

DAY 16

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TITLE: INTRODUCTION OF CLOUD COMPUTING AND AWS

- **Cloud computing** - Cloud Computing means storing and accessing the data and programs on remote servers that are hosted on the internet instead of the computer's hard drive or local server. Cloud computing is also referred to as Internet-based computing, it is a technology where the resource is provided as a service through the Internet to the user. The data that is stored can be files, images, documents, or any other storable document.
Cloud computing helps users in easily accessing computing resources like storage and processing over the internet rather than local hardware.
Here we are discussing how it works in a nutshell:
 - Infrastructure: Cloud computing depends on remote network servers hosted on internet for store, manage, and process the data.
 - On-Demand Access: Users can access cloud services and resources based on-demand they can scale up or down the without having to invest for physical hardware.
 - Types of Services: Cloud computing offers various benefits such as cost saving, scalability, reliability and accessibility it reduces capital expenditures, improves efficiency.
 - Some of the providers are AWS, Google Cloud Platform (GCP), Microsoft Azure.

➤ **Types of Clouds (Based on Deployment Models)**

1. Public Cloud

- Hosted by third-party providers (e.g., AWS, Azure, GCP).
- Resources are shared among multiple users (multi-tenant).
- Cost-effective and scalable.

- Example: Gmail, Dropbox, Amazon EC2.

2. Private Cloud

- Used exclusively by a single organization.
- Can be hosted on-premises or by a third-party.
- Offers more control, security, and customization.
- Example: A bank running its own private cloud for data security.

3. Hybrid Cloud

- Combination of public and private clouds.
- Allows data and apps to move between environments.
- Provides flexibility and scalability.
- Example: Store sensitive data in a private cloud, use public cloud for workloads.

4. Community Cloud

- Shared among a specific community of users with common concerns (e.g., security, policy, compliance).
- Can be managed internally or by a third-party.
- Example: Universities sharing resources on a community cloud.



➤ Types of Cloud Services (Service Models)

1. IaaS (Infrastructure as a Service)

- Provides virtualized **computing resources** over the internet.
- You manage OS, storage, applications; provider manages hardware.
- Example: Amazon EC2, Microsoft Azure VM.

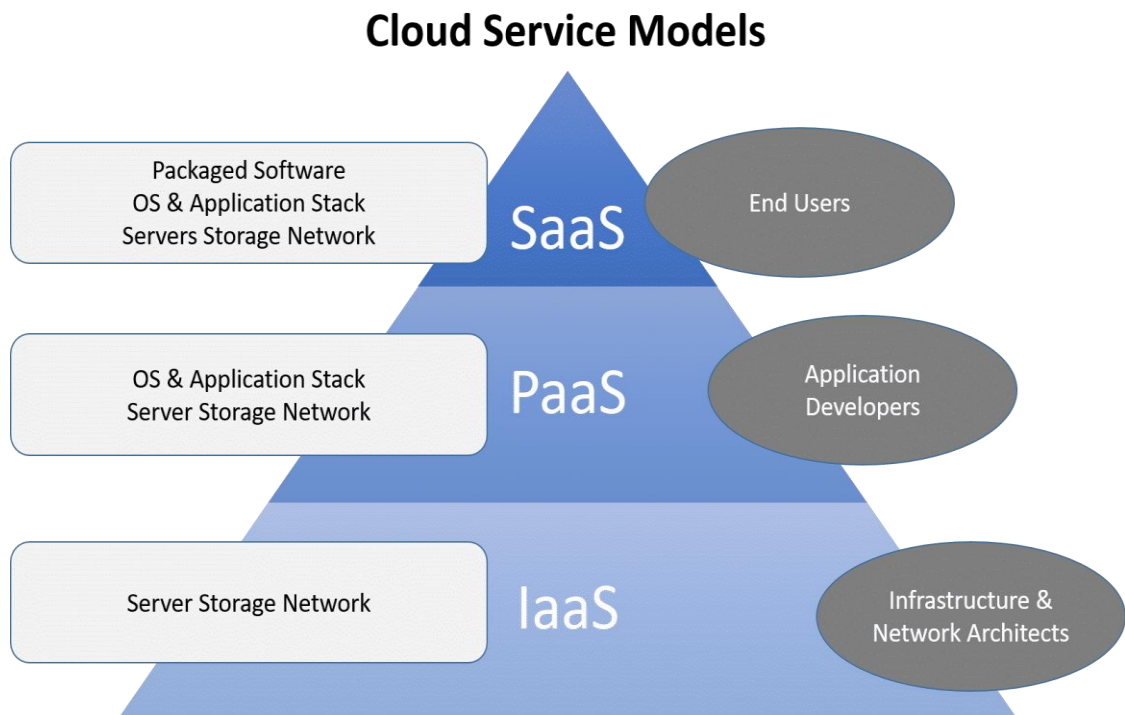
2. PaaS (Platform as a Service)

- Provides a platform to develop, run, and manage applications.
- You manage applications; provider manages OS, hardware, runtime.

