

Cloud Computing workshop

Carton Kam



Content

- Introduction
- Get inside the Cloud
- Real case



Introduction

Background

A Brief History of Cloud Computing

First large datacenters: ENIAC, ORDVAC, ILLIAC
Many used vacuum tubes and mechanical relays

Supercomputers
Server Farms (e.g., Oceano)

P2P Systems (90s-00s)
• Many Millions of users
• Many GB per day

Clouds

1940



1950



1960

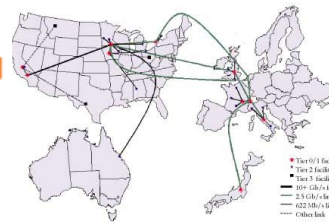


1970

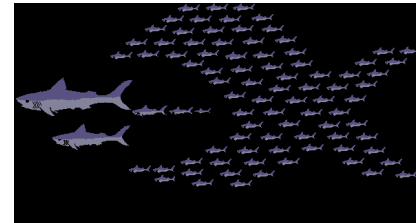


Open Science Grid

1980



1990



2000



2012



Trends and changes

- Technology

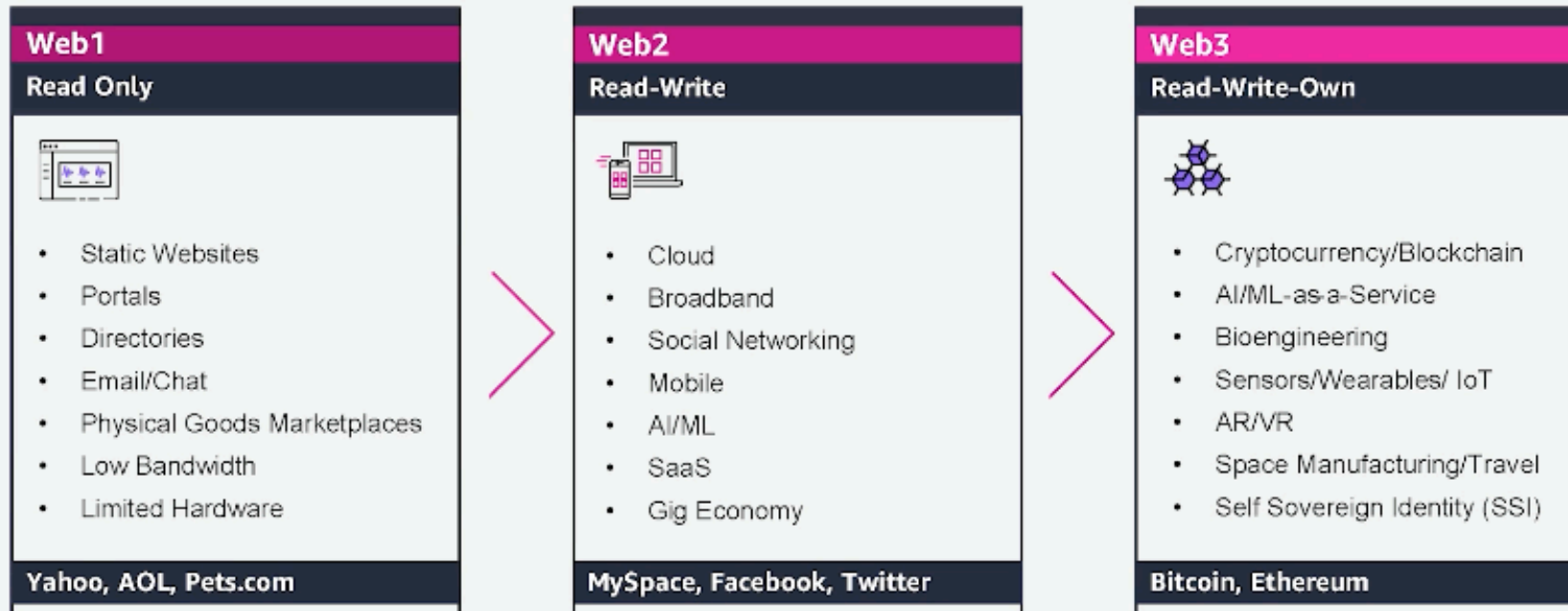
- Bandwidth: 1985 mostly 56Kbps links nationwide
- Disk capacity: 1TB, 2TB, SSD

- Users

- Facebook [GigaOm, 2012]
 - 350M in 2009 -> 608M in 2010 -> 1Billion in 2012
- Microsoft [NYTimes, 2008]
 - 150K machines
 - Growth rate of 10K per month
 - 80K total running Bing
 - In 2013, Microsoft Cosmos had 110K machines (4 sites)

WEB1~2~3

The Internet continues to evolve



Decentralized property rights:
Web3 gives people the ability to own their
content on the Internet



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N

Yamato Group: TA-Q-BIN Service



* Approx. Information as of / for the Year Ended 31st March 2021



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BLACK FRIDAY

amazon



System Busy / 系統繁忙

Sorry, the booking system is now busy.

抱歉，購票系統目前非常繁忙。

You will be redirected in 7 seconds.

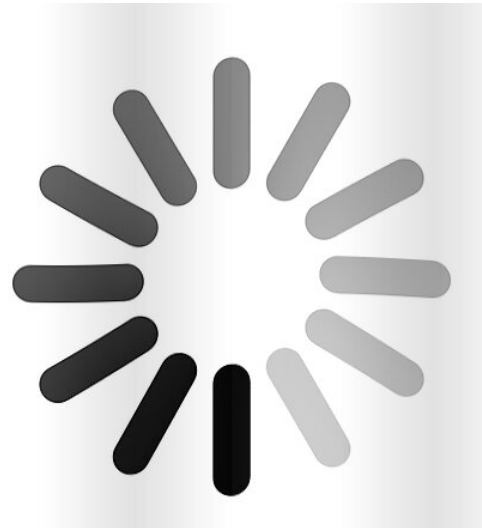
閣下將於7秒後被重新轉載。



Please do not refresh this page.

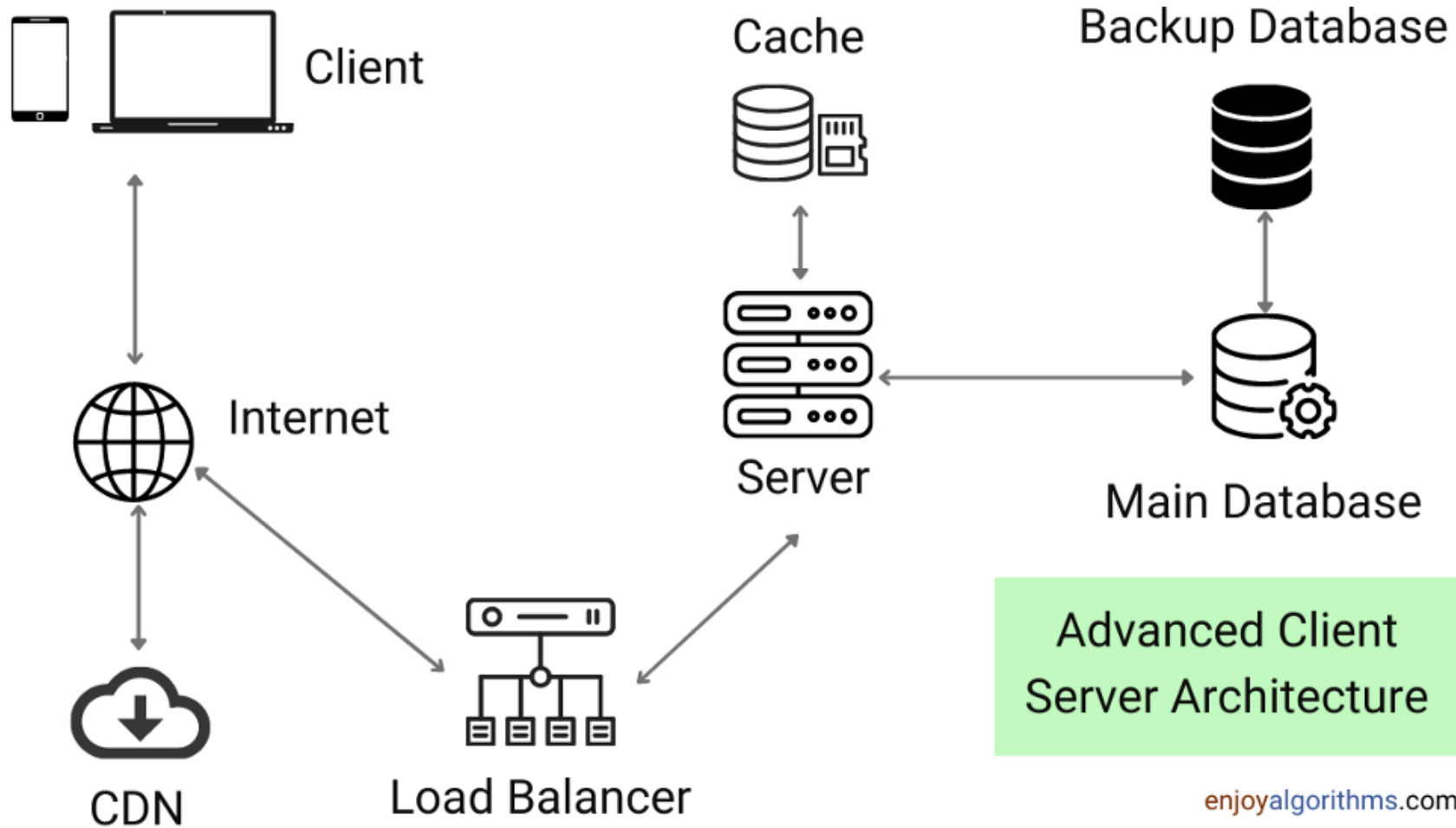
請不要更新頁面。

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這個座位表只用作參考，它只顯示本節目現時的場地佈局。
座位及舞台位置有可能會在節目正式演出前有所變動。

