

1. Introduction to Cloud Computing

1.1 What Is Cloud Computing?

Cloud computing means delivering computing services—like servers, storage, databases, networking, software, and analytics—over the internet (“the cloud”) instead of using local computers or on-premise hardware.

It’s like *renting* computer power and storage from someone else’s data center, and accessing it online whenever you need it.

- **On-demand access:** Use resources when you need them.
- **Scalability:** Easily increase or decrease capacity.
- **Pay-as-you-go:** You only pay for what you use.
- **Remote access:** Use it from anywhere with an internet connection.

1.2 Characteristics

1. On-Demand Self-Service

Users can access computing resources (like storage or processing power) whenever they need them, without needing human assistance.

2. Broad Network Access

Services are available over the internet and can be accessed from various devices—laptops, phones, tablets, etc.

3. Resource Pooling

Cloud providers use shared resources to serve many customers at the same time, with resources dynamically assigned as needed.

4. Rapid Elasticity & Scalability

Resources can be quickly increased or decreased based on demand—almost instantly.

5. Measured Service (Pay-as-You-Go)

Users pay only for what they use. The cloud automatically tracks usage like storage, processing, or bandwidth.

6. Reliability & High Availability

Cloud data centers offer backup systems, ensuring services are available with minimal downtime.

7. Security

Cloud providers implement advanced security measures like encryption, firewalls, and identity management.

