🌥️ Lecture 30 – Cloud Service Types

Cloud computing provides three major service models:

👉 **SaaS** – Software as a Service
👉 **IaaS** – Infrastructure as a Service
👉 **PaaS** – Platform as a Service

Each service model defines **who manages what** between the **cloud provider** and **user**.

Here is the full detailed explanation:

☁️ 1. Software as a Service (SaaS)

✔️ Definition

SaaS allows users to **access complete software applications** over the internet **without installing or managing anything** on their devices.

The cloud provider manages **everything**, including:

- Application
- Data
- Runtime
- Middleware
- Operating System
- Virtualization
- Servers
- Storage
- Networking

Users just **open the software and use it**.

✔ **Examples**

- **Google Drive**
- **Microsoft Teams**
- **WordPress**
- **Gmail**
- **Salesforce CRM**
- **ServiceNow ITSM**
- **Zoho ERP**

These apps run **directly from the cloud**.

✔ **Who Uses SaaS?**

- **End users**: employees, students, customers
  No technical setup is required.

✔ **Why SaaS?**

- No installation needed
- No updates required (cloud handles everything)
- Accessible from anywhere
- Cost effective (subscription-based)
- High availability

✔ **SaaS Responsibility Model**

Cloud manages everything ↓

[User]

|

|--- Uses the application only

Cloud Manages:

Application

Data

Runtime

Middleware

Operating System

Virtualization

Servers

Storage

Networking

🖥️ **2. Infrastructure as a Service (IaaS)**

✔ **Definition**

IaaS provides the **infrastructure** needed to run IT systems, such as:

- Routers
- Switches
- Firewalls
- Virtual Machines
- Storage
- Networks

- Active Directory
- Web Servers

The cloud provider gives you the **hardware and virtualization**.
You manage the software part.

✔ **Examples**

- Microsoft Azure VM
- AWS EC2
- Google Compute Engine
- DigitalOcean Droplets

✔ **What the User Manages in IaaS?**

You manage:

- Applications
- Data
- Runtime environment
- Middleware
- Operating system

✔ **What Cloud Provider Manages in IaaS?**

Cloud manages:

- Virtualization
- Servers
- Storage
- Networking

✔ Benefits of IaaS

- Saves operational costs
- Saves capital expense (no need to buy physical servers)
- Scalable infrastructure
- Quick provisioning of VMs
- Ideal for IT admins, system engineers

✔ IaaS Responsibility Model

User Manages:

Application

Data

Runtime

Middleware

Operating System

Cloud Manages:

Virtualization

Servers

Storage

Networking

👷 3. Platform as a Service (PaaS)

✔ Definition

PaaS provides a **complete development platform** for software developers.
It includes tools for:

- Coding
- Testing
- Deploying
- Debugging
- Database management

No need to manage operating systems or hardware.

✔ Who uses PaaS?

- **Software developers**
- **DevOps engineers**

✔ Examples

- Azure App Service
- Google App Engine
- AWS Elastic Beanstalk
- Heroku
- Firebase

✔ What User Manages in PaaS?

User manages only:

- Application code
- Application data

✔ What Cloud Manages in PaaS?

Cloud manages:

- Runtime environment
- Middleware
- Operating systems
- Virtualization
- Servers
- Storage
- Networking

✔ Why PaaS?

- Faster development
- No hardware needed
- Automatic OS updates
- Built-in scalability
- Easy deployment

✔ PaaS Responsibility Model

User Manages:

Application

Data

Cloud Manages:

Runtime

Middleware

Operating System

Virtualization

Servers

Storage

Networking

🔥 **Clear Comparison Table (SaaS vs PaaS vs IaaS)**

Feature	SaaS	PaaS	IaaS
Manages Application	Cloud	User	User
Manages OS	Cloud	Cloud	User
Manages Servers	Cloud	Cloud	Cloud
Best For	End users	Developers	System admins
Examples	Gmail, Teams	Heroku, App Engine	Azure VM, AWS EC2
Control Level	Low	Medium	High
Cost	Low	Medium	Depends on usage

🧠 **Easy Way to Remember**

- **SaaS** → "Ready-made software" (Use it directly)
- **PaaS** → "Platform for developers" (Build apps)
- **IaaS** → "Raw infrastructure" (Full control, install your OS)

✔️ **Summary**

- SaaS = cloud-managed software
- PaaS = cloud-managed platform
- IaaS = cloud-managed hardware

Each model depends on **how much control** and **responsibility** the user wants.