Server-Client Architecture



enjoyalgorithms.com

Definitions

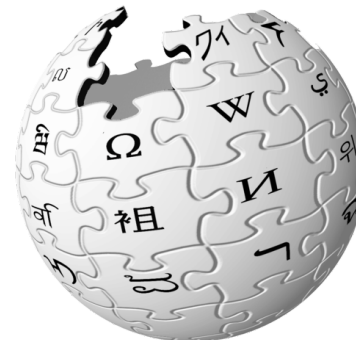
- Definition from ***NIST*** (*National Institute of Standards and Technology*)
 - Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

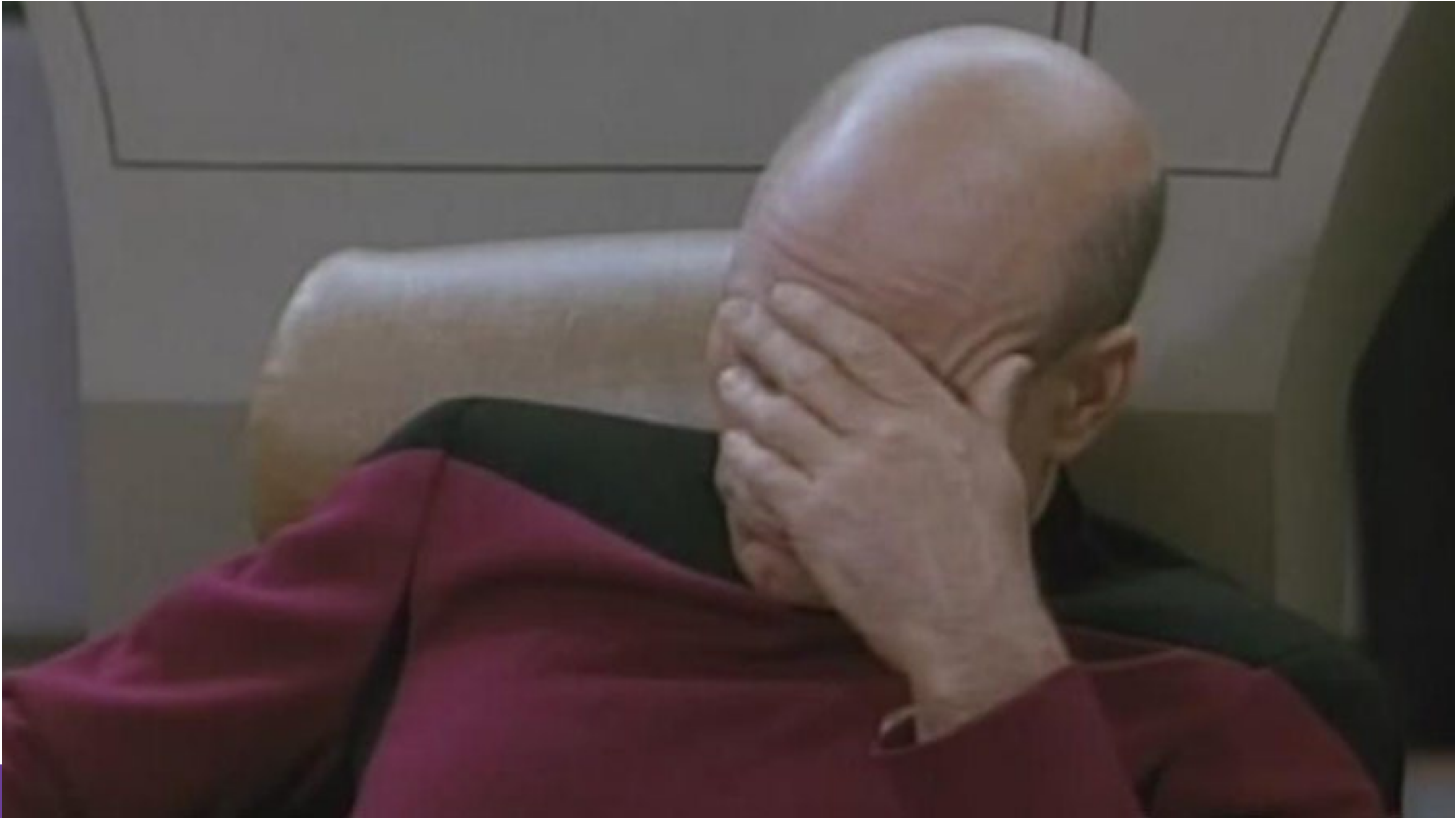
NIST

National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

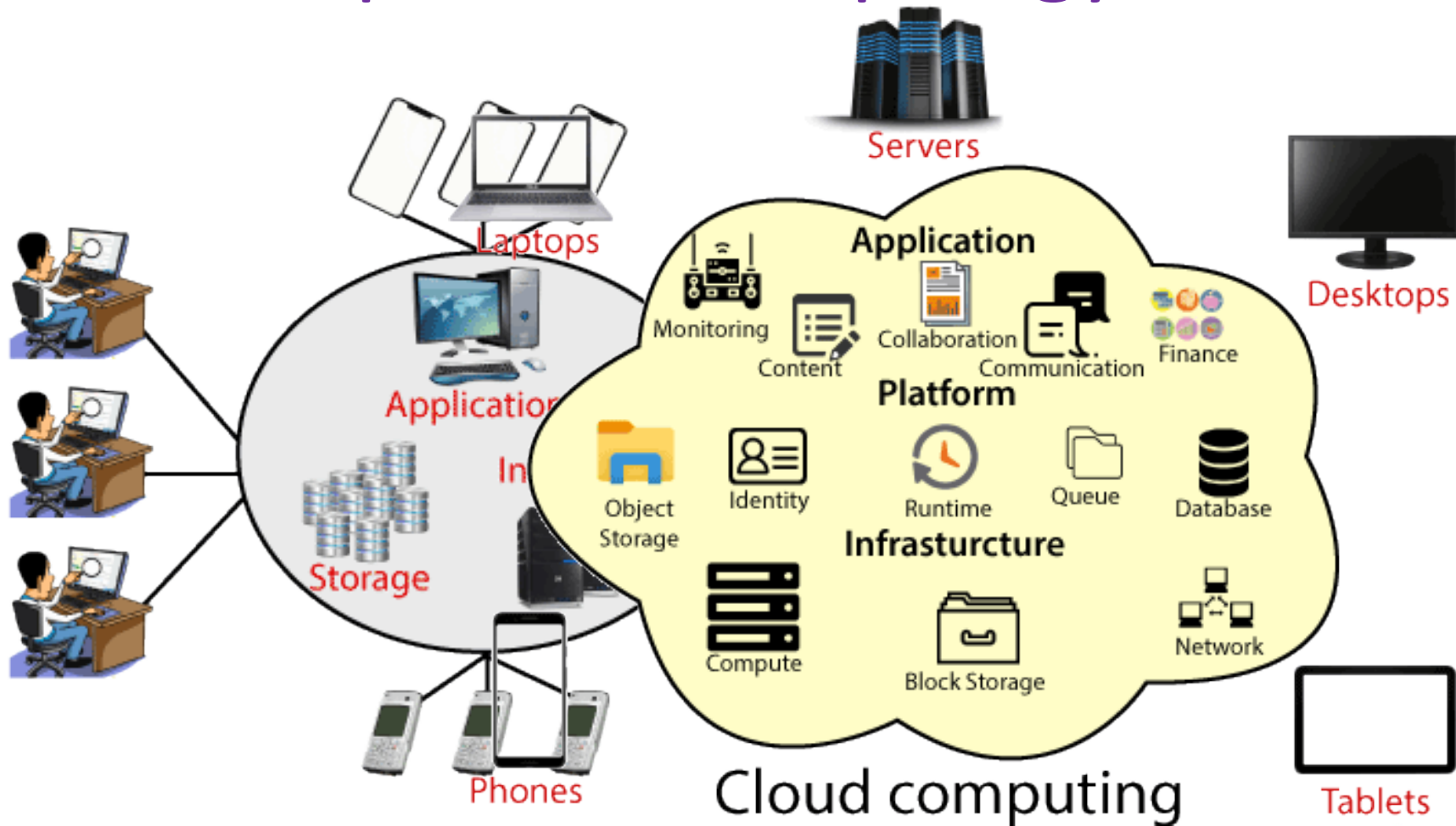
Definitions

- Definition from *WIKI*
- Cloud computing is **Internet-based** computing, whereby **shared** resources, software, and information are provided to computers and other devices on demand, like the electricity grid.
- Cloud computing is a style of computing in which dynamically **scalable** and often virtualized resources are provided as a service over the Internet.