- Example: Google App Engine, Heroku.

3. SaaS (Software as a Service)

- Provides fully functional applications over the internet.
- Everything is managed by the provider.
- Example: Google Workspace, Salesforce, Microsoft 365.



➤ Characteristics of Cloud Computing

1. On-Demand Self-Service

- Users can automatically provision computing resources (e.g., storage, servers) without human intervention.
- Example: Launching a virtual machine on AWS.

2. Broad Network Access

- Services are accessible over the **internet or private networks** via standard devices (laptops, smartphones, tablets).
- Supports **remote access** from anywhere.

3. Resource Pooling

- Resources are **shared among multiple users** (multi-tenancy).
- The provider dynamically assigns resources based on demand.
- Example: A single server hosting multiple users' data.

4. Rapid Elasticity

- Resources can be **scaled up or down quickly** according to demand.
- Appears unlimited to the user and is automatically adjusted.
- Example: Auto-scaling during peak website traffic.

5. Measured Service

- Cloud usage is **monitored, controlled, and reported**.
- Users are **billed based on consumption** (pay-as-you-go).
- Example: Paying for 100 GB storage per month on Google Cloud.

6. High Availability & Reliability

- Cloud services are designed for **fault tolerance** and **minimal downtime**.
- Data is often replicated across multiple servers/locations.

7. Security

- Built-in features like **encryption, firewalls, identity management**, and compliance standards.
- Providers follow **security best practices** to protect user data.

8. Automation

- Many processes (like backups, updates, scaling) are **automated**, reducing manual work and human error.

➤ Benefits of Cloud Computing

- Cost-Effective – No upfront hardware/software purchase.
- Scalable & Flexible – Scale resources on demand.
- Accessibility – Access services from anywhere, anytime.
- Automatic Updates – No manual effort for patching/upgrading.

- Disaster Recovery – Built-in backup and recovery systems.
- Performance – Uses high-end servers with global distribution.
- Environmentally Friendly – Efficient use of resources.

➤ **Disadvantages of Cloud Computing**

1. Internet Dependency – No access without a stable connection.
2. Security Concerns – Shared environment may pose risks.
3. Limited Control – Provider manages the infrastructure.
4. Compliance Issues – Sensitive data may not meet all regulations.
5. Downtime Risks – Outages from the provider affect availability.

➤ **Cloud Computing vs On-Premise**

Feature	Cloud Computing	On-Premise
Deployment	Hosted by third-party providers (AWS, Azure)	Hosted locally within your organization
Cost	Pay-as-you-go (OPEX)	High upfront cost (CAPEX)
Maintenance	Maintained by cloud provider	Maintained by in-house IT team
Scalability	Easily scalable (auto/manual)	Limited and often expensive to scale
Accessibility	Accessible via internet from anywhere	Only within organization's network
Security	Shared responsibility (provider + user)	Full control over data security
Setup Time	Quick setup and deployment	Takes longer to install and configure
Backup/Recovery	Automated and integrated	Manual or separate backup systems required

➤ **What are AWS?**

AWS (Amazon Web Services) is a cloud computing platform offered by Amazon, providing a wide range of on-demand services such as computing power, storage, databases, networking, machine learning, and more — all over the internet.

1. **AWS Region** - A Region is a **geographical area** where AWS has multiple data centres. Each region is isolated from others for data residency, compliance, and latency optimization.

2. **Availability Zone (AZ)** - An Availability Zone is **one or more data centres** within a region. Each region has at least 2–6 AZs.

➤ 3 Ways to Interact with AWS

You can interact with AWS services in the following three main ways:

1. AWS Management Console

- A web-based UI.
- Ideal for beginners and visual users.
- Allows you to manage services like EC2, S3, IAM, etc.
- URL: <https://console.aws.amazon.com>

2. AWS CLI (Command Line Interface)

- Tool to interact via terminal or command prompt.
- Suitable for automation and scripting.

3. AWS SDKs (Software Development Kits)

- Used to interact with AWS programmatically using programming languages.
- Available for languages like Python (Boto3), Java, JavaScript, .NET, Go, etc.

➤ AWS Well-Architected Framework



