Day 1

"CLOUD SECURITY"

What is Cloud Computing?

Cloud computing is the delivery of computing services—including storage, servers, databases, networking, software, and analytics—over the internet ("the cloud"). It enables on-demand access, scalability, and cost-efficiency, allowing users to access resources anytime, anywhere without owning physical infrastructure. It supports innovation, collaboration, and faster deployment of digital solutions.

Characteristics of Cloud Computing:

1. On-Demand Self-Service – Users can provision resources without human interaction.
2. Broad Network Access – Services are accessible via the internet from any device.
3. Resource Pooling – Resources are shared among multiple users (multi-tenancy).
4. Rapid Elasticity – Resources can scale up/down automatically as needed.
5. Measured Service – Usage is monitored, controlled, and billed based on consumption.
6. High Availability – Ensures continuous access with minimal downtime.
7. Scalability – Easily adjusts to workload changes.
8. Security – Includes built-in data protection, access control, and compliance features.

Limitations of cloud computing:

1. Security and Privacy Risks – Data stored off-site may face unauthorized access or breaches.
2. Downtime and Reliability – Service outages or disruptions can affect availability.
3. Limited Control – Users have less control over infrastructure and updates.
4. Vendor Lock-In – Difficult to switch providers due to compatibility or migration issues.
5. Internet Dependency – Requires stable, high-speed internet for access.
6. Hidden Costs – Unexpected costs can arise from bandwidth, storage, or scaling.
7. Compliance Issues – Meeting regulatory and data residency requirements can be complex.

Types of Cloud Services Model:

Feature	IaaS (Infrastructure as a Service)	PaaS (Platform as a Service)	SaaS (Software as a Service)
User Controls	OS, storage, applications	Applications, data	Only application usage
Managed by Provider	Hardware, networking	Hardware, OS, runtime, middleware	Everything (hardware, platform, app)
Flexibility	Highly flexible	Moderate flexibility	Least flexible
Use Case	Hosting virtual machines, storage	App development, testing	Email, CRM, collaboration tools
Examples	AWS EC2, Microsoft Azure VM	Google App Engine, Heroku	Google Workspace, Dropbox, Salesforce

Feature	IaaS (Infrastructure as a Service)	PaaS (Platform as a Service)	SaaS (Software as a Service)
Target Users	System admins, IT teams	Developers	End users
Cost Model	Pay-per-use (compute, storage)	Pay-per-use (platform, tools)	Subscription-based

Types of Cloud Deployment Models:

1. **Public Cloud**
   Public cloud services are provided by third-party vendors over the internet and shared among multiple users. It is cost-effective, scalable, and requires no infrastructure management by the user.
2. **Private Cloud**
   A private cloud is dedicated to a single organization, offering more control and security. It can be hosted on-premise or by a third-party provider, tailored to specific business needs.
3. **Community Cloud**
   Community cloud is shared by several organizations with common concerns (e.g., compliance, security). It is collaborative but more restricted than public clouds.
4. **Hybrid Cloud**
   Hybrid cloud combines two or more clouds (private, public, or community). It enables flexibility, allowing data and applications to move between environments.

Feature	Public Cloud	Private Cloud	Community Cloud	Hybrid Cloud
Ownership	Cloud provider	Single organization	Multiple similar orgs	Mixed (public + private)
Security	Moderate	High	Moderate to high	Variable, based on components
Cost	Low (shared resources)	High (dedicated setup)	Shared costs	Moderate
Customization	Limited	High	Moderate	High
Scalability	High	Moderate	Moderate	High
Use Case	Startups, testing	Banks, gov agencies	Research groups, consortia	Enterprises needing flexibility