NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

Introduction To Cloud Computing

Cloud Infrastructure Engineering

Nanyang Technological University
& Skills Union - 2022/2023

Course Content

- Quick Check-In
- Dive into the basics of Cloud Computing and Traditional Computing
- Explore the differences between Cloud Computing and Traditional Computing
- Explore the benefits of Cloud Computing

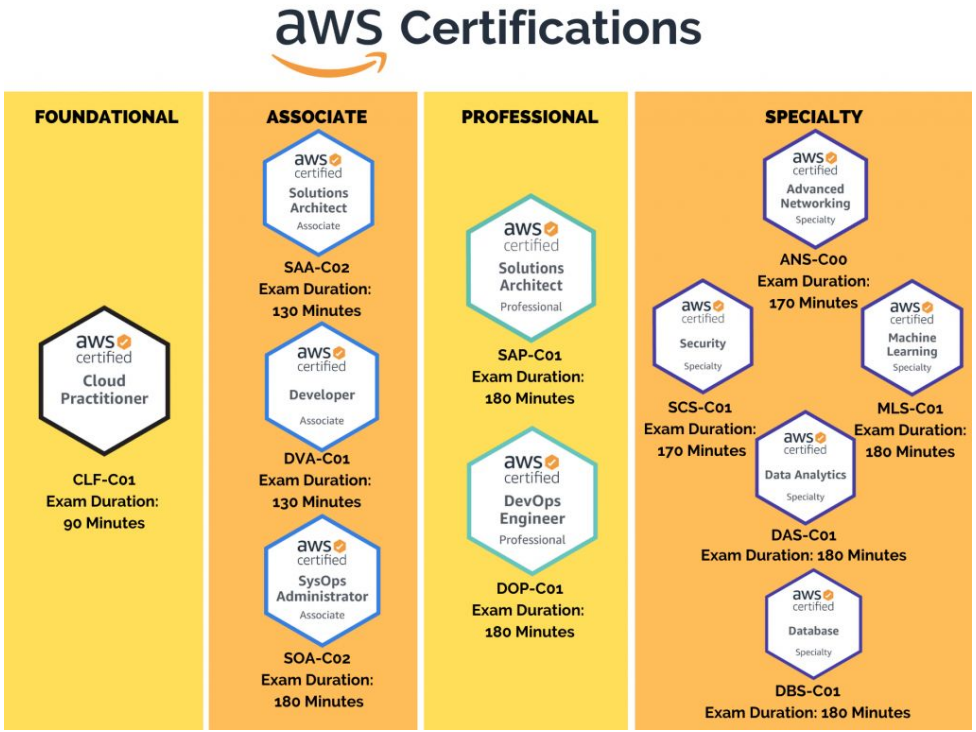
Time	What	How or Why
7:15pm - 7:30pm	Part 1 - Presentation	Introduction To Cloud Computing & Its Benefits
7:30pm - 7:40pm	Activity	Brainstorming of Cloud Computing
7:45pm - 7:55pm	Part 2 - Presentation	Cloud Computing vs Traditional Computing
7:55pm - 8:15pm	Part 3 - Presentation	Case Study Discussion
8:15pm - 8:25pm	Break	
8:25pm - 8:40pm	Part 4 - Presentation	Hybrid Cloud Computing
8:40pm - 9:00pm	Activity	
9:00pm - 10:00pm	Assignment & Wrap Up	

