

Introduction to Cloud Computing

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Quick reference guide – concise, organized, and easy to read.

1. What Is Cloud Computing?

Definition	Key Idea
Delivery of computing resources (servers, storage, databases, networking, software, analytics, AI) over the Internet (“the cloud”) on a pay-as-you-go basis.	Users access services on demand without owning or managing the underlying hardware.

2. Core Characteristics (NIST Model)

Characteristic	What It Means	Example
On-Demand Self-Service	Users can provision resources automatically, without human interaction.	Spin up a virtual machine via a web portal.
Broad Network Access	Services are reachable over standard networks (Internet, mobile, LAN).	Access a cloud-hosted database from a laptop or smartphone.
Resource Pooling	Multi-tenant model; physical resources are shared and dynamically allocated.	Multiple customers run workloads on the same physical server cluster.
Rapid Elasticity	Resources scale out/in quickly to match workload fluctuations.	Auto-scale a web app from 2 to 200 instances during a sale.
Measured Service	Usage is monitored, controlled, and billed automatically.	Billing per GB of storage used per month.

3. Service Models

Model	Description	Typical Offerings	Who Uses It?
IaaS (Infrastructure as a Service)	Raw compute, storage, networking.	VMs, block storage, load balancers, virtual networks.	Sysadmins, developers needing full control of OS & runtime.

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Model	Description	Typical Offerings	Who Uses It?
PaaS (Platform as a Service)	Managed runtime environment & development tools.	Managed databases, app hosting, serverless functions, CI/CD pipelines.	Developers focusing on code, not infrastructure.
SaaS (Software as a Service)	Fully functional applications delivered over the web.	Email (e.g., Gmail), CRM (Salesforce), collaboration (Office 365).	End-users who need ready-to-use software.
FaaS (Function as a Service) – a subset of serverless	Executes single functions in response to events.	AWS Lambda, Azure Functions, Google Cloud Functions.	Event-driven workloads, micro-services, rapid prototyping.

4. Deployment Models

Model	Ownership	Accessibility	Typical Use Cases
Public Cloud	Provider owns & operates the infrastructure.	Open to anyone (pay-per-use).	Start-ups, variable workloads, cost-sensitive projects.
Private Cloud	Single organization owns or leases dedicated resources.	Restricted to the organization.	Regulated industries, legacy migration, strict security/compliance.
Hybrid Cloud	Combination of public & private, linked for data & app portability.	Both internal and external users.	Burst to public cloud during peaks, keep sensitive data on-prem.
Community Cloud	Shared by several organizations with common concerns (e.g., government).	Access limited to the community members.	Joint research projects, industry consortia.

5. Major Cloud Providers (2024)

Provider	Core Strengths	Notable Services
Amazon Web Services (AWS)	Largest ecosystem, breadth of services.	EC2, S3, RDS, Lambda, SageMaker.

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Provider

Core Strengths

Notable Services

Microsoft Azure

Strong integration