

Introduction to Cloud Computing

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Quick-reference guide for students, professionals, and anyone new to the cloud.

1. What Is Cloud Computing?

Aspect	Definition
Core idea	Deliver computing resources (servers, storage, databases, networking, software, analytics, AI) over the Internet on a pay-as-you-go basis.
Key benefit	Users can access powerful IT capabilities without owning or managing physical hardware .
Analogy	Like electricity: you plug in a device and pay for the kilowatt-hours you consume, rather than building your own power plant.

2. Service Models (What You Consume)

Model	What It Provides	Typical Use Cases
IaaS – Infrastructure as a Service	Virtualized compute, storage, and networking (e.g., VMs, block storage, load balancers).	Run custom OSes, legacy apps, large data-processing clusters.
PaaS – Platform as a Service	Runtime environment, middleware, development tools, managed databases.	Build, test, and deploy web/mobile apps without worrying about OS patches or scaling.
SaaS – Software as a Service	Fully functional applications delivered via a web browser or API.	Email (Gmail), CRM (Salesforce), collaboration (Microsoft 365), analytics dashboards.
FaaS / Serverless (often grouped under PaaS)	Event-driven functions that run only when triggered.	Microservices, data pipelines, IoT processing.

3. Deployment Models (Where You Run It)

Model	Description	When to Choose
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Public Cloud	Resources owned and operated by a third-party provider; shared among many customers.	Start-ups, variable workloads, need for rapid scaling.
Private Cloud	Dedicated infrastructure (on-premises or hosted) for a single organization.	Strict regulatory/compliance requirements, legacy workloads.
Hybrid Cloud	Combination of public and private clouds with orchestration between them.	Burst workloads to public cloud, keep sensitive data on-premises.
Multi-Cloud	Use of two or more public cloud providers simultaneously.	Avoid vendor lock-in, leverage best-of-breed services (e.g., AI from one, storage from another).

4. Core Characteristics (Why It Works)

Characteristic	Explanation
On-Demand Self-Service	Users can provision resources via a portal or API instantly.
Broad Network Access	Access from any device with Internet connectivity (laptops, smartphones, IoT).
Resource Pooling	Multi-tenant architecture; physical resources are abstracted and shared.
Rapid Elasticity	Scale out/in automatically based on demand; resources appear limitless.
Measured Service	Usage is monitored, billed, and reported (CPU hours, GB-months, API calls).

5. Major Cloud Providers (Quick Overview)

Provider	Notable Services	Unique Strength
Amazon Web Services (AWS)	EC2, S3, Lambda, RDS, SageMaker	Largest ecosystem, deep service breadth.
Microsoft Azure	Virtual Machines, Azure SQL, Functions, Azure AI	Strong integration with Windows/Office, hybrid tools (Azure Arc).

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Google Cloud Platform (GCP)	Compute Engine, Cloud Storage, BigQuery, Vertex AI	Advanced data