Introduction To Cloud Computing

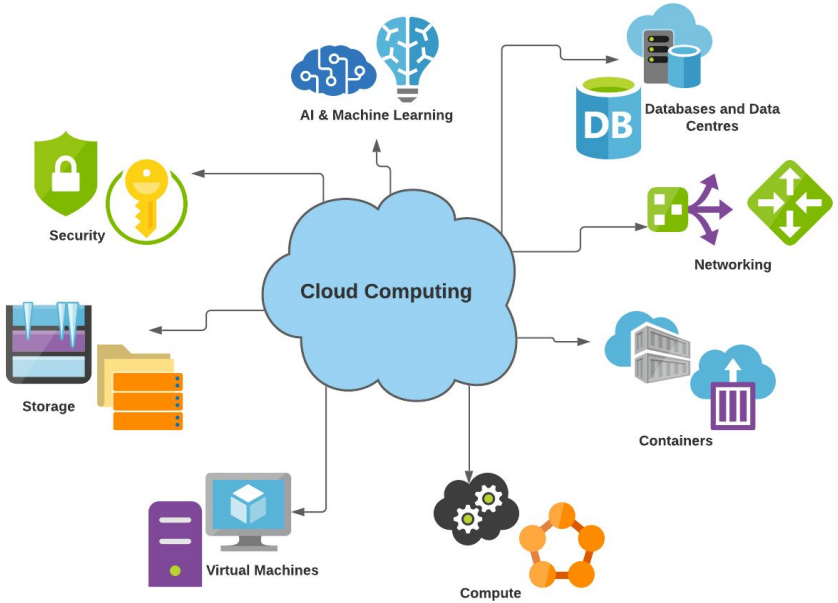
What is Traditional Computing?

What is Cloud Computing?

What is Cloud Computing?



What is Cloud Computing?



What is Cloud Computing?

In order to **provide quicker innovation, adaptable resources, and scale economies**, cloud computing, in its simplest form, is the supply of computing services via the Internet ("the cloud"), encompassing servers, storage, databases, networking, software, analytics, and intelligence.

Typically, you only **pay for the cloud services you actually use**, which **lowers operational expenses, improves infrastructure management, and enables you to scale** as your company's needs evolve.

History of Cloud Computing

The name "cloud computing" has been used since the **early 2000s,** although the idea of "**computing as a service**" dates back to the **1960s**, when computer bureaus allowed businesses to rent time on mainframes rather than having to purchase one themselves.

History of Cloud Computing

However, in the application service providers, utility computing, and grid computing of the **late 1990s and early 2000s**, the idea of **renting access to computer resources** has often come up.

This was followed by the rise of software as a service and hyperscale cloud-computing companies like **Amazon Web Services**, after which cloud computing really took off.

Why is it Called Cloud Computing?

The **location of the service** and many other variables, such as the **hardware or operating system** on which it is running, are key ideas in cloud computing, although they are mostly irrelevant to the user.

The metaphor of the cloud was derived from these schematics.

Of course, this oversimplifies the situation; for many consumers, the location of their services and data continues to be a major concern.

