

Introduction to Cloud Computing



What is Cloud Computing?



Definition: Cloud computing is the delivery of computing services over the internet



Services include: servers, storage, databases, networking, software, analytics, and intelligence

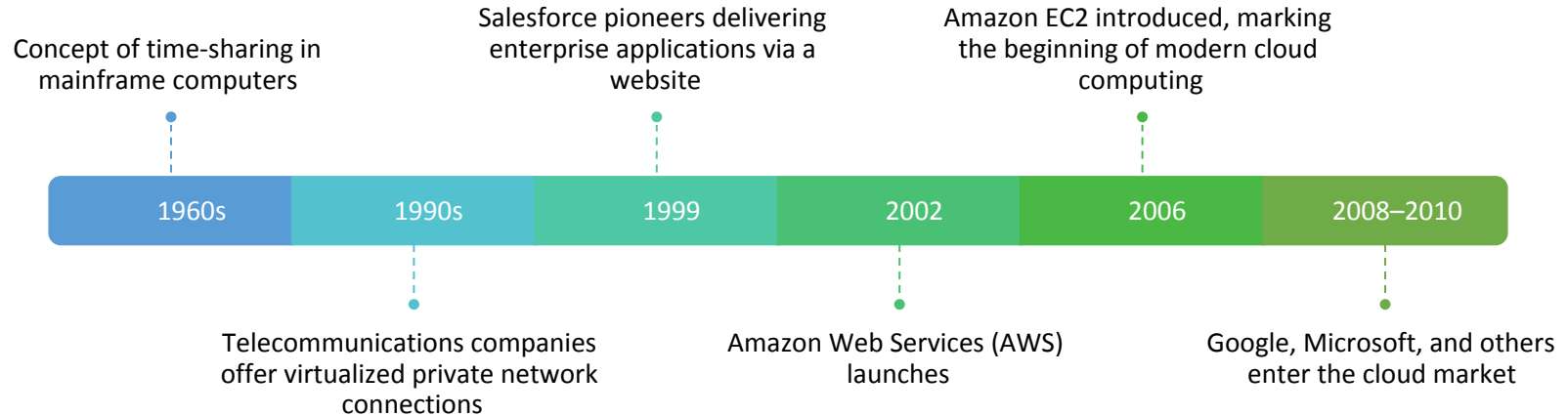


Key characteristic: On-demand availability

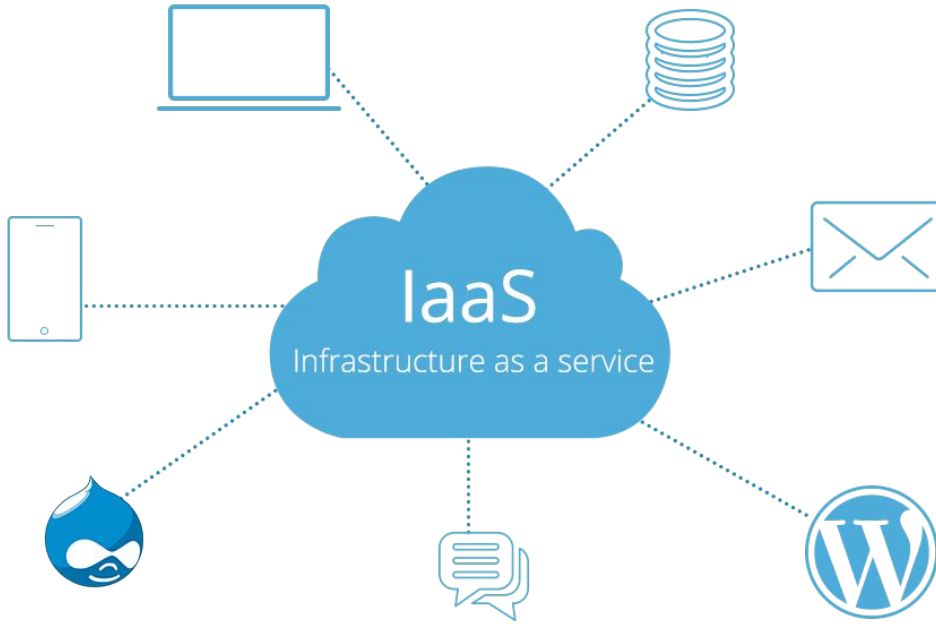


Eliminates the need for owning and maintaining physical data centers and servers

Brief History of Cloud Computing

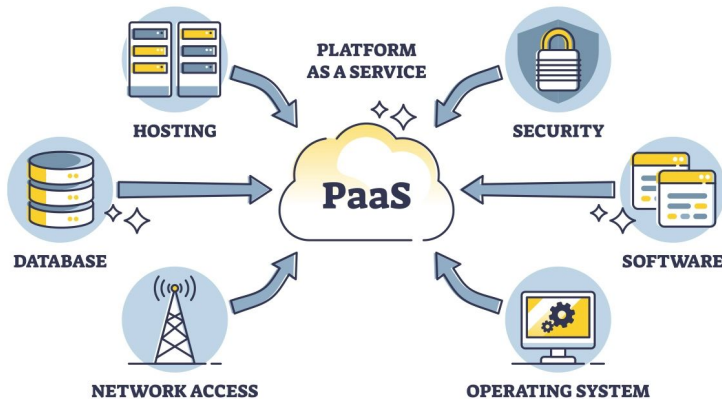


Types of Cloud Computing Services



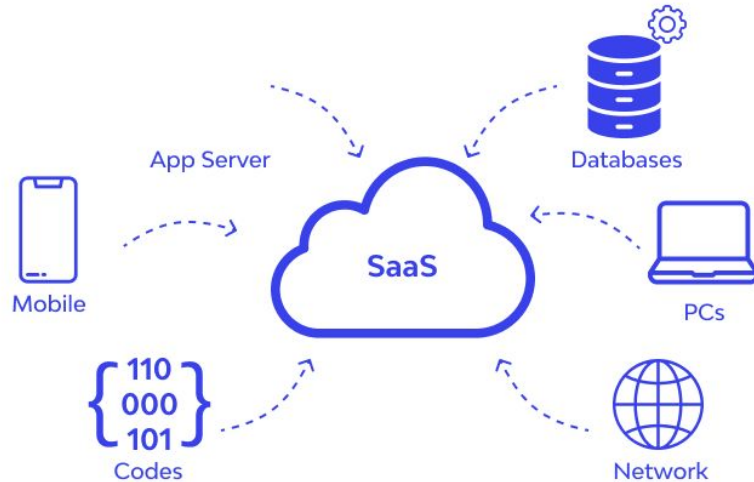
- Infrastructure as a Service (IaaS)
 - Provides virtualized computing resources over the internet
 - Examples: Amazon EC2, Google Compute Engine

Types of Cloud Computing Services



- Platform as a Service (PaaS)
 - Offers hardware and software tools over the internet, typically for application development
 - Examples: Google App Engine, Microsoft Azure

Types of Cloud Computing Services



- Software as a Service (SaaS)
 - Delivers software applications over the internet, on-demand and typically on a subscription basis
 - Examples: Salesforce, Google Workspace, Microsoft 365, gmail, outlook