A Sample Cloud Topology



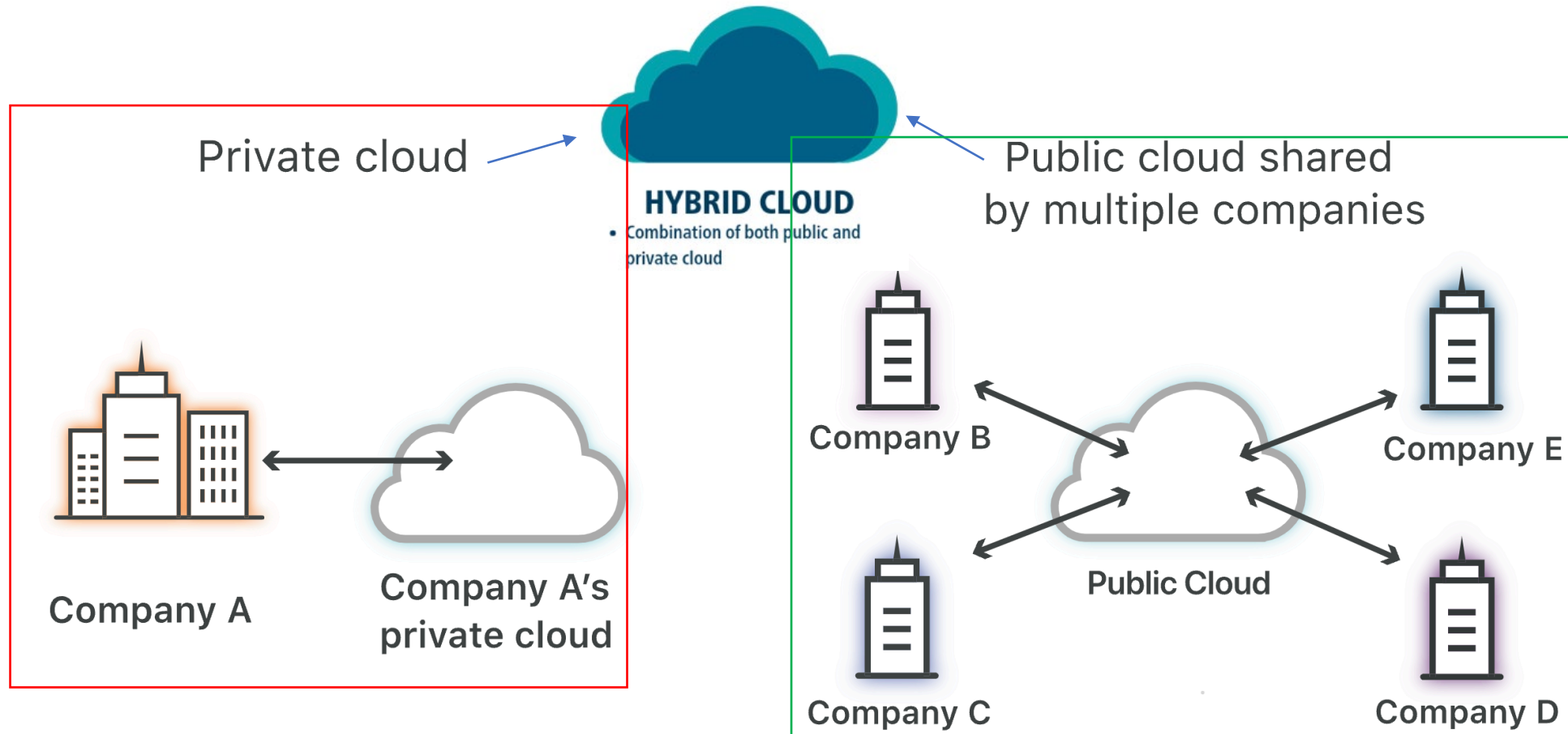
Perspective from user :

- End Users do not care about how the works are done
 - Instead, they only concern about what they can get
- Company do not care about what the provider actually did
 - Instead, they only concern about their quality of service
- Company do not want to own the physical infrastructure
 - Instead, they only want to pay as many as they used



Get inside the Cloud

Type of Cloud



API (Application Programming Interface)

- What dose user really care ?
 - They only care about their “Service”
- Service is
 - what you connect together using Web Services.
 - the endpoint of a connection.
 - <https://hkapa.instructure.com/api/v1/courses/11845/pages>
- A service should be self-contained
- A service should not depend on the context or state of other services.
- Web service providers offer APIs that enable developers to exploit functionality over the Internet, rather than delivering full-blown applications



Type of Cloud Services

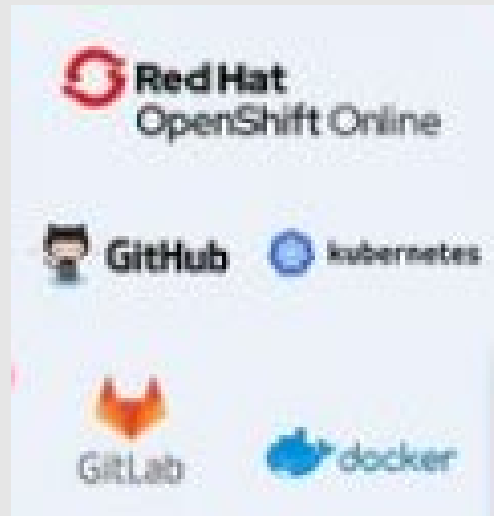
- Infrastructure as a Service (**IaaS**)
- Platform as a Service (**PaaS**)
- Software as a Service (**SaaS**)

Type of Services

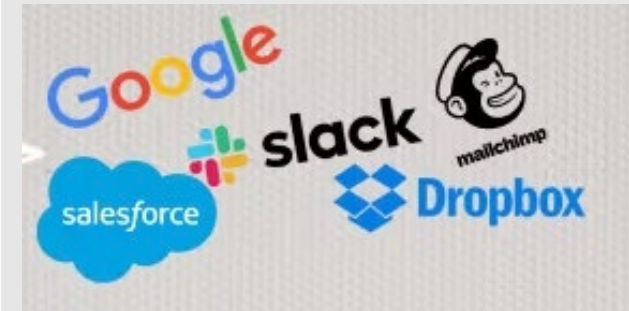
Infrastructure as a Service (IaaS)



Platform as a Service (PaaS)



Software as a Service (SaaS)



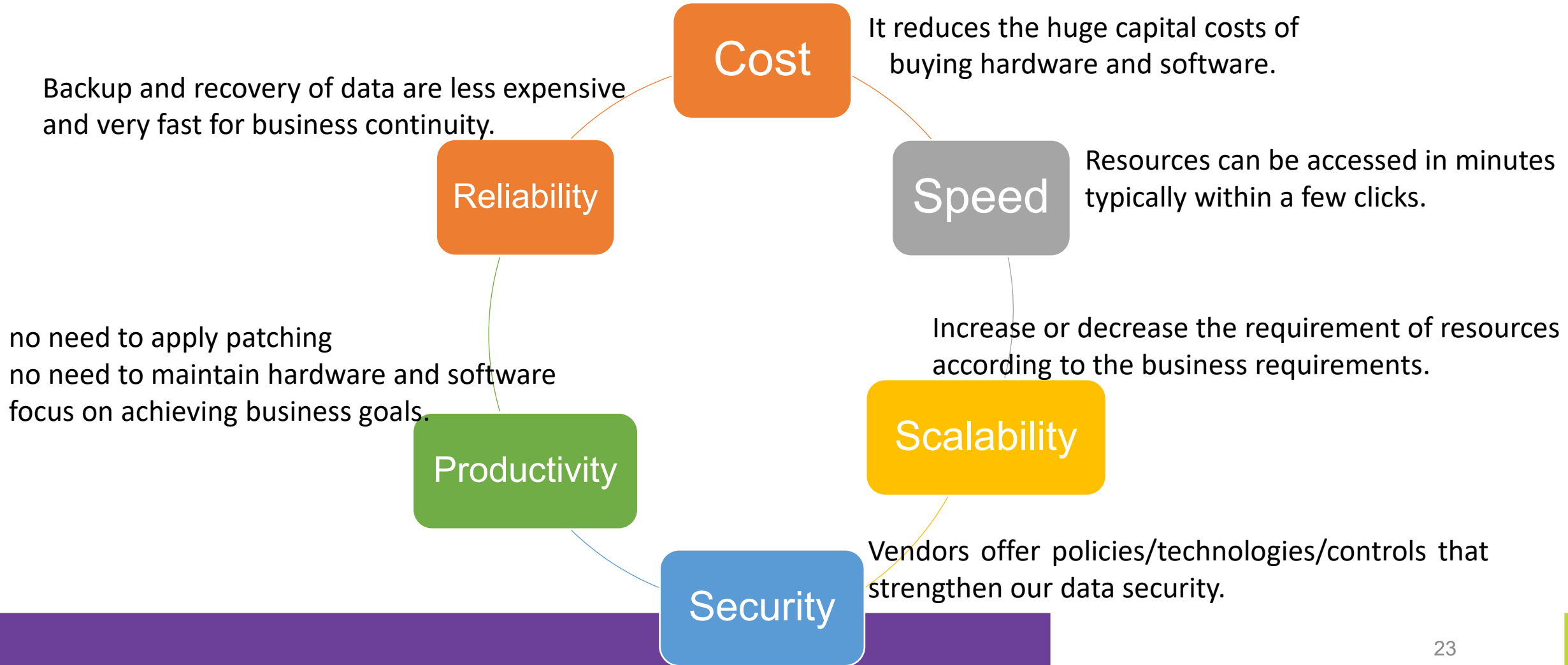
(Atlassian, 2022)