Benefits of Cloud Computing

Benefits of Cloud Computing

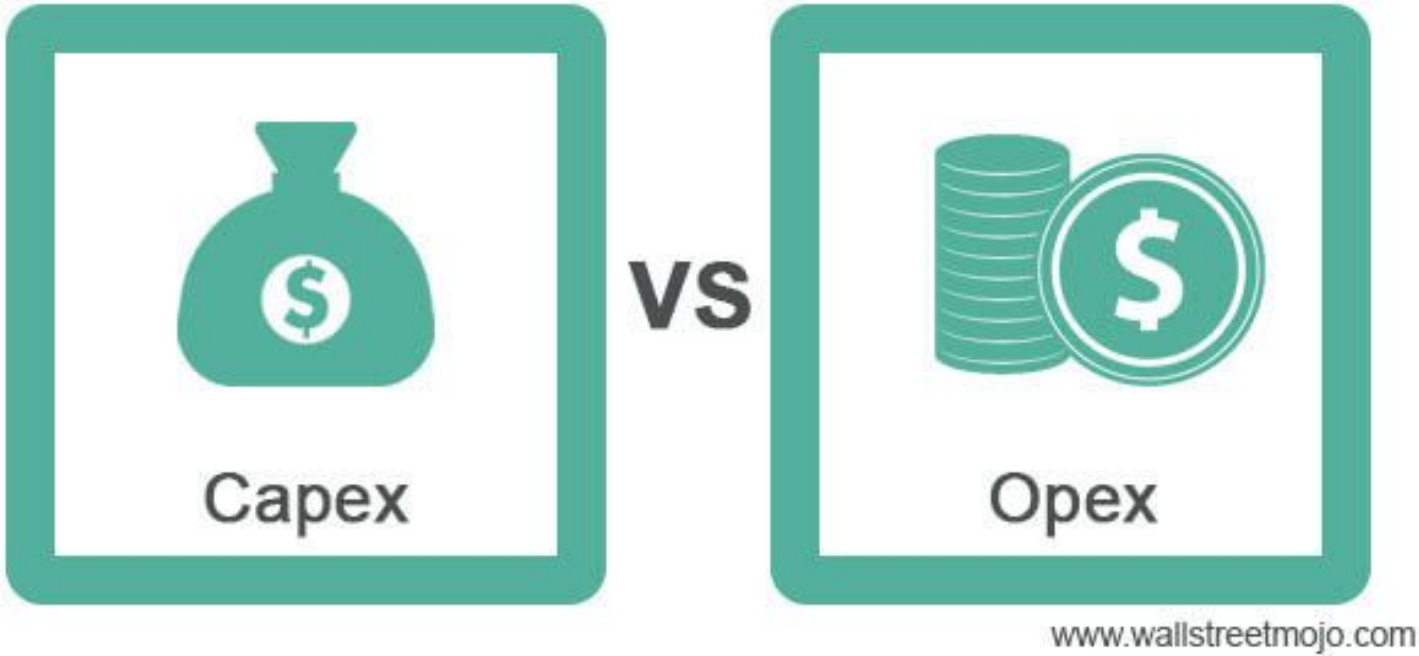
A significant change from how organizations have traditionally viewed IT resources is cloud computing.

The following are prevalent among businesses for using cloud computing services:

Costs

With cloud computing, there is **no longer a need to invest in hardware, software, the infrastructure of on-site data centers**, including the server racks, round-the-clock electricity for power and cooling, and IT professionals to oversee the infrastructure. It quickly adds up.

Costs



Speed

The majority of cloud computing services are **self-service and on-demand**, making it possible to provision even large quantities of computing resources quickly and generally with only a few mouse clicks.

This gives enterprises a great deal of flexibility and relieves the burden of capacity planning.

Global Scope & Presence

The **flexibility of scaling** is one of the advantages of cloud computing services.

In the context of the cloud, this refers to providing the appropriate level of IT resources at the **appropriate time and from the appropriate location**, such as more or less processing power, storage, and bandwidth.

Global Scope & Presence

Productivity of Internal IT Teams

Hardware installation, software patching, and other time-consuming IT management tasks are frequently needed for on-site datacenters.

Many of these duties are **no longer necessary thanks to cloud computing**, freeing up IT employees' time to focus on more crucial business objectives.