Cloud Deployment Models

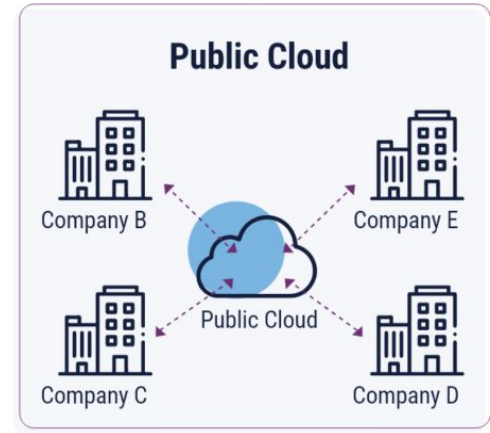
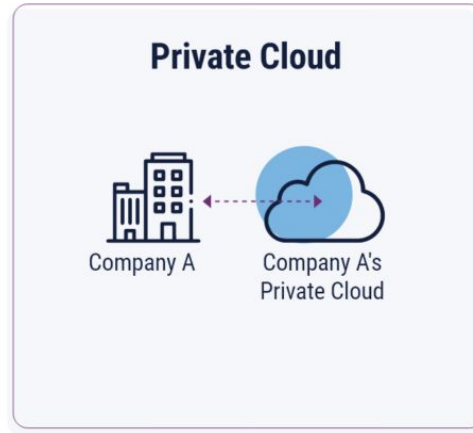
•1. Public Cloud

- Services offered by third-party providers over the public internet
- Available to anyone who wants to use or purchase them

PUBLIC CLOUD



Cloud Deployment Models

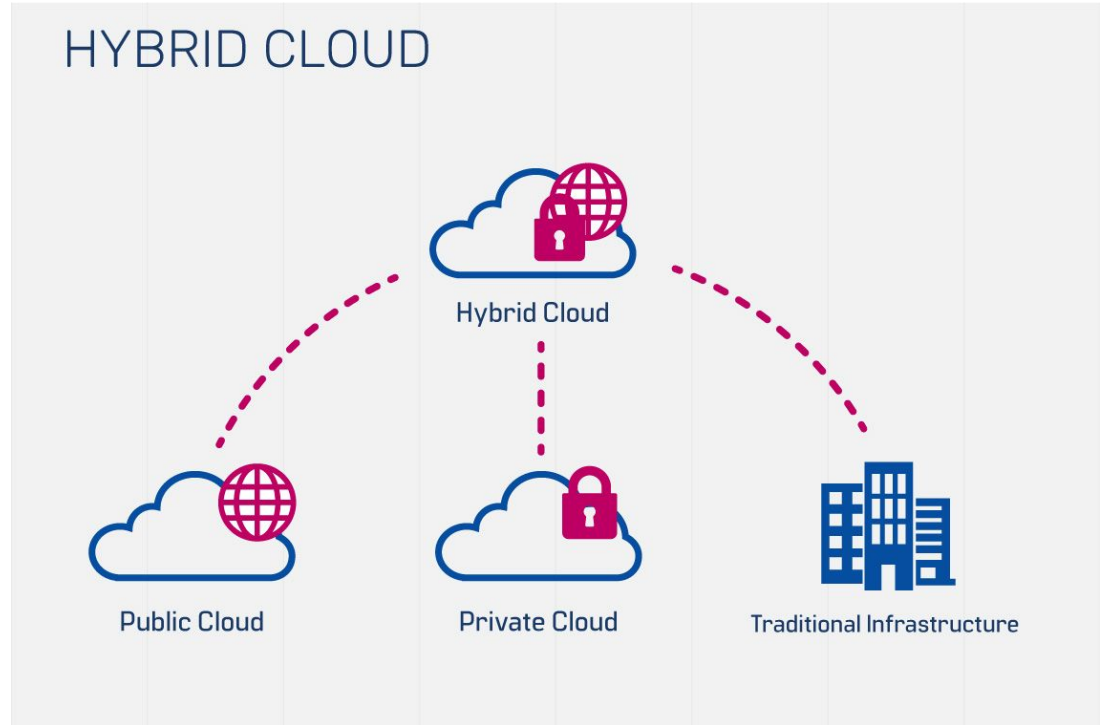


2. Private Cloud

- Cloud computing resources used exclusively by a single business or organization
- Can be physically located at an organization's on-site datacenter or hosted by a third-party service provider