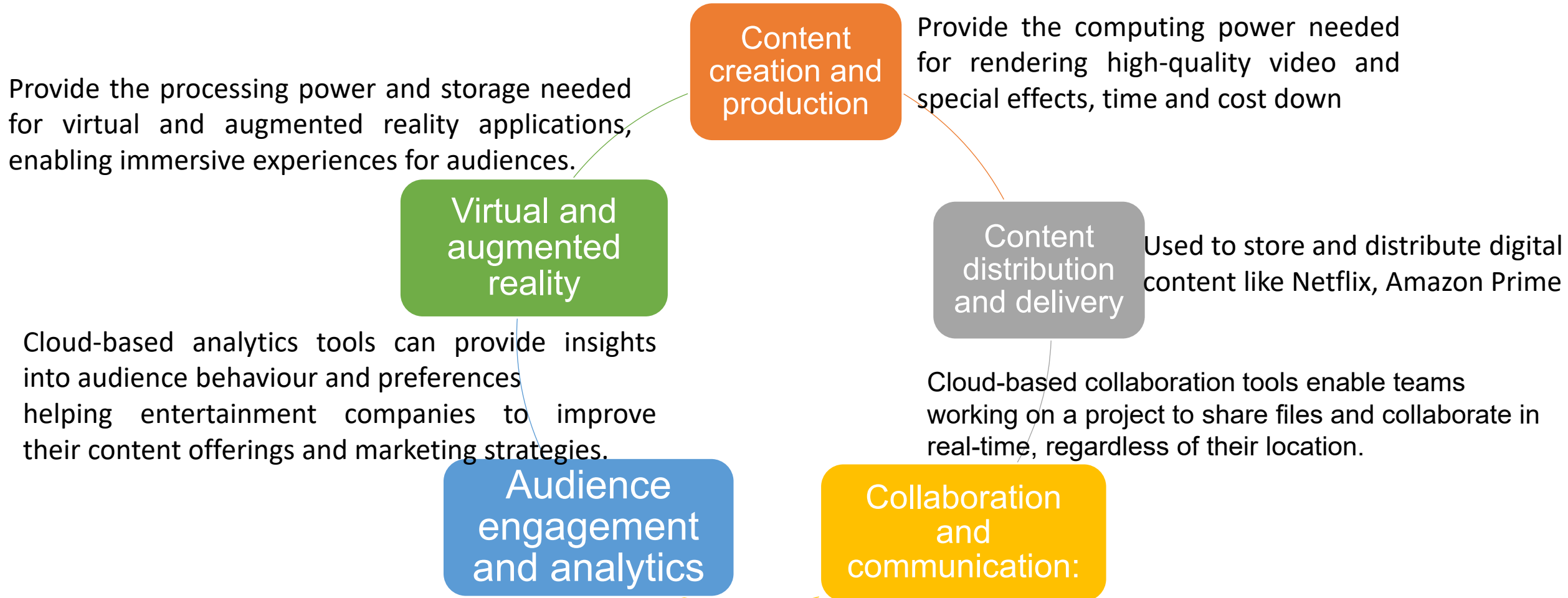
DOUBLE FACEPALM

When the Fail is so strong, one Facepalm is not enough.

Advantages of cloud computing



How about entertainment industry?



Resilience

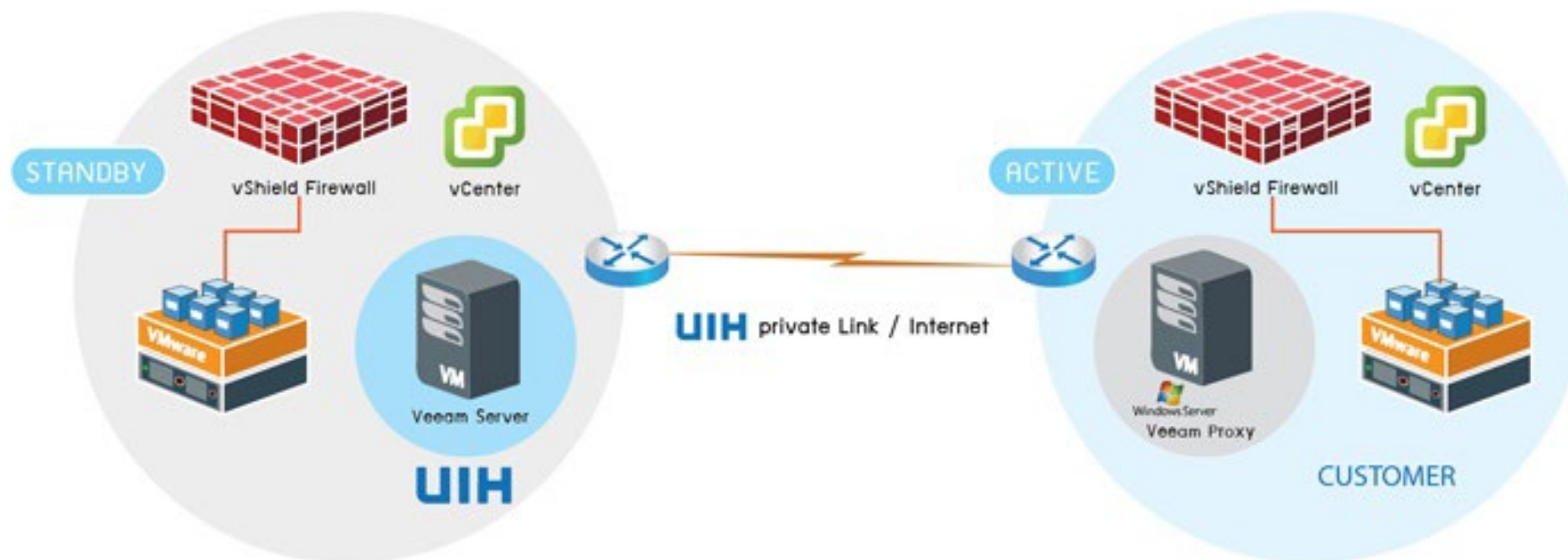
resilience:

“an ability to recover from or adjust easily to misfortune or change.”

—Merriam-Webster Dictionary

Disaster Recovery

Cloud Disaster Recovery (Cloud DR)

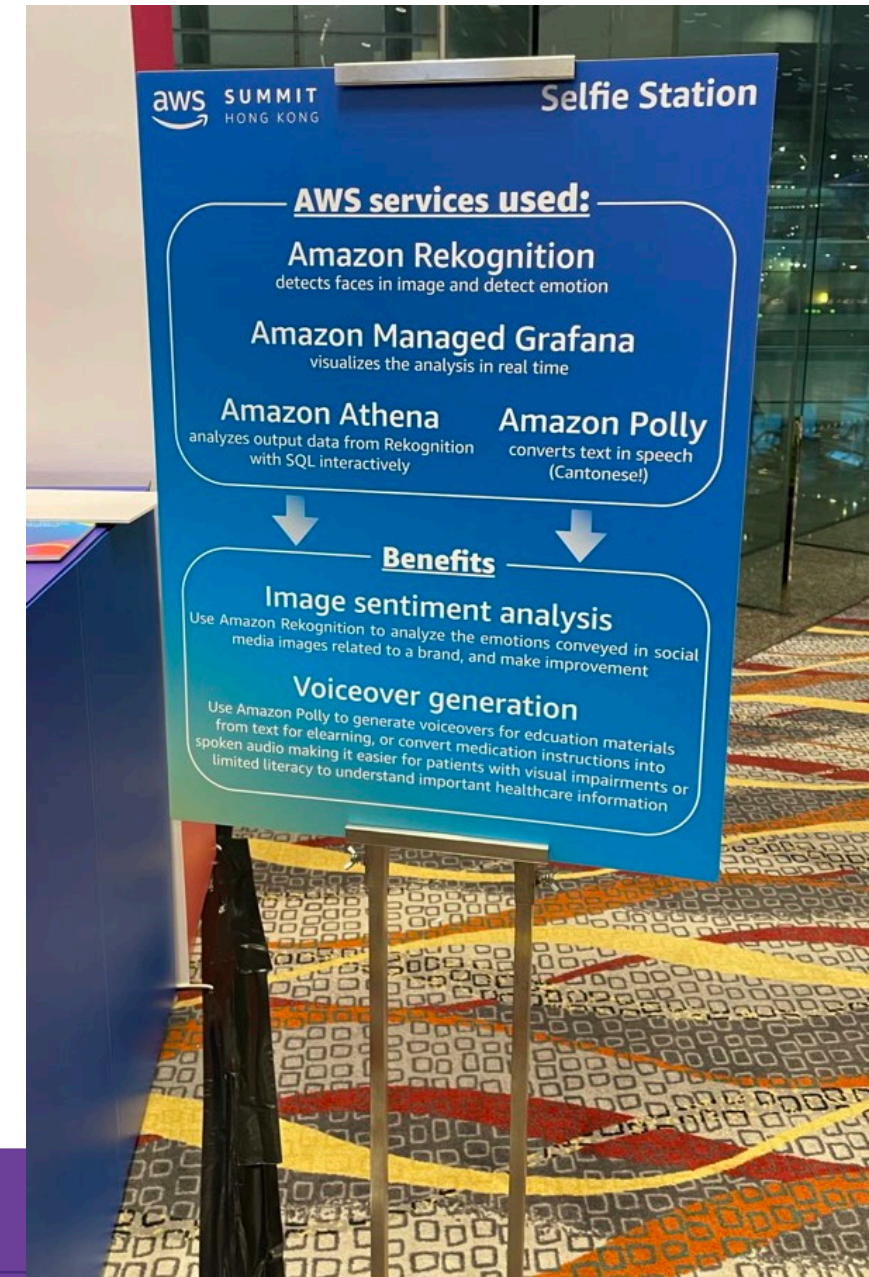
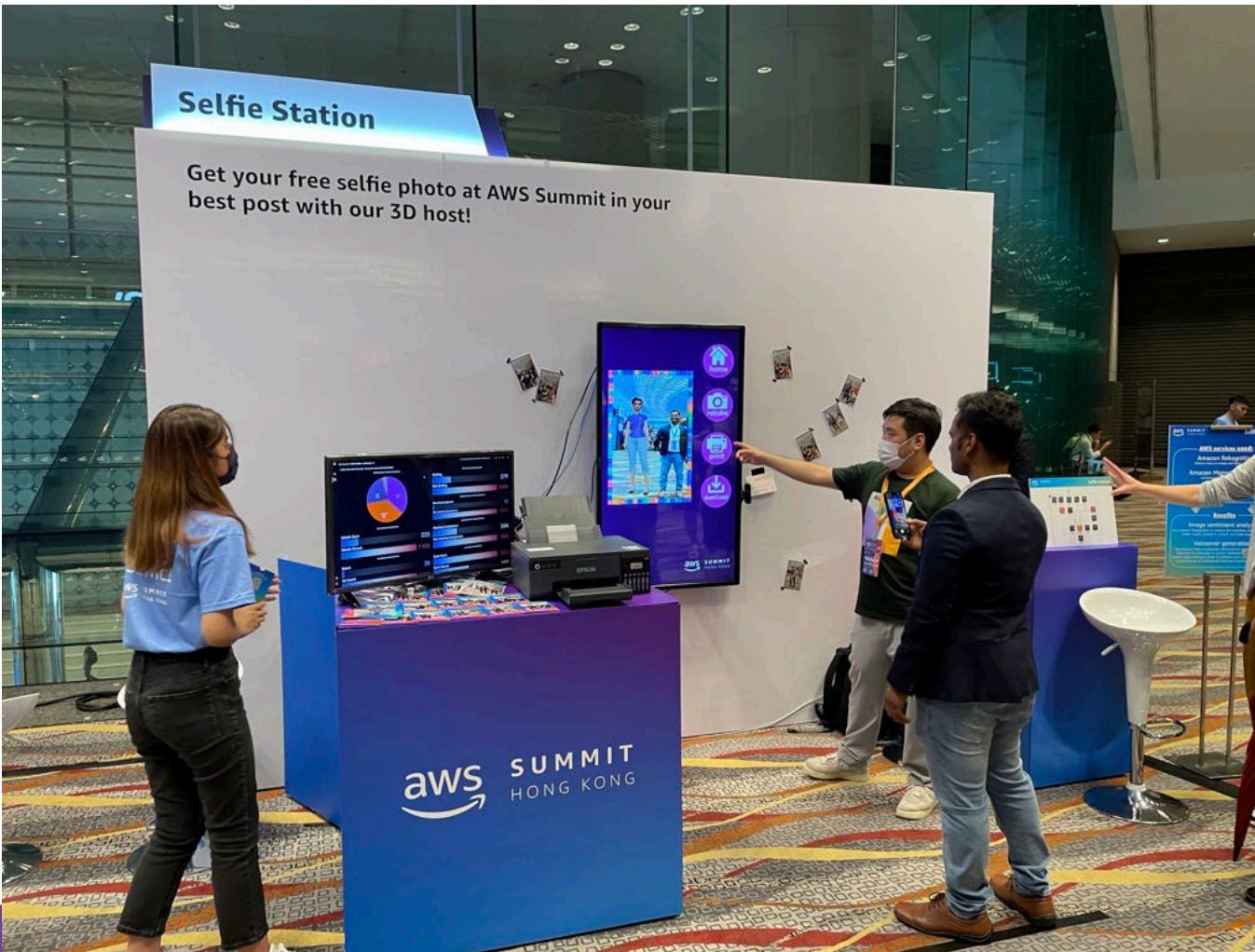