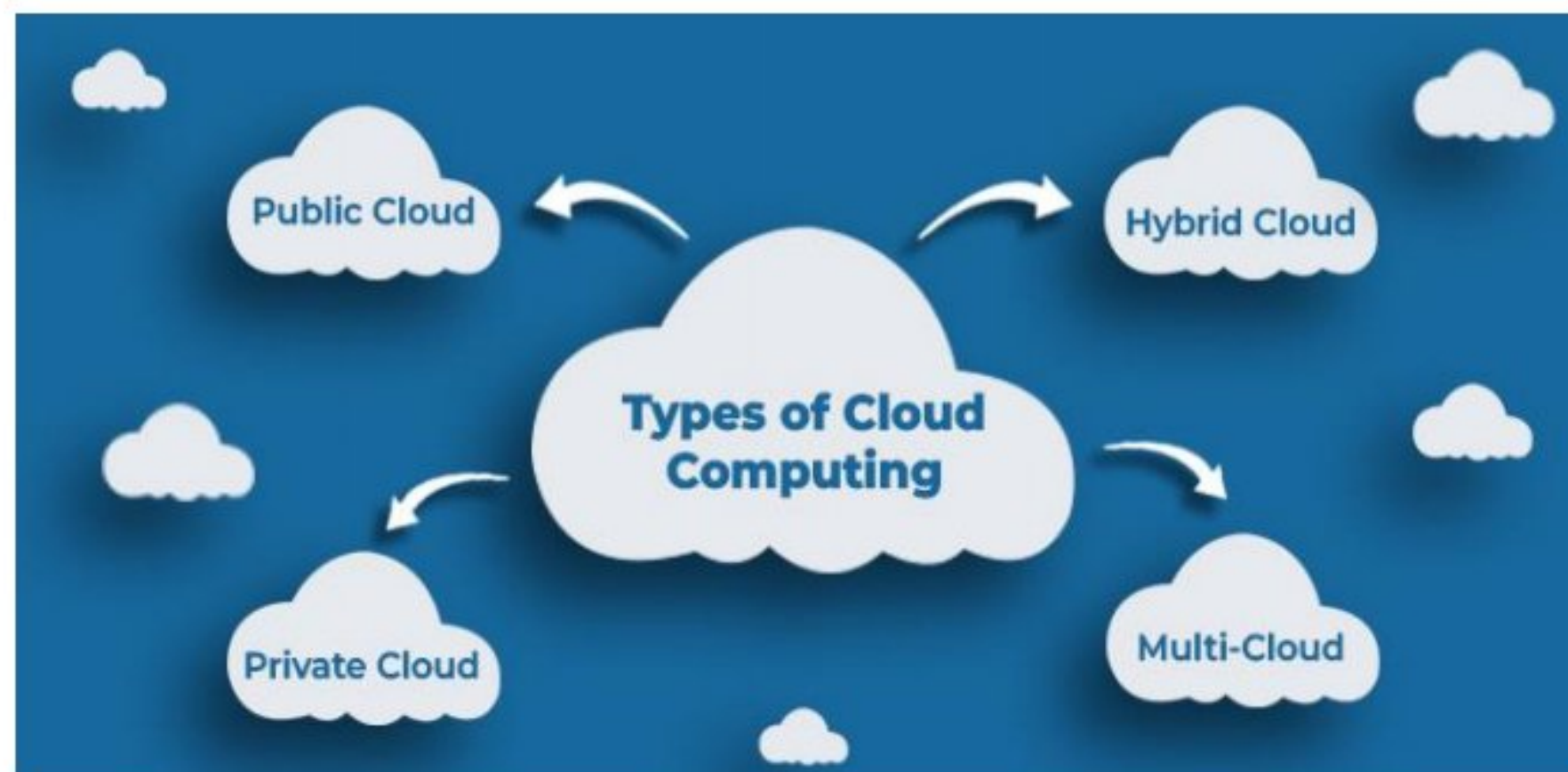
8. Automation

Many cloud operations (provisioning, scaling, monitoring) are automated, reducing manual work.

Service Providers

- Google Cloud
- AWS (Amazon Web Services)
- Microsoft Azure
- IBM Cloud
- Alibaba Cloud

1.3 Types of Clouds



1. Public Cloud

Services are available to everyone on the internet.
Examples: AWS, Google Cloud, Azure.

2. Private Cloud

Used by a single organization for higher security and control.
Example: A company's internal cloud server.

3. Hybrid Cloud

A mix of public + private cloud.
It offers flexibility (public) and security (private).

4. Community Cloud

Shared by a group of organizations with similar needs.
Example: Government departments sharing a common cloud.

2. Cloud Service Models.

Cloud computing offers different service models that define how much control the user has and what type of resources are provided. The three main service models are Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).

2.1 Infrastructure as a Service (IaaS)

Meaning:

Infrastructure as a Service provides virtualized computing resources over the internet. It includes servers, storage, networking, and virtualization. Users can install their own operating systems and applications. It is similar to renting computer hardware instead of purchasing it.

Key Features:

- Virtual machines
- Storage and backup
- Networking resources
- High flexibility and customization

Purpose:

Used by companies to avoid buying and maintaining physical hardware.

Examples:

AWS EC2, Google Compute Engine, Microsoft Azure Virtual Machines

Advantages:

- Pay only for the resources used
- Full control over operating systems and applications
- Highly scalable and flexible
- Reduces hardware maintenance cost

2.2. Platform as a Service (PaaS)

Meaning:

Platform as a Service provides a complete platform for developers. It includes an operating system, programming environment, development tools, databases, and web servers. Developers can build, test, and deploy applications without managing hardware or infrastructure.

Key Features:

- Development frameworks and tools
- Database management
- Automatic scaling
- Pre-configured environments

Purpose:

Used to simplify and speed up the application development process.

Prepared by – Priyanka Patel, Ankit Yadav

Examples:

Google App Engine, Microsoft Azure App Services, AWS Elastic Beanstalk

Advantages:

- Faster development
- No need to manage servers or OS
- Easy testing, deployment, and updates
- Supports team collaboration

2.3. Software as a Service (SaaS)

Meaning:

Software as a Service provides ready-to-use software applications over the internet. Users simply log in through a browser or mobile app. The provider manages everything, including updates, security, and servers. No installation is required.

Key Features:

- Accessible through the internet
- Automatic updates and security
- Multi-device access
- Subscription-based usage

Purpose:

Used for email, storage, document creation, CRM, and daily business tasks.

Examples:

Gmail, Google Drive, Microsoft 365, Dropbox, Salesforce

Advantages:

- Easy to use
- No installation or maintenance
- Accessible from anywhere
- Cost-effective