Cloud Deployment Models

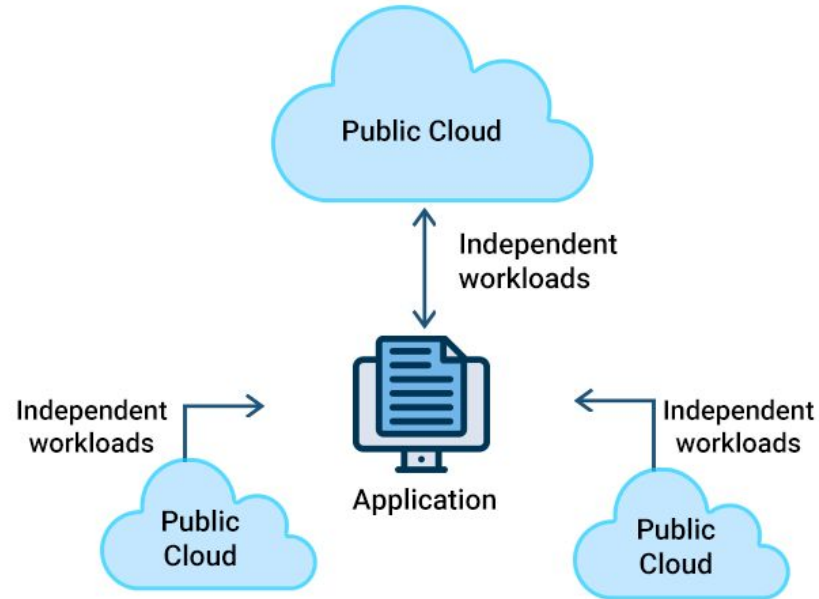
- Hybrid Cloud
 - Combines public and private clouds, allowing data and applications to be shared between them



Cloud Deployment Models

- Multi-Cloud
 - Use of multiple cloud computing and storage services in a single heterogeneous architecture

MULTI-CLOUD



Key Benefits of Cloud Computing



Cost
Efficiency



Flexibility



Performance



Scalability



Reliability



Security

Cost Efficiency



Reduces capital expenditure on hardware and software



Eliminates costs related to on-premises data centers



Pay-as-you-go pricing model



Reduces IT staff and energy consumption costs

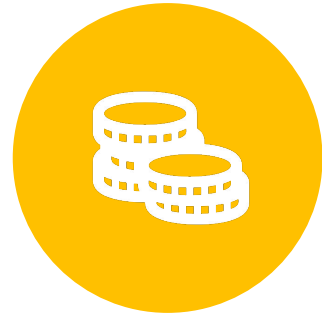
Scalability



EASILY SCALE RESOURCES UP OR
DOWN BASED ON DEMAND



SUPPORTS BUSINESS GROWTH
WITHOUT EXPENSIVE CHANGES
TO EXISTING IT SYSTEMS



PROVIDES THE RIGHT AMOUNT
OF IT RESOURCES WHEN
NEEDED

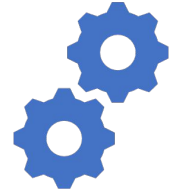
Flexibility



Access cloud services from
anywhere with an internet
connection



Supports remote work and
global operations



Quickly deploy new
applications and services

Reliability



Data backup and disaster recovery made simpler and less expensive



Redundancy across multiple sites ensures business continuity



Most cloud providers offer a 99.99% uptime guarantee

Performance



Regular upgrades to the latest generation of fast and efficient computing hardware