Real case

The background of the slide features a photograph of a modern architectural complex, possibly a university or corporate campus. The image is overlaid with a semi-transparent purple filter. White geometric lines, including a large triangle and several intersecting lines, are drawn over the image, creating a technical or architectural feel. The text 'Real case' is prominently displayed in white on the left side.

Secret of Selfie Station



Generative AI



Generative AI

AWS::CloudFormation::Template

```
AWSTemplateFormatVersion: '2010-09-09'
```

Description: A CloudFormation template to deploy the Stable Diffusion Web UI by

Resources:

EC2Key:

Type: AWS::EC2::KeyPair

Properties:

KeyName: sd-webui-key

PublicKeyMaterial: ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQDGBpILKHwJS...

SecurityGroup:

Type: AWS::EC2::SecurityGroup

Properties:

GroupName: sd-webui-sg

GroupDescription: Security group for StableDiffusion WebUI EC2 instance

SecurityGroupIngress:

- IpProtocol: tcp

FromPort: 22

ToPort: 22

CidrIp: 0.0.0.0/0 # 建議修改為自己的IP

- IpProtocol: tcp

FromPort: 7860

ToPort: 7860

CidrIp: 0.0.0.0/0 # 建議修改為自己的IP

EC2Instance:

Type: AWS::EC2::Instance

Properties:

InstanceType: g4dn.xlarge

ImageId: ami-0096760a13eddf1bb

BlockDeviceMappings:

- DeviceName: /dev/sda1

Ebs:

VolumeSize: 50 # 預設為 50GB, 可依需求修改

VolumeType: gp3

"Tags" : [

{ "Key" : "Name", "Value" : "sd-webui" },

]

KeyName: !Ref EC2Key

SecurityGroups:

- Ref: SecurityGroup

```
'Fn::Base64': |
  #!/bin/bash
  sudo apt-get update
  sudo apt-get upgrade -y
  sudo apt install wget git python3 python3-venv build-essential net-

# install git-lfs
curl -s https://packagecloud.io/install/repositories/github/git-lfs
sudo apt-get install git-lfs
sudo -u ubuntu git lfs install --skip-smudge

# install pyenv
sudo -u ubuntu git clone https://github.com/pyenv/pyenv.git /home/u
sudo chown -R ubuntu:ubuntu /home/ubuntu/.pyenv
echo -e 'if shopt -q login_shell; then' \
  '\n export PYENV_ROOT="$HOME/.pyenv"' \
  '\n export PATH="$PYENV_ROOT/bin:$PATH"' \
  '\n eval "$(pyenv init --path)"' \
  '\nfi' >> /home/ubuntu/.bashrc
echo -e 'if [ -z "$BASH_VERSION" ]; then' \
  '\n export PYENV_ROOT="$HOME/.pyenv"' \
  '\n export PATH="$PYENV_ROOT/bin:$PATH"' \
  '\n eval "$(pyenv init --path)"' \
  '\nfi' >> /home/ubuntu/.profile
echo 'if command -v pyenv >/dev/null; then eval "$(pyenv init -)";

# install dependency of installing python 3.10.6 by pyenv
sudo apt-get install -y make build-essential libssl-dev zlib1g-dev
libbz2-dev libreadline-dev libsqlite3-dev wget curl llvm libncu
xz-utils tk-dev libxml2-dev libxmlsec1-dev libffi-dev liblzma-d

# clone sd webui
cd /home/ubuntu
git clone https://github.com/AUTOMATIC1111/stable-diffusion-webui.g

# clone model and lora
git clone https://huggingface.co/AnonPerson/ChilloutMix
mv ChilloutMix/ChilloutMix-ni-fp16.safetensors stable-diffusion-web
mkdir stable-diffusion-webui/models/Lora
mv ChilloutMix/*.safetensors stable-diffusion-webui/models/Lora
rm -Rf ChilloutMix
sudo chown -R ubuntu:ubuntu stable-diffusion-webui/
```

EIP:

Type: AWS::EC2::EIP

EIPAssociation:

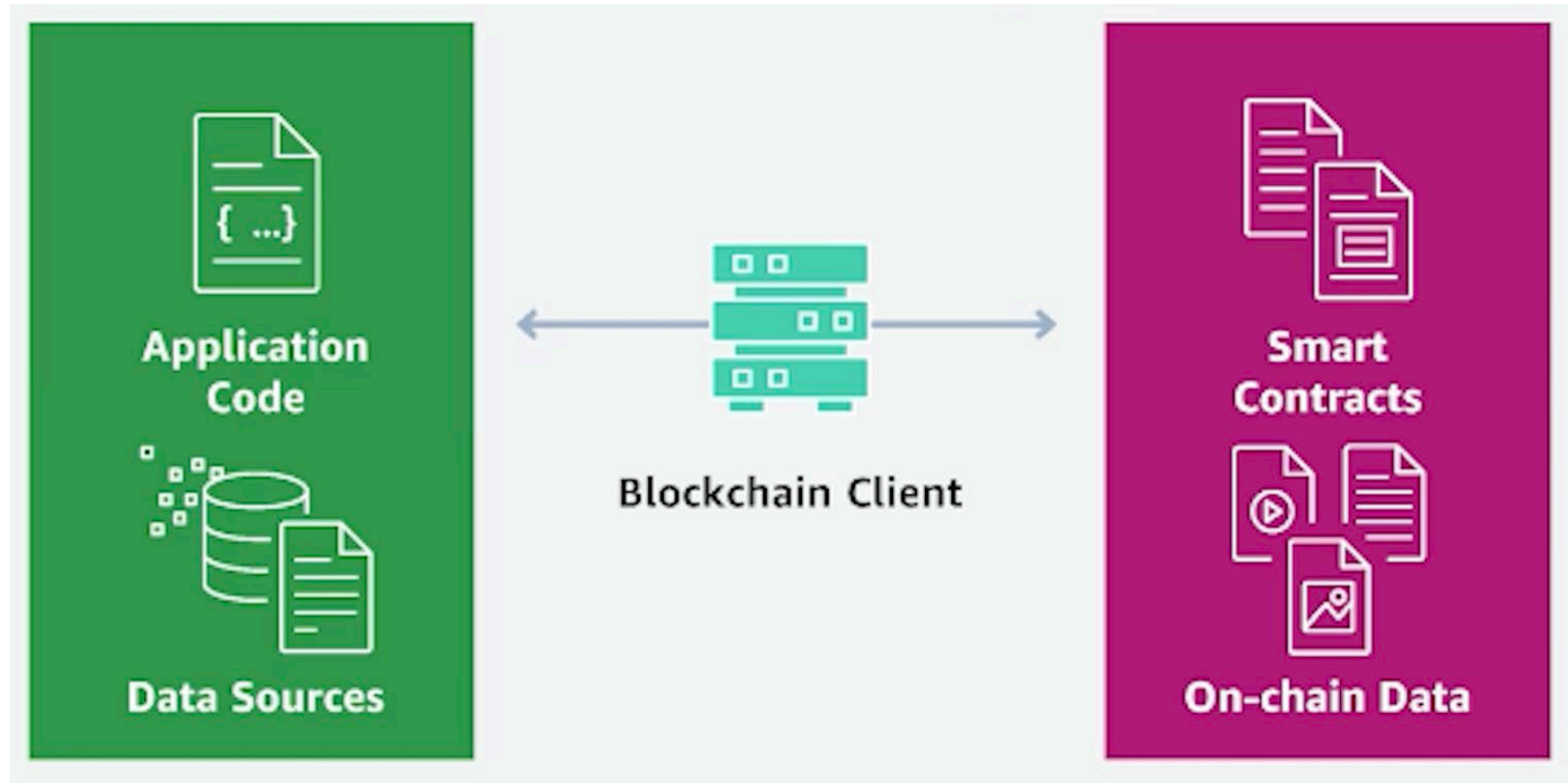
Type: AWS::EC2::EIPAssociation

Properties:

AllocationId: !GetAtt EIP.AllocationId

InstanceId: !Ref EC2Instance

Blockchain



Blockchain

WEB3

Blockchain Concepts – Smart Contracts

A "smart contract" is simply a **program** that runs at an address on the Ethereum blockchain. By design smart contracts are **immutable** on the Ethereum blockchain.



```
1 pragma solidity >=0.4.22 <0.7.0;
2 contract EtherBank {
3     mapping (address => uint256) public balances;
4     function deposit() external payable {
5         require(balances[msg.sender] + msg.value >= balances[msg.
6             sender]);
7         balances[msg.sender] += msg.value;
8     }
9     function withdraw(uint256 amount) external {
10        require(amount <= balances[msg.sender]);
11        balances[msg.sender] -= amount;
12        msg.sender.transfer(amount);
13    }
14 }
```

