Cloud Computing

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Cloud Computing

Cloud computing is the delivery of computing services (like storage, processing power, and applications) over the internet. Instead of using local servers or personal devices, you access and store data on remote servers.

Key Services:

Storage: Services like Google Drive and Dropbox.

Databases: Managed services like Amazon RDS and S3 bucket.

Networking: Virtual networks provided by cloud services.

Software Applications: Tools like Google Workspace and Microsoft Office 365.

Analytics: Big data tools like AWS Redshift and Google BigQuery.

History of Cloud Computing

1960s: Conceptual Beginnings

1960s: The concept of "utility computing" was introduced by J.C.R. Licklider, who envisioned a future where computing resources and applications could be ==accessed from anywhere==. This idea was a precursor to cloud computing.

John McCarthy, a computer scientist, envisioned in 1960 that computing could be provided as a ==public utility,== similar to electricity. This idea laid the foundation for modern cloud computing, where resources are shared and users ==pay based on usage.==

1970s: Virtualization

1970s: IBM developed virtual machines, which allowed multiple operating systems to run on a single physical machine. This technology laid the groundwork for the virtualization essential to cloud computing.

1990s: The Internet Era

1990s: The rise of the internet and the development of Virtual Private Networks (VPNs) allowed for secure data transfer over public networks. Salesforce launched its Software as a Service (SaaS) product in 1999, marking the beginning of cloud-based software applications.

History of Cloud Computing

2000s: Emergence of Cloud Services

2000s: Amazon Web Services (AWS) launched in 2006, offering cloud storage and computing services. This was a significant milestone that demonstrated the potential of cloud computing to deliver scalable and reliable services over the internet.

Late 2000s: Other major tech companies, including Google, Microsoft, and IBM, entered the cloud market, expanding the range of services and capabilities available to businesses and consumers.

2010s: Expansion and Diversification

2010s: Cloud computing became mainstream, with widespread adoption across various industries. The range of services offered by cloud providers expanded to include advanced technologies like machine learning, big data analytics, and Internet of Things (IoT) integration.

Present: Ubiquity and Innovation : Cloud computing is now ubiquitous, with businesses of all sizes leveraging cloud services for various applications, from data storage and processing to software development and deployment. Innovations in cloud technology continue to emerge, including edge computing, serverless computing, and enhanced security measures.

Future Trends : Emerging trends in cloud computing include the growth of edge computing (processing data closer to the source), serverless computing (running code without provisioning servers e g: AWS Lamda), and the increasing adoption of artificial intelligence (AI) and machine learning (ML) in the cloud. The cloud's role in supporting digital transformation and enabling new business models is expected to continue growing.

Characteristics of Cloud Computing

On-Demand Self-Service: Users can access computing resources as needed without human intervention.

Broad Network Access: Services are accessible from various devices over the internet.

Resource Pooling: Providers pool computing resources to serve multiple customers efficiently.

Rapid Elasticity: Resources can be quickly scaled up or down to meet demand.

Measured Service: Usage is monitored and billed based on actual consumption.

Cloud VS Traditional

Cloud Computing

Cost: Pay-as-you-go model, reducing initial costs.

Scalability: Easily scaled based on demand.

Maintenance: Providers handle maintenance and updates.

Accessibility: Accessible from anywhere with an internet connection.

Disaster Recovery: Offers robust backup and recovery solutions.

Traditional IT

Cost: Requires significant upfront investment in hardware and infrastructure.

Scalability: Scaling requires physical hardware additions, which can be time-consuming.

Maintenance: Requires in-house teams for maintenance.

Accessibility: Often limited to on-premises access.

