway

Leverages low latency usage

Gov Cloud

- 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

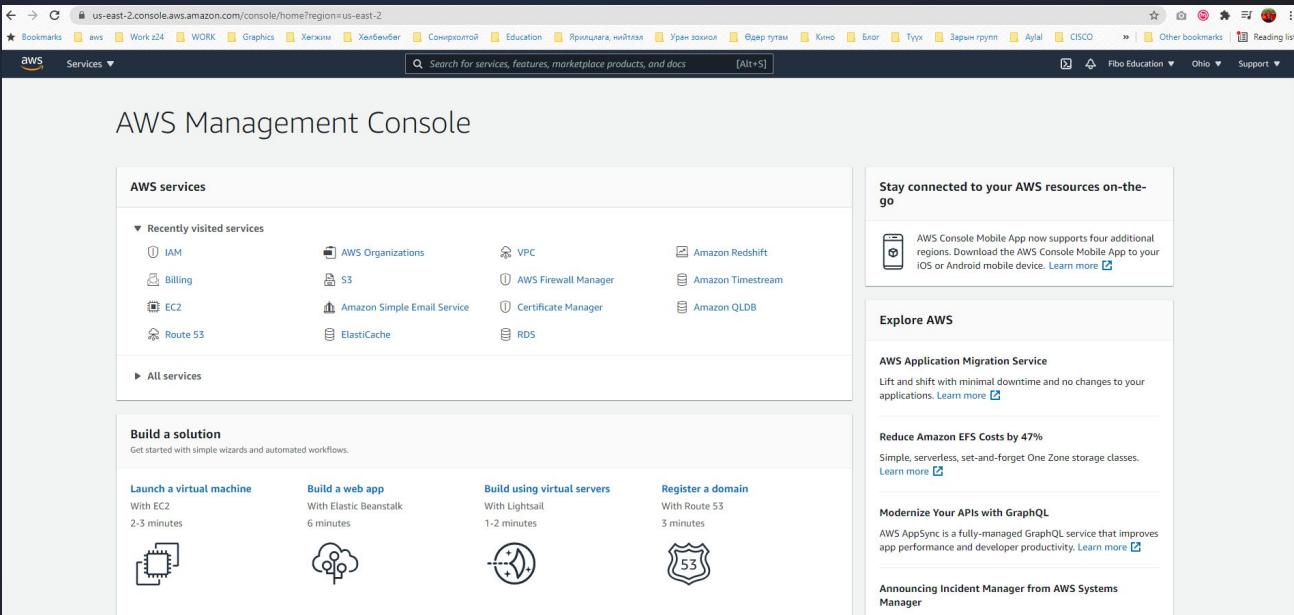
<https://aws.amazon.com/govcloud-us/>

Accessing AWS

Web console

AWS Management Console

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



The screenshot shows the AWS Management Console homepage. At the top, there's a navigation bar with links for Bookmarks, AWS services, a search bar, and user account information. Below the header is the main title "AWS Management Console". The left sidebar contains a "AWS services" section with a "Recently visited services" list including IAM, AWS Organizations, VPC, Amazon Redshift, Billing, S3, AWS Firewall Manager, Amazon Timestream, EC2, Amazon Simple Email Service, Certificate Manager, Amazon QLDB, Route 53, ElastiCache, and RDS. There's also a "All services" link. Below this is a "Build a solution" section with four cards: "Launch a virtual machine With EC2 2-3 minutes" (represented by a CPU icon), "Build a web app With Elastic Beanstalk 6 minutes" (represented by a cloud icon), "Build using virtual servers With Lightsail 1-2 minutes" (represented by a server icon), and "Register a domain With Route 53 3 minutes" (represented by a shield icon). To the right of the main content area is a sidebar titled "Stay connected to your AWS resources on-the-go" which mentions the AWS Console Mobile App supports four additional regions. It also features sections for "Explore AWS", "AWS Application Migration Service" (with a note about minimal downtime), "Reduce Amazon EFS Costs by 47%" (mentioning One Zone storage classes), "Modernize Your APIs with GraphQL" (mentioning AWS AppSync), and "Announcing Incident Manager from AWS Systems Manager".

Command Line Interface

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

SDK

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

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

SDKs



Java



JavaScript



Python (bot)



.NET



Ruby



Node.js



iOS



Android



Go



C++



Хичээл

- Онолын мэдлэг
- Холбогдох мэдлэг, ойлголтууд
- Практик дасгал
- Нэмэлт техник, ойлолтууд
- Гэрийн даалгавар
- **Python**
- **Web**
- **Rest**
- **Relational Database**
- **Storage**
- **Networking**
- **Virtualization**
- **Linux**