Language

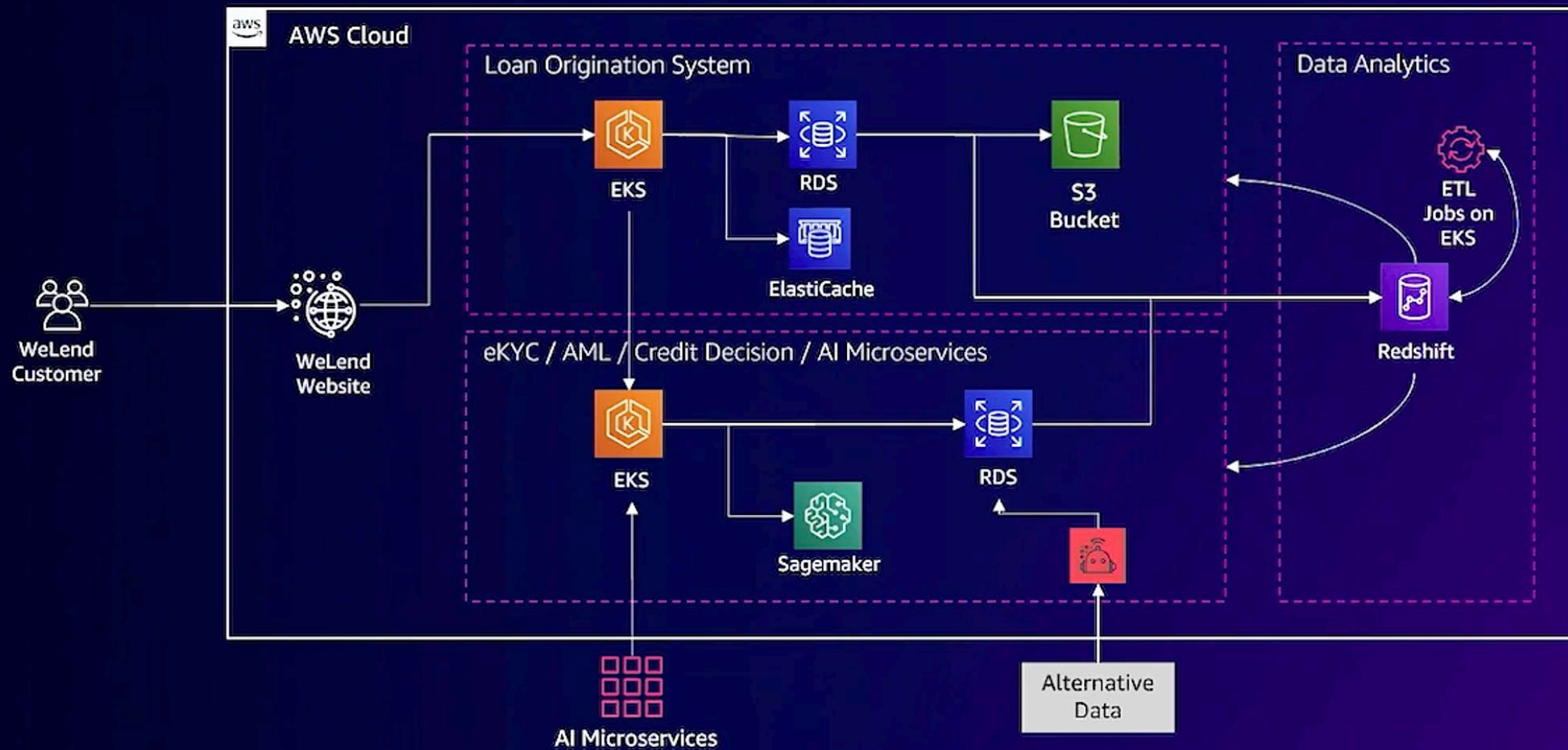
- **Solidity**
- Vyper
- Yul

Standard

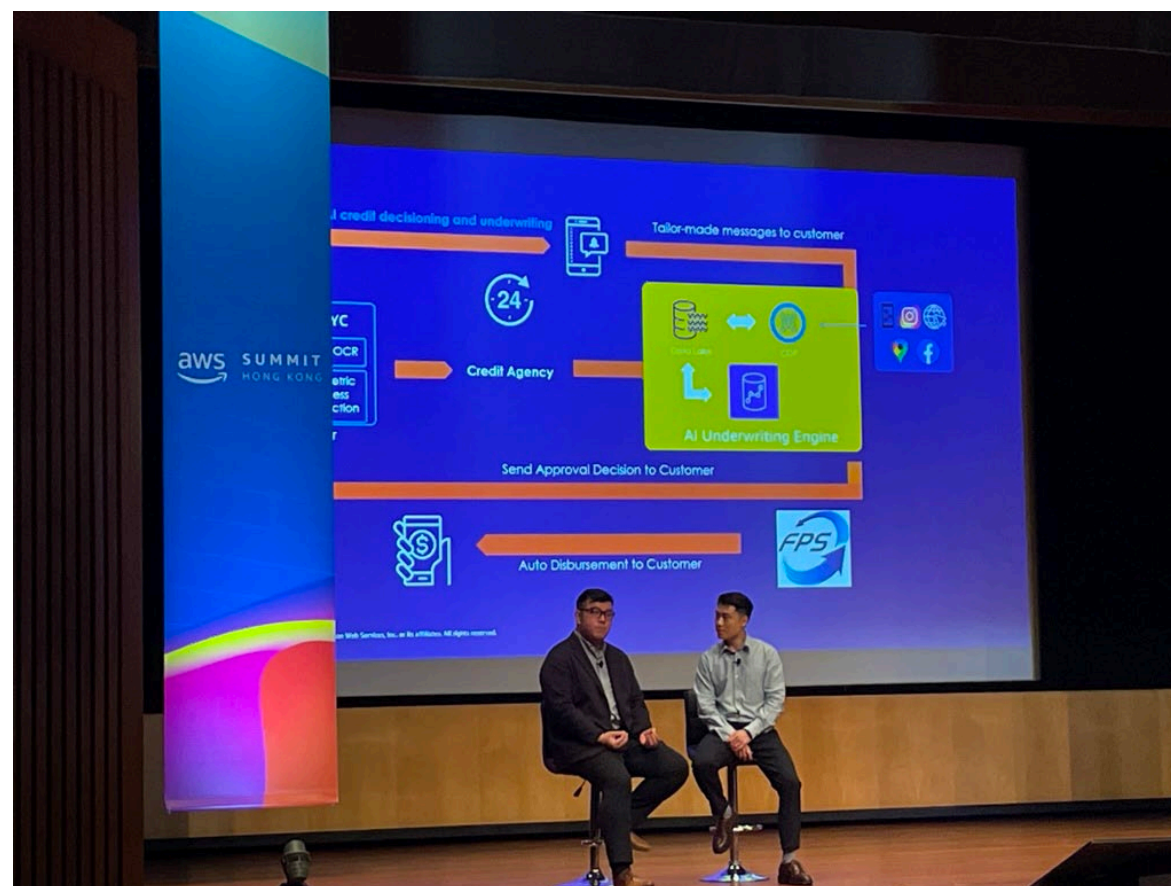
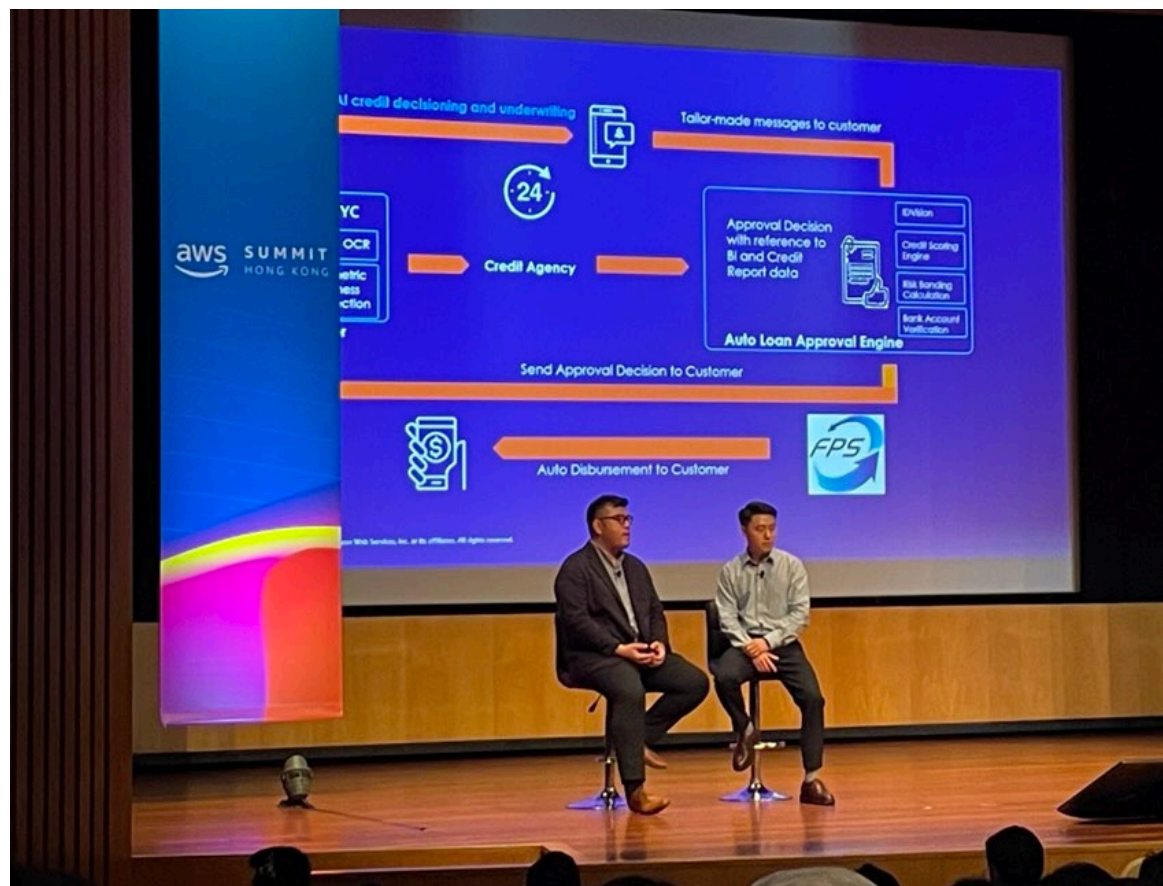
- ERC-20: for fungible tokens
- **ERC-721**: for non fungible tokens
- **ERC-1155**: contain both fungible and non-fungible assets

WeLend





Applying AI



Lalamove



aws 與客戶Lalamove攜手推出
限時優惠



LaLaMove

- Launches operations in a new city in just a few days
- Standardizes management of 100 containerized microservices
 - Database: self host-> Amazon RDS
 - Log: self ElasticSearch -> Amazon Opensearch
- Maintains 99.95% uptime
- Autoscales for spikes in user traffic up to 400%