Disaster Recovery: May require complex and costly disaster recovery setups.
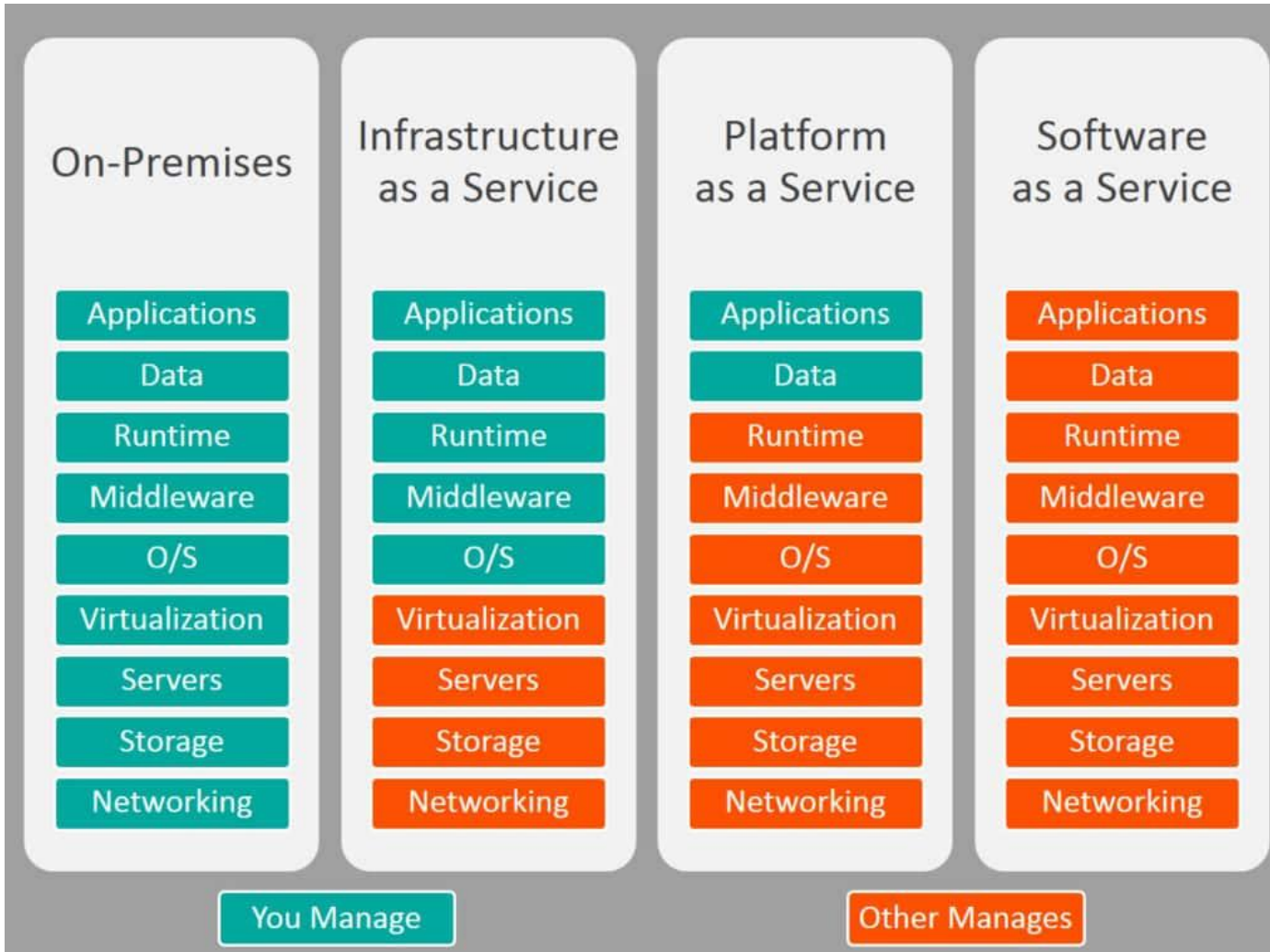
Service Models

Infrastructure as a Service (IaaS): Provides virtualized computing resources like virtual machines and storage over the internet. Examples: Amazon EC2, Google Compute Engine.

Platform as a Service (PaaS): Offers a platform for developing, running, and managing applications without dealing with the underlying infrastructure. Examples: Google App Engine, Microsoft Azure App Service.

Software as a Service (SaaS): Delivers software applications over the internet, typically on a subscription basis. Examples: Google Workspace, Microsoft Office 365.

What Service Models Provides?

Advantage of Cloud Computing

$ **Cost Efficiency**: Pay only for what you use, reducing costs.

Scalability: Easily adjust resources to meet demand.

Flexibility: Access services from anywhere with an internet connection.

Disaster Recovery: Reliable backup and recovery options.

Automatic Updates: Providers handle updates and maintenance.

Disadvantage of Cloud Computing

Security Concerns: Data privacy and security can be a concern when using third-party servers.

Downtime: Internet connectivity issues can disrupt access to services.

Limited Control and Flexibility: Less control over the infrastructure compared to on-premises solutions.

Potential for Over Dependency: Reliance on cloud providers can be challenging if services are disrupted.

Cloud Service Providers

Amazon Web Services (AWS): Offers a wide range of services, known for scalability and reliability.

Microsoft Azure: Provides comprehensive cloud solutions with strong integration with Microsoft products.

Google Cloud Platform (GCP): Focuses on data analytics and machine learning.

IBM Cloud: Offers enterprise-grade services with a focus on AI and blockchain.

Oracle Cloud: Provides cloud solutions with a strong focus on databases.

Use Case of Cloud Computing

Data Storage and Backup: Services like Google Drive and Dropbox.

Web Hosting: Platforms like AWS Elastic Beanstalk and Microsoft Azure App Service.

Big Data Analysis: Tools like AWS Redshift and Google BigQuery.

Disaster Recovery: Cloud-based backup and recovery solutions.

DevOps: Continuous integration and deployment (CI/CD) for software development.