Performance

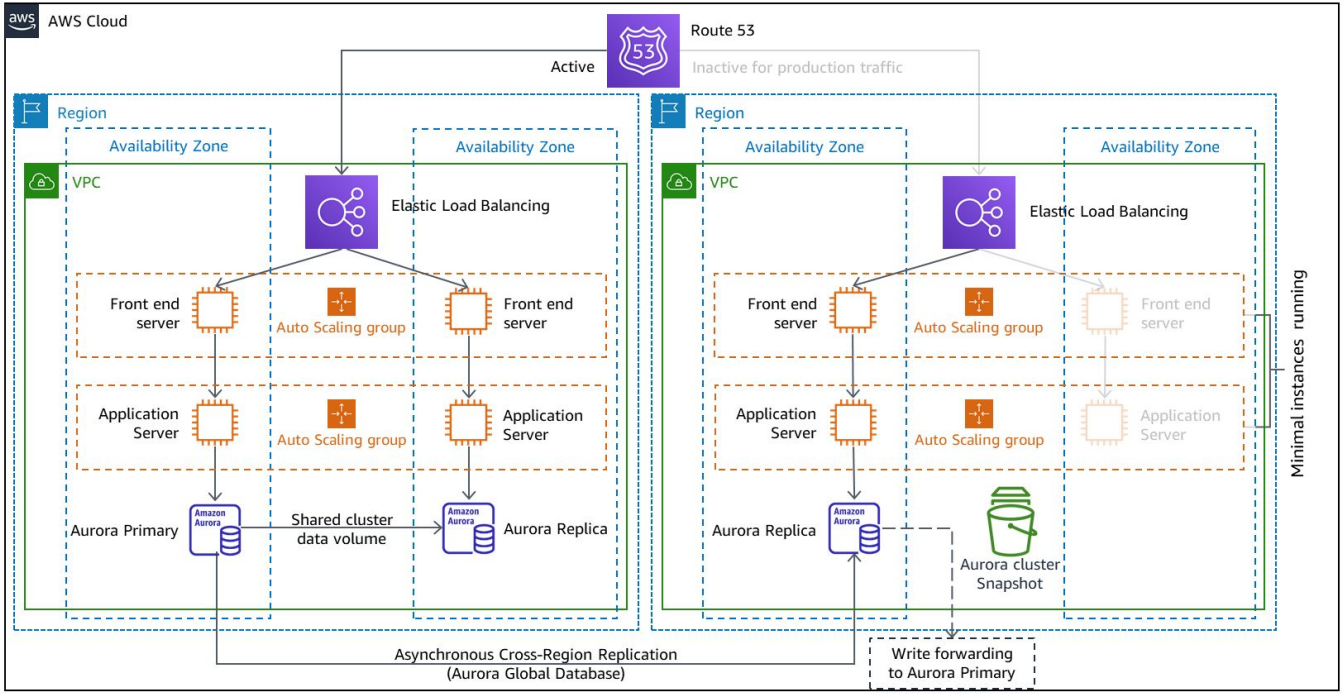
The largest cloud computing services are **powered by a global network of safe datacenters** that are routinely updated with the newest models of quick and effective computing gear.

In comparison to a single corporate datacenter, this has a number of advantages, including **lower network latency for applications and greater economies of scale**.

Reliability

Due to the fact that **data can be replicated at numerous redundant sites** on the network of the cloud provider, cloud computing makes data backup, disaster recovery, and business continuity simpler and less expensive.