Greater economies of scale translate to improved performance



Reduced network latency for applications

Security



Cloud providers
implement robust
security measures



Data encryption in
transit and at rest



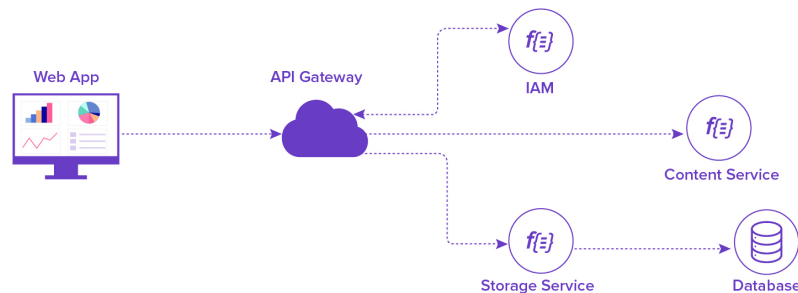
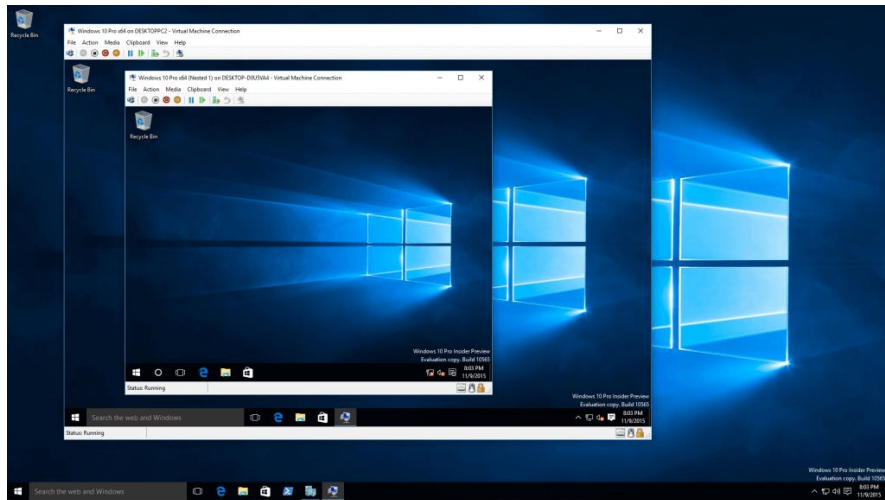
Regular security updates
and patches



Compliance with various
industry standards and
regulations

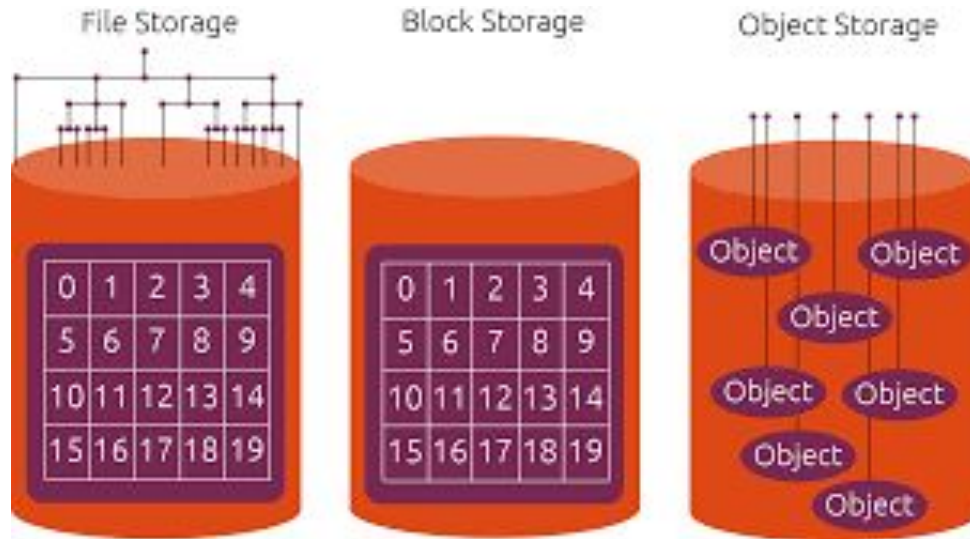
Common Cloud Computing Services

Compute power (virtual machines, serverless computing)