香港管弦樂團 HKPhil

- Leading orchestra in Asia
- Presenting > 150 concerts over 44-week season



香港管弦樂團 HKPhil

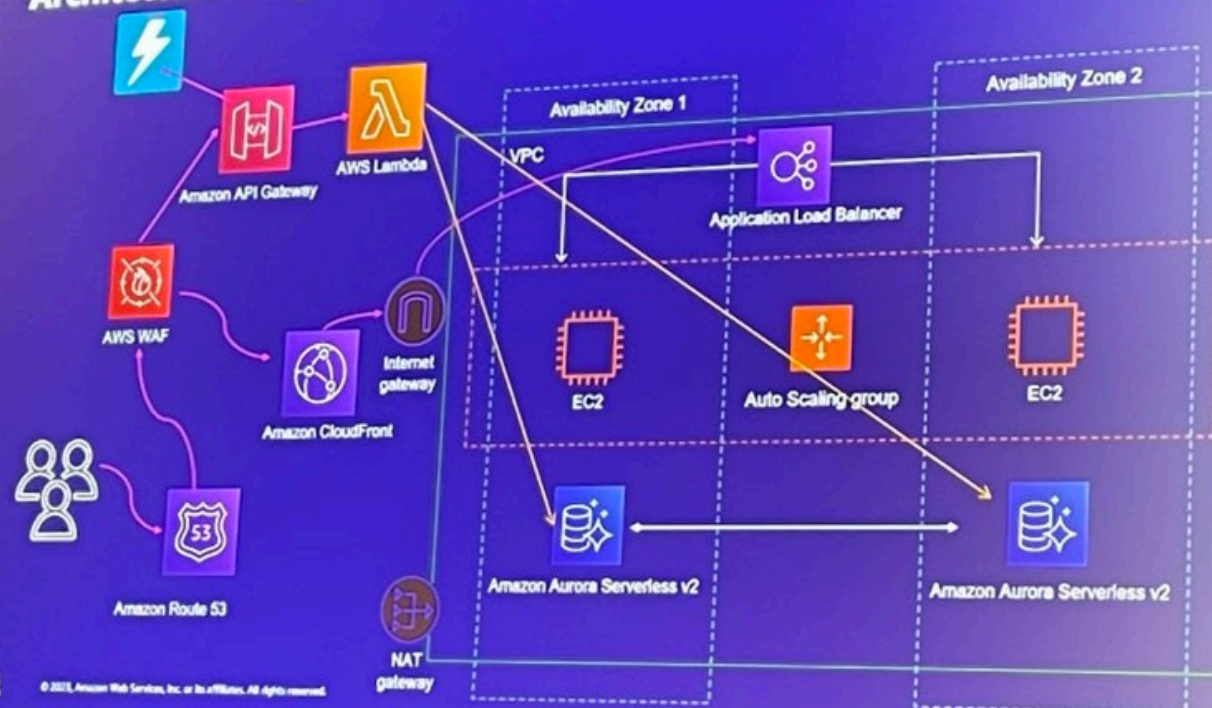
Club Bravo

- Digitalization and relaunch in 03/2023
- Scan/reward/point accumulation

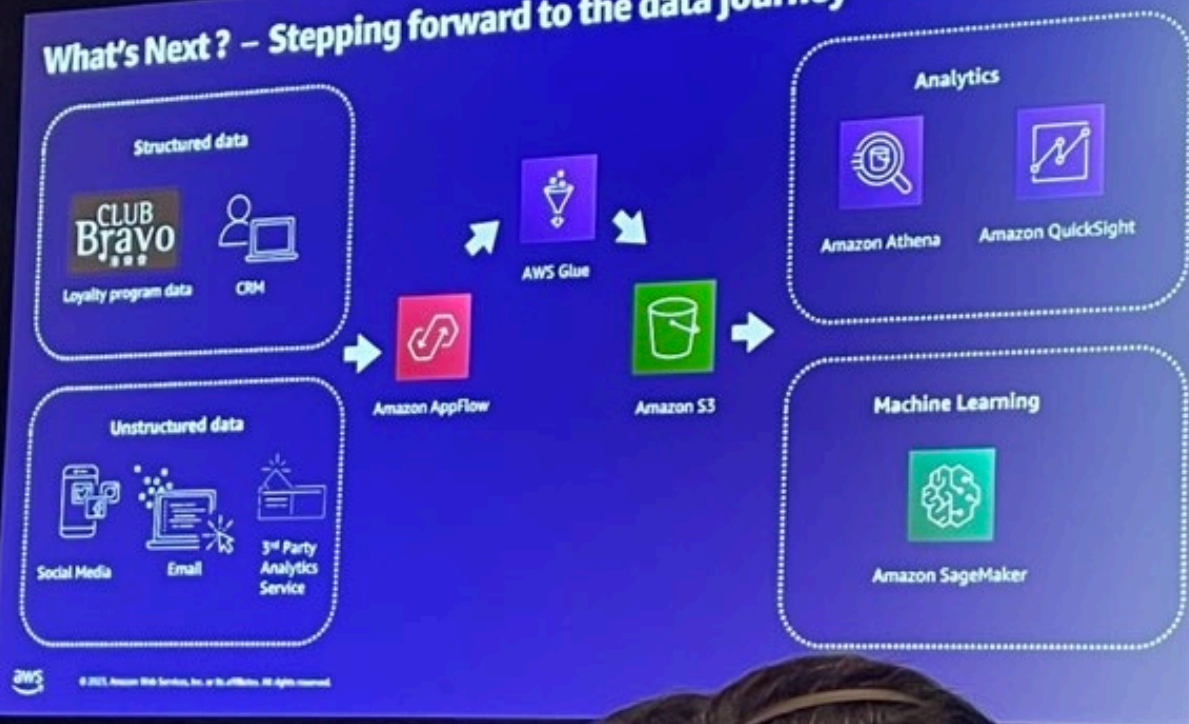


香港管弦樂團 HKPhil

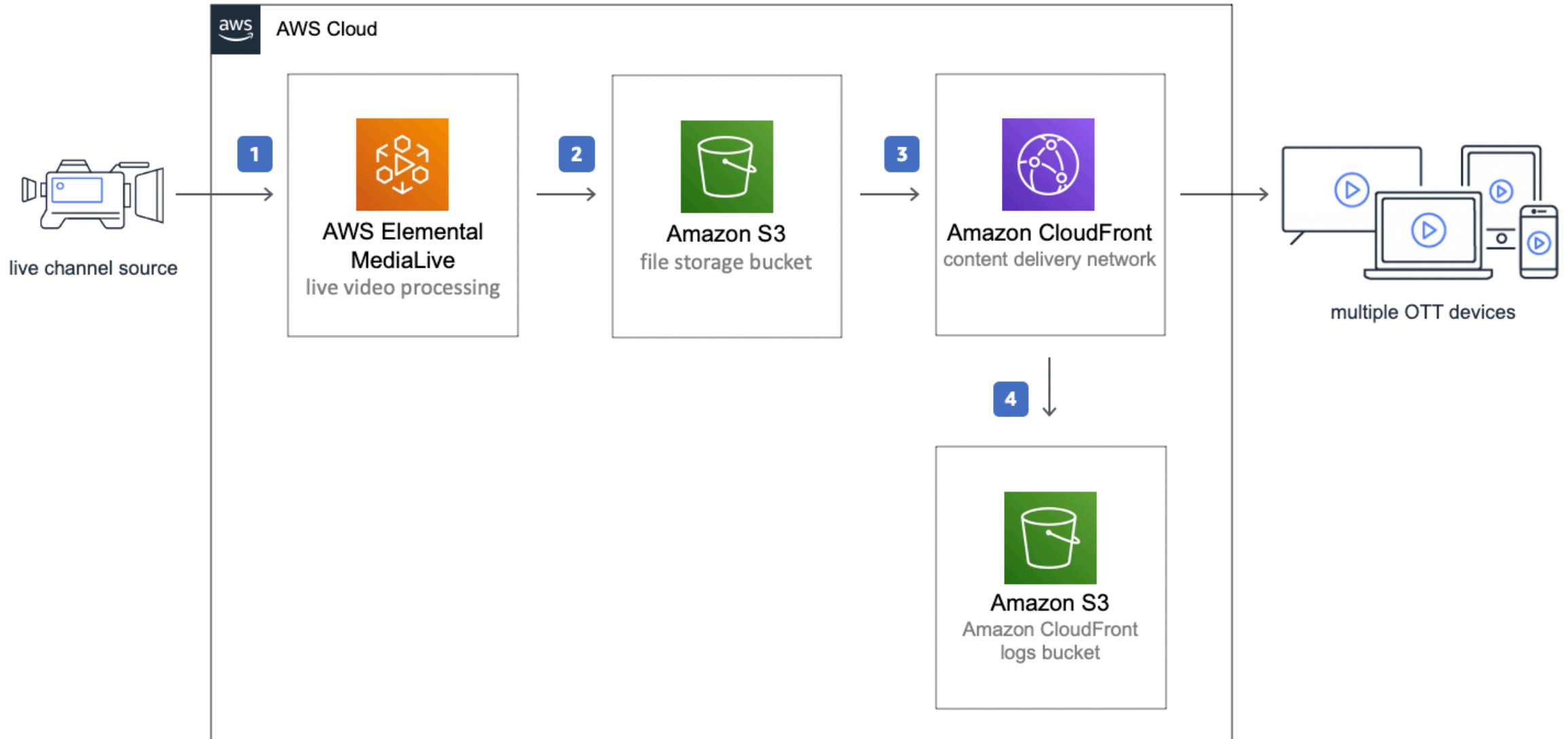
Architecture design



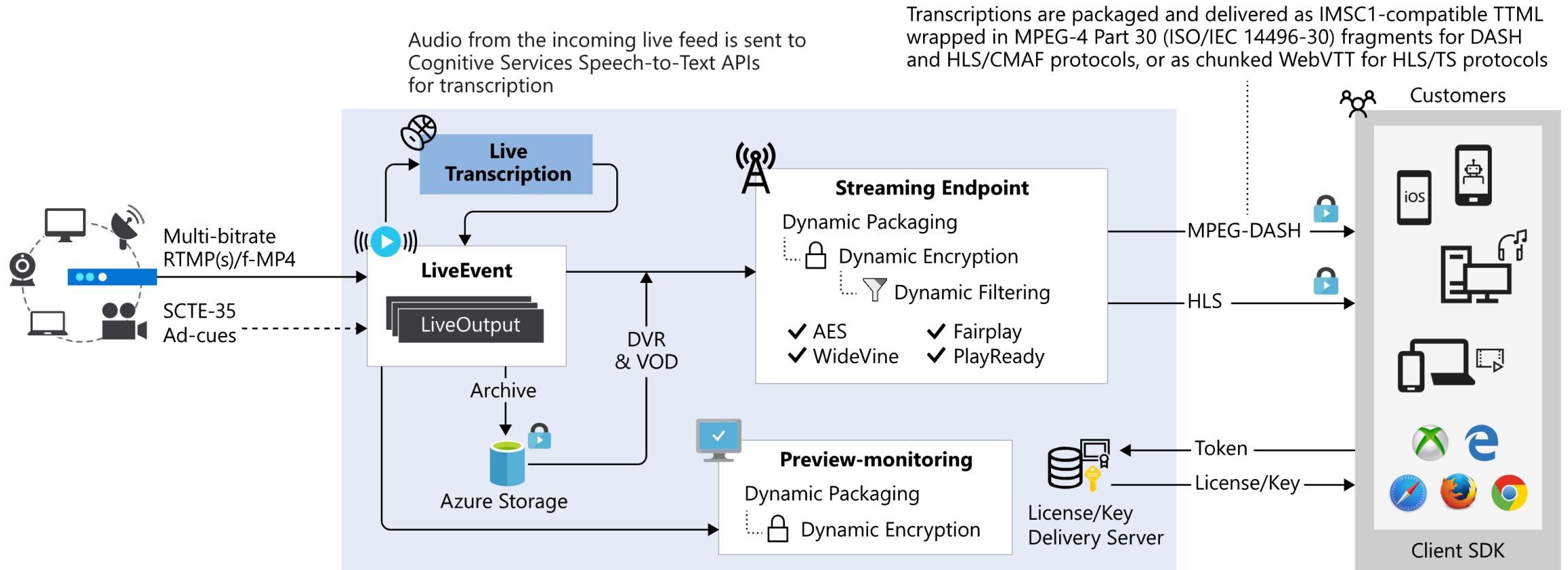
What's Next? – Stepping forward to the data journey



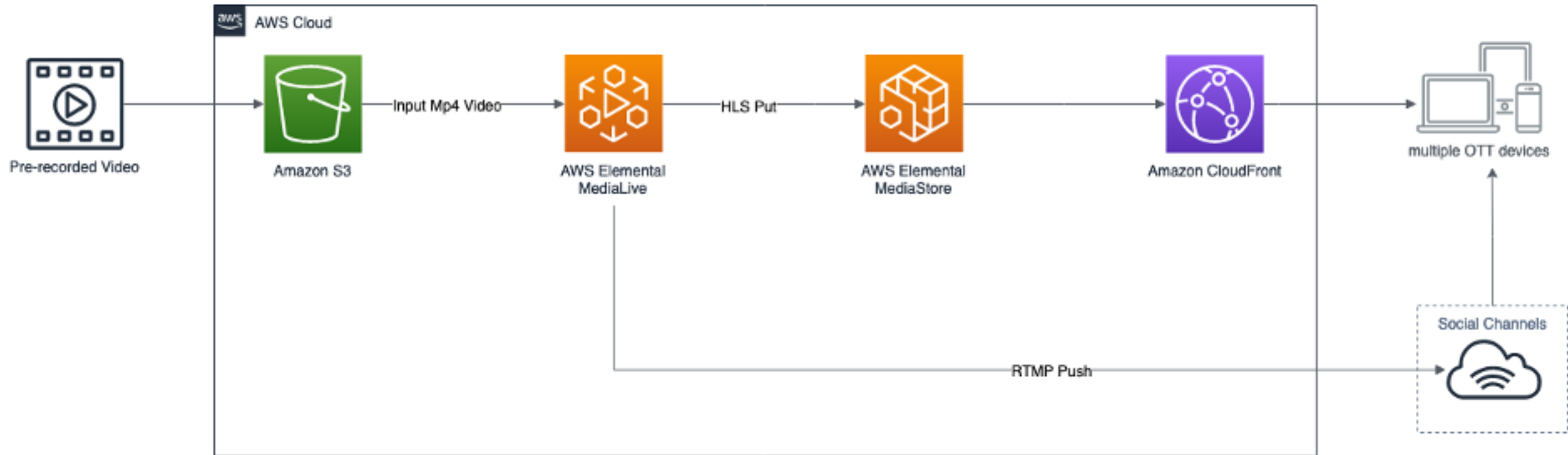
Live Streaming



Live Streaming



Media Streaming



Summary

- Purpose – growth of user, technology
- Type of cloud, service
- Advantage of using cloud
- Live scenario



~Thanks~
Q&A