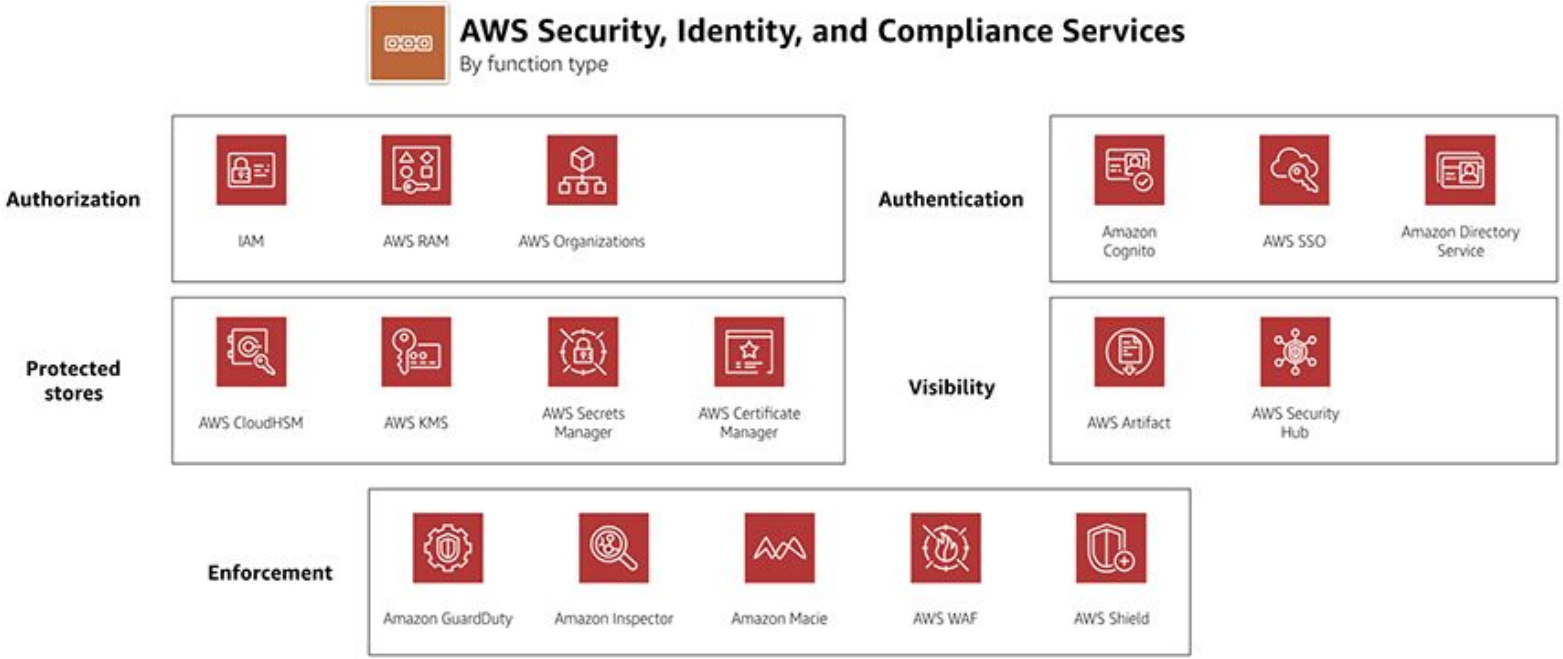
Reliability



Security

A wide range of rules, tools, and controls are provided by many cloud service providers, **strengthening your overall security posture** and defending your infrastructure, apps, and data from potential threats.

Security


AWS Security, Identity, and Compliance Services
By function type
Authorization
IAM
AWS RAM
AWS Organizations
Authentication
Amazon Cognito
AWS SSO
Amazon Directory Service
Protected stores
AWS CloudHSM
AWS KMS
AWS Secrets Manager
AWS Certificate Manager
Visibility
AWS Artifact
AWS Security Hub
Enforcement
Amazon GuardDuty
Amazon Inspector
Amazon Macie
AWS WAF
AWS Shield

Summary

- Costs
- Speed
- Global Scope & Presence
- Productivity
- Performance
- Reliability
- Security

Individual Activity

1. What is Cloud Computing?

2. What is benefit of cloud computing?

3. Do you have any experience in cloud computing?

4. Do you know what company have well implementation of cloud computing?

5. If you are a CTO or Decision maker in your company, will you use Cloud Computing? Why? What does your business look like?

Cloud Computing vs Traditional Computing

Differences

Cloud computing is a lot more ethereal than traditional virtual hosting.

All servers, software, and networks are housed in the **cloud, off-site**, and not via physical hardware.

It is a **concurrently hosted real-time virtual environment spread across numerous separate servers**.

Therefore, you can **rent data storage space** from cloud computing companies on a more **cost-effective pay-per-use basis** rather than investing money into buying physical servers in-house.

Resilience and Elasticity

The servers connected to function as a single unit are **evenly distributed** with respect to the **data and applications hosted** in the cloud.

As a result, **downtime is avoided** and **no data is lost** if one server fails. Additionally, the cloud **provides better server resources**, including more storage space, and computing power.

A consistently high level of server performance cannot be guaranteed by traditional IT systems because they are not as resilient.

Flexibility and Scalability

Compared to conventional data centers, cloud computing provides a **higher level of flexibility and scalability**.

Cloud computing's on-demand virtual environment has more server resources and limitless storage space.

Depending on the volume of traffic to your website, **cloud servers can scale up or down**, and you will have full control to install any software whenever you need to. This offers your company more growth potential.

Hands-On Management

The storage company manages cloud computing, taking care of all required hardware, making sure security precautions are taken, and keeping everything running smoothly.

Traditional data centers **demand a lot of internal management,** which can be expensive and time-consuming for your company.

To ensure regular server monitoring and maintenance, including upgrades, configuration issues, threat protection, and installations, fully trained IT personnel may be required.