Common Cloud Computing Services

- Storage (object storage, file storage, block storage)



Common Cloud Computing Services



Databases (relational, NoSQL)



Networking (virtual private clouds, content delivery networks)



Analytics and big data processing



Artificial Intelligence and Machine Learning services

Challenges in Cloud Computing

- Data privacy and security concerns
- Compliance with regulations (e.g., GDPR, HIPAA)
- Vendor lock-in
- Network dependency and potential downtime
- Complex pricing models
- Skills gap in cloud technologies



Cloud Computing Use Cases



Web and mobile applications



Data backup and storage



Big data analytics



Internet of Things (IoT)



Test and development environments



Disaster recovery and business continuity

Future Trends in Cloud Computing



Edge computing



Serverless architecture



AI and ML integration



Multi-cloud and hybrid cloud strategies



Quantum computing in the cloud



Enhanced focus on sustainability and green computing

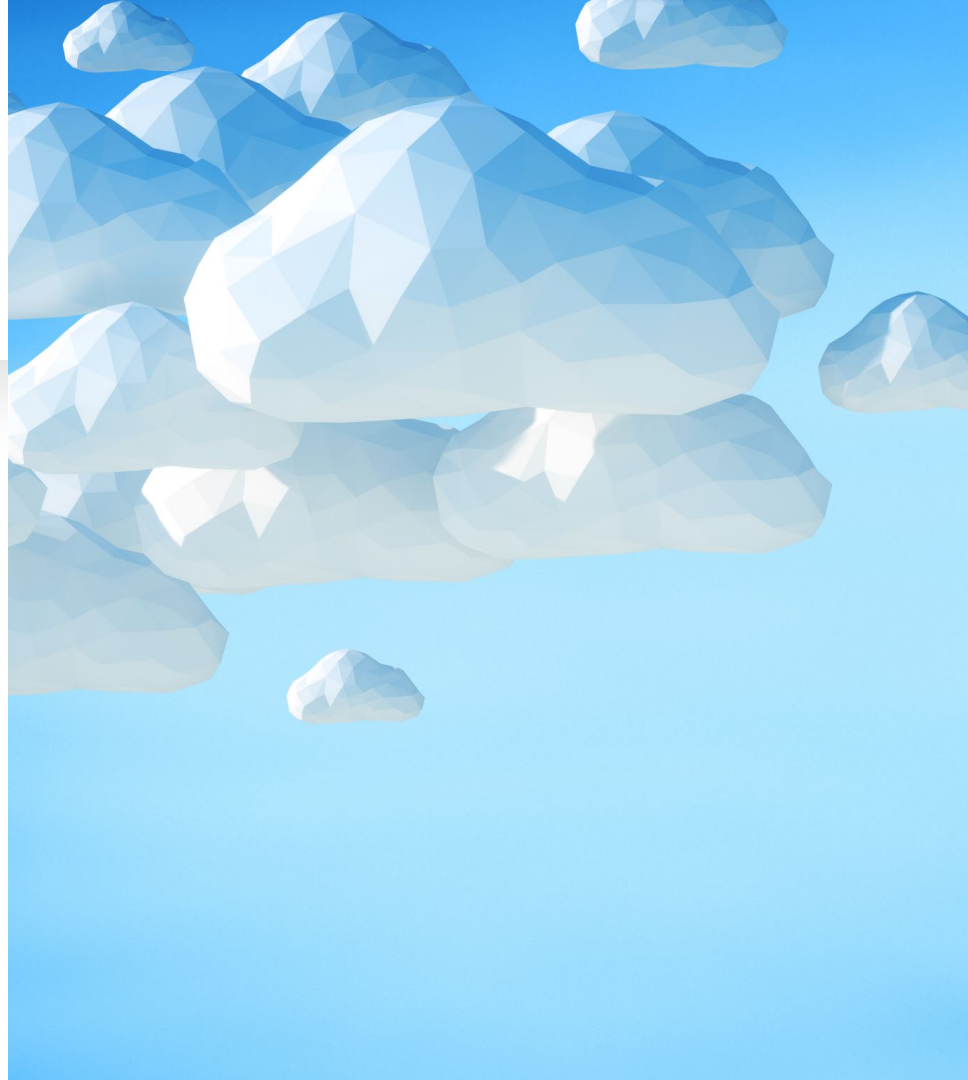
Question 1:

Understanding Cloud Models

- What are the main differences between public, private, and hybrid cloud models? Provide an example use case for each.

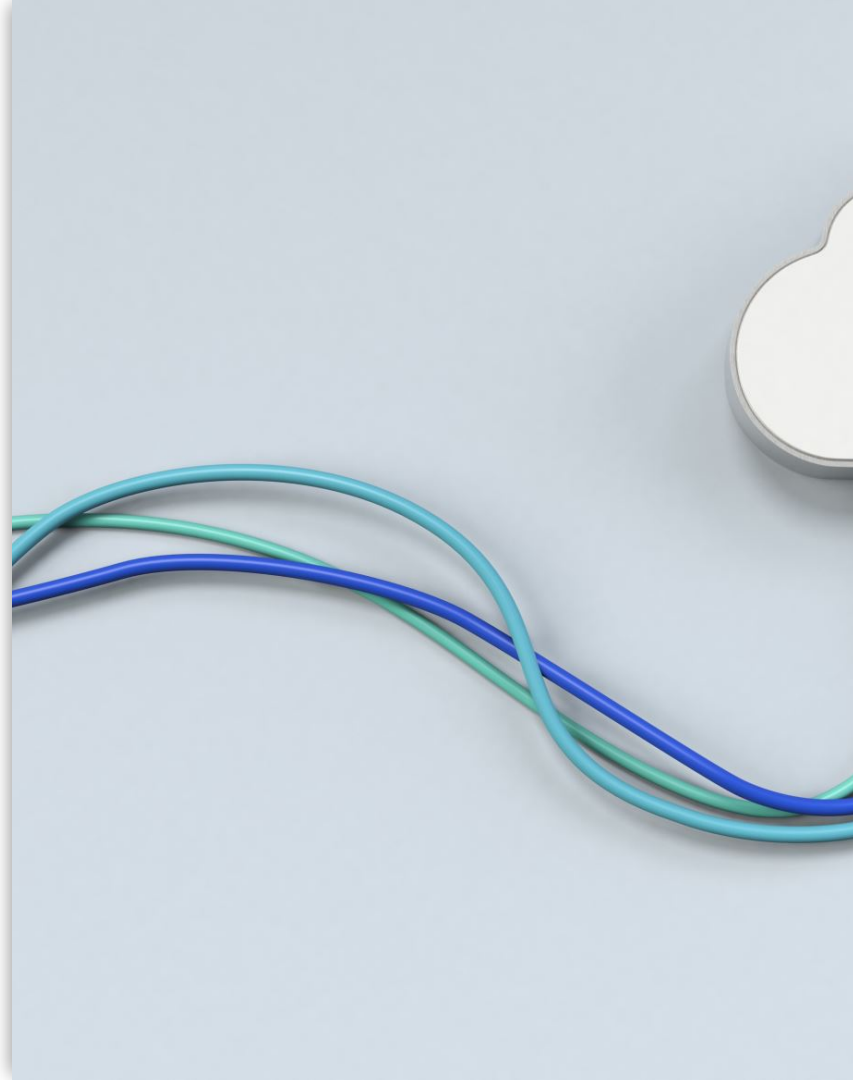
Question 2: Cloud Computing Benefits

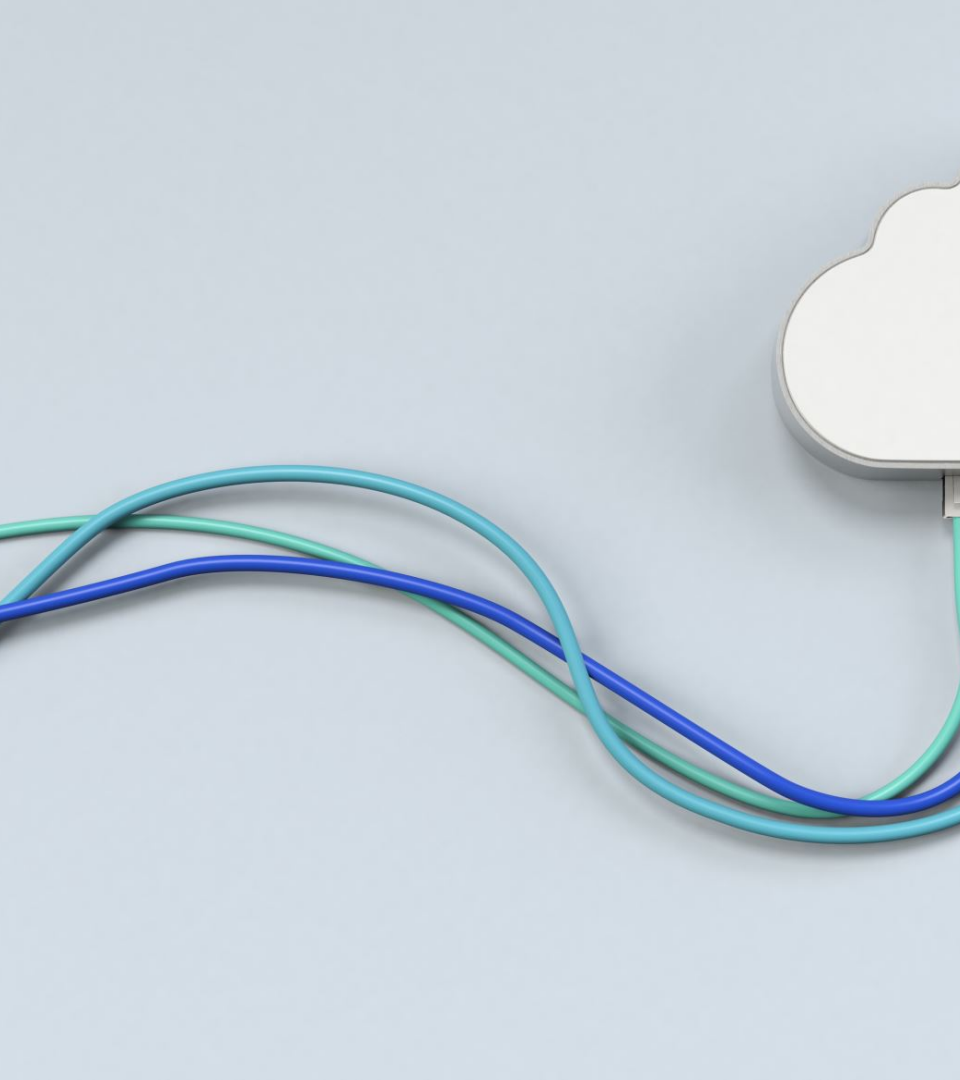
- Identify and explain three key benefits of cloud computing for businesses. How might these benefits vary for small startups versus large enterprises?



Question 3: Cloud Computing Challenges

- Discuss two major challenges organizations face when adopting cloud computing. What strategies can be employed to overcome these challenges?





Class Activity: Cloud Service Provider Comparison

- In groups of 3-4:
 - Choose three major cloud service providers (e.g., AWS, Google Cloud, Microsoft Azure)
 - Compare their offerings for a specific service (e.g., virtual machines, storage, databases)
 - Analyze pricing, features, and ease of use
 - Present findings to the class, recommending a provider for a hypothetical startup