Costs

Similar to how you pay for utilities like electricity, you **only pay for the cloud-based services that you use.**

Additionally, the likelihood of downtime is reduced, which leads to better productivity at work and longer-term revenue growth.

To accommodate business growth with traditional IT infrastructure, you will need to **make up-front purchases of hardware and additional server space.** You will wind up paying for resources you don't use if this slows down.

Security

When moving to the cloud, it is essential to select a cloud service provider that is **transparent** about hosting cloud platforms and can **provide the best security measures** in place (Also a responsibility of your team).

With traditional IT infrastructure, **you are responsible for the protection of your data**, and it is easier to ensure that only approved personnel can access stored applications and data.

Summary

Resilience & Elasticity

Flexibility & Scalability

Hands-on Management

Costs

Security

Break Time

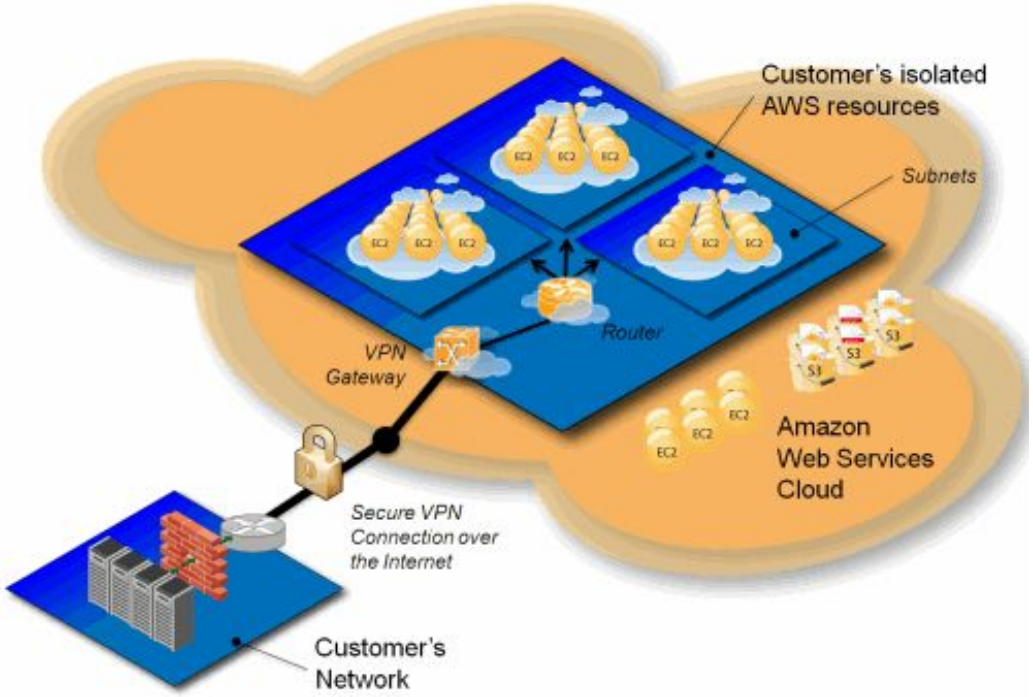
Hybrid Cloud Computing

Before That, What is Private Cloud?

Private cloud (also known as an **internal cloud** or **corporate cloud**) is a cloud computing environment in which all hardware and software resources are **dedicated exclusively to, and accessible only by, a single customer/ user**.

Private cloud combines many of the benefits of cloud computing—including **elasticity, scalability, and ease of service delivery**—with the **access control, security, and resource customization of on-premises infrastructure**.

Private Cloud



Types of Private Cloud

On-Premise Private Cloud

- Deploy on your own resources in an internal data center

Managed Private Cloud

- Single-tenant environment fully managed by a third party

Virtual Private Cloud

- Deploy within a public cloud infrastructure

Who Owns Private Cloud?

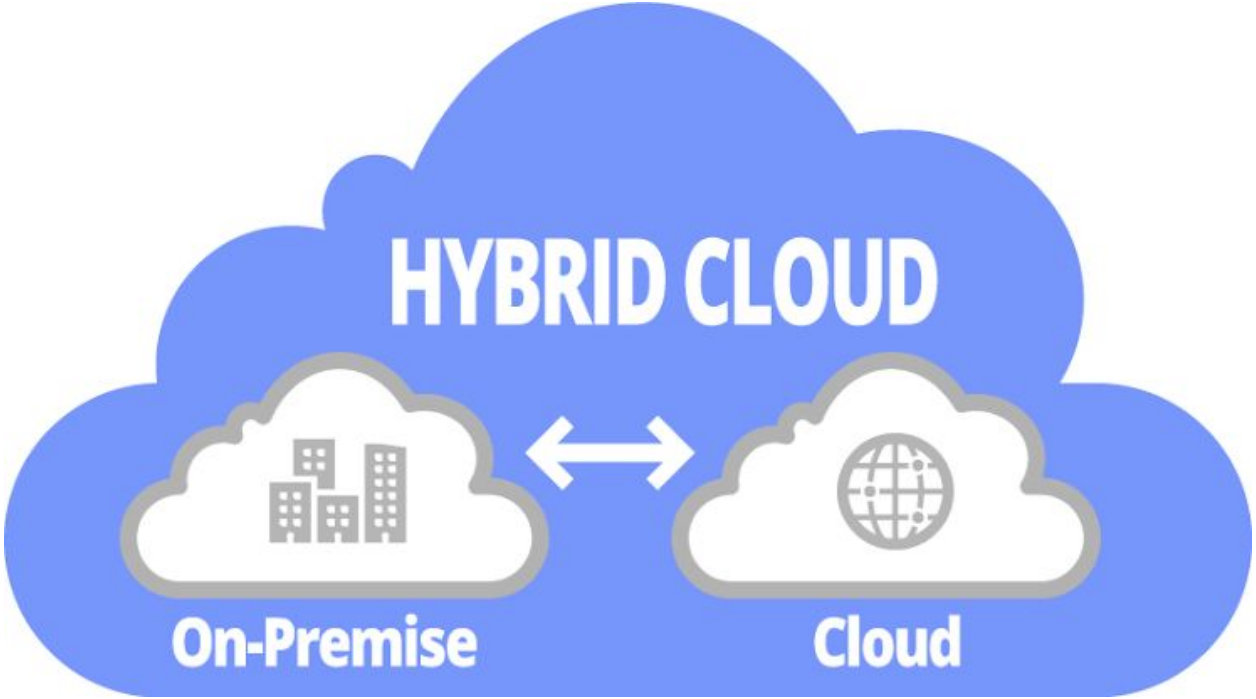
A private cloud can either be **inside an organization** or r**emotely managed by a third party and accessed over the Internet** (but unlike a public cloud, it is not shared with anyone).

Hybrid Cloud Computing

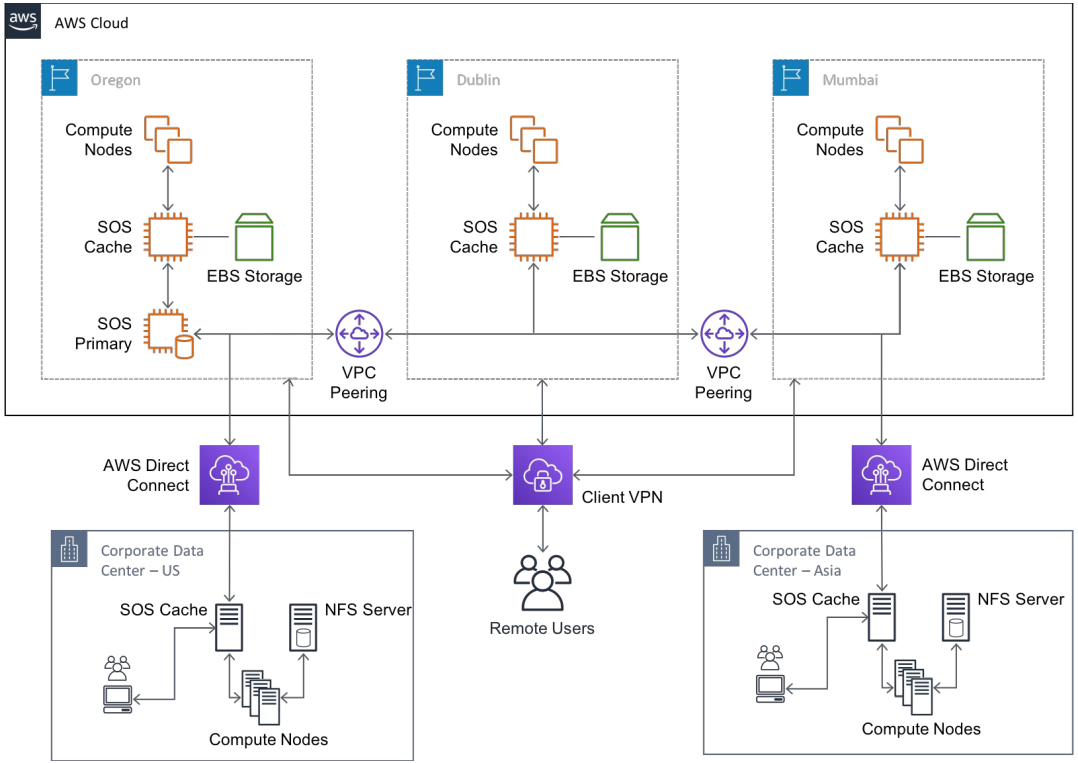
A hybrid cloud approach is one of the most common infrastructure setups today because you can **continue to use your on-premises servers** while also **taking advantage of public cloud options** like AWS & GCP.

Hybrid cloud solutions include applications, or their components such as compute, networking, and storage, when deployed across public and private clouds.

Hybrid Cloud Computing



Hybrid Cloud Computing



Hybrid Cloud Benefits

Let’s explore the benefits of Hybrid Cloud

Effective Application Governance

A hybrid approach allows you to **decide where your application sits** and where hybrid computing happens.

This can help **improve privacy** and ensure **compliance** for your regulated applications.

Improve Performance & Latency

Sometimes, distributed apps at remote locations benefit from a hybrid cloud solution.

For applications with **low latency requirements**, hybrid computing happens close to the end users.

Improve Performance & Latency

Low Latency = *computer network that is optimized to process a very high volume of data messages with minimal delay (latency)*

Examples: High-Frequency Trading Applications, Gaming, Streaming

Flexible Operations

Hybrid computing gives you the flexibility to operate in the environment that's best for you.

For example, by **building containers**, you can create portable applications and easily move between public and private clouds. You could also build **serverless applications**.

Improved ROI

By adding a public cloud provider to your existing on-premises infrastructure, you can expand your cloud computing capacity without increasing your data center expenses.

Summary

- Governance
- Improve Performance & Latency
- Flexible Operations
- Improved ROI

Individual Activity

1. What is Hybrid Computing?

2. What is benefit of Hybrid computing?

3. Do you have any experience in Traditional or Hybrid computing?

4. Do you know what company have well implementation of Hybrid computing?

5. If you are a CTO or Decision maker in your company, will you use Hybrid Computing? Why? What is your business look like?

Assignment Briefing

Group Activity

Work with your group & prepare presentation with your own group about which method that will you use to handle these case:

- Newly Launched eCommerce,
- Large eCommerce with millions of user,
- Financial Institution,
- Government,
- Personal Static Website,
- Email Application or
- *Pick your own cases*

Group Activity

Method:

- Traditional Computing
- Cloud Computing
- Hybrid Cloud Computing

Group Activity

Questions:

- What is your case about? Explain (Company Size, User Size, etc)
- What method you choose? Why?
- What is the benefit of method that you choose?

Activity

Learner:

- Clean up AWS.
- Remove/delete/terminate all service/ resources that created.

Instructor

- Clean up AWS.
- Remove/delete/terminate all service/ resources that created.
- Check the AWS account after learner clean up.

What’s Next?