# Cloud Computing

## *A Network Application Analysis*

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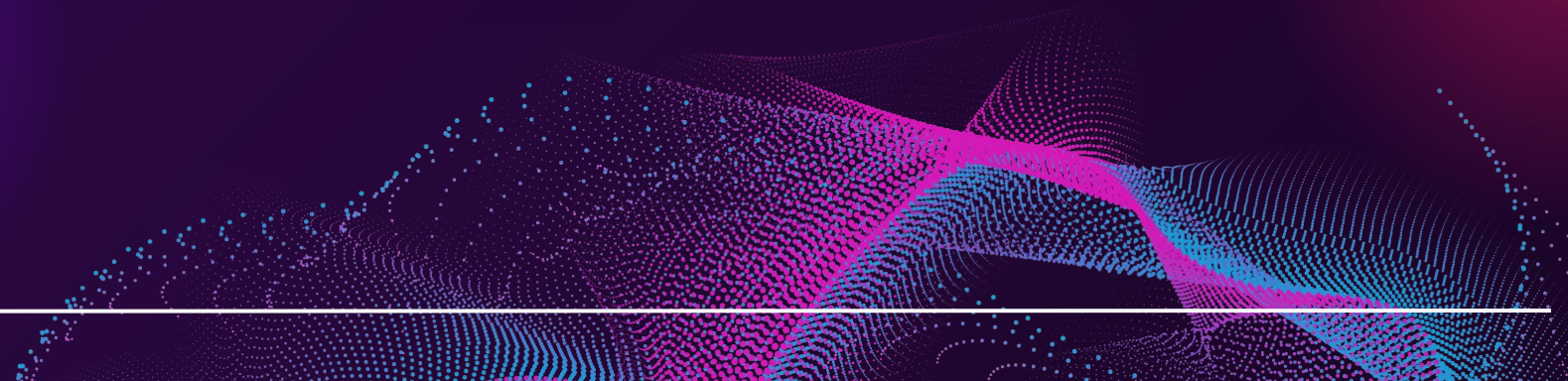
# 01 Introduction to Cloud Computing

Understanding the Basics and Service Models + History

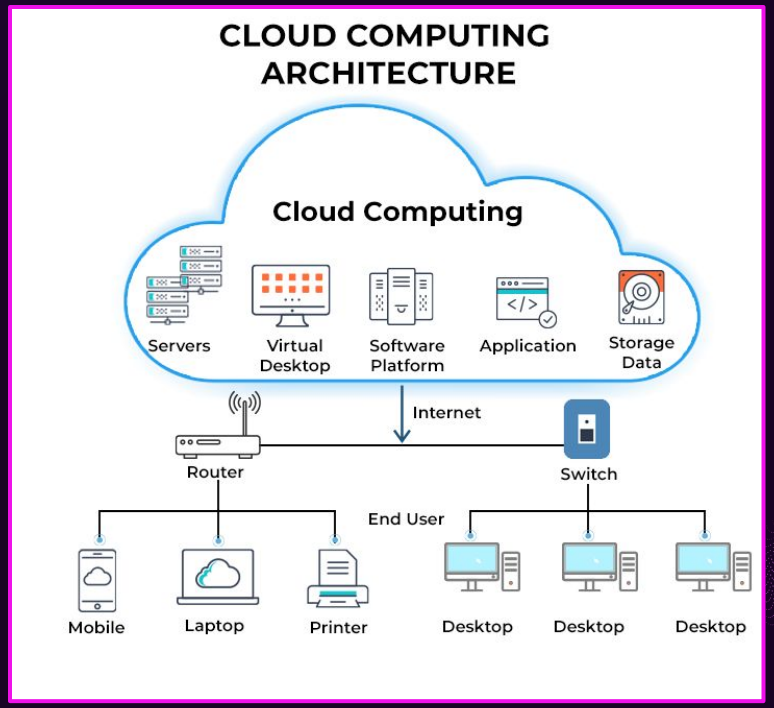


# What is Cloud Computing?

**Cloud computing** is the *delivery of computing services* - servers, storage, databases, networking, software - over the internet (or **“the cloud”**) in order to offer faster innovation, flexible resources, and economies of scale.

Some ***key characteristics*** include:

- On-demand availability
- Scalability
- Resource pooling



# Service Models of Cloud Computing

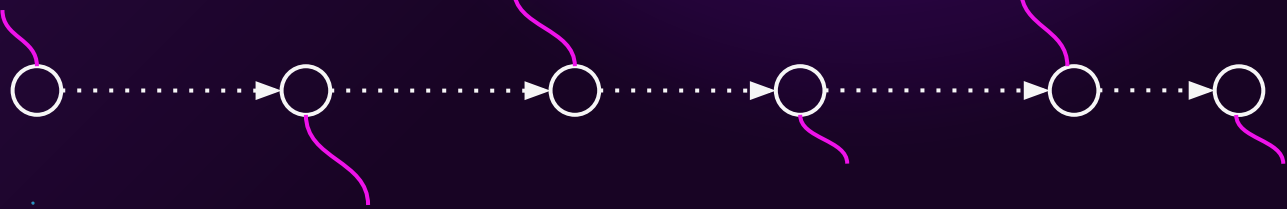
The **primary service models** of Cloud Computing are:

- IaaS (Infrastructure as a Service)
  - Provides virtualized computing resources over the internet
- PaaS (Platform as a Service)
  - Supplies environment for developers to build/deploy applications
- SaaS (Software as a Service)
  - Delivers software applications over internet, usually on subscription basis.



**Some example providers include: Google Cloud Platform, Microsoft Azure, etc.

# History of Cloud Computing



## 1960s

Time-sharing concepts emerged for remote computing resources

## 1970s & 80s

ARPANET and distributed computing developed.

## 1999

Salesforce launched one of the first major SaaS platforms

## 2006

AWS launched, transforming cloud infrastructure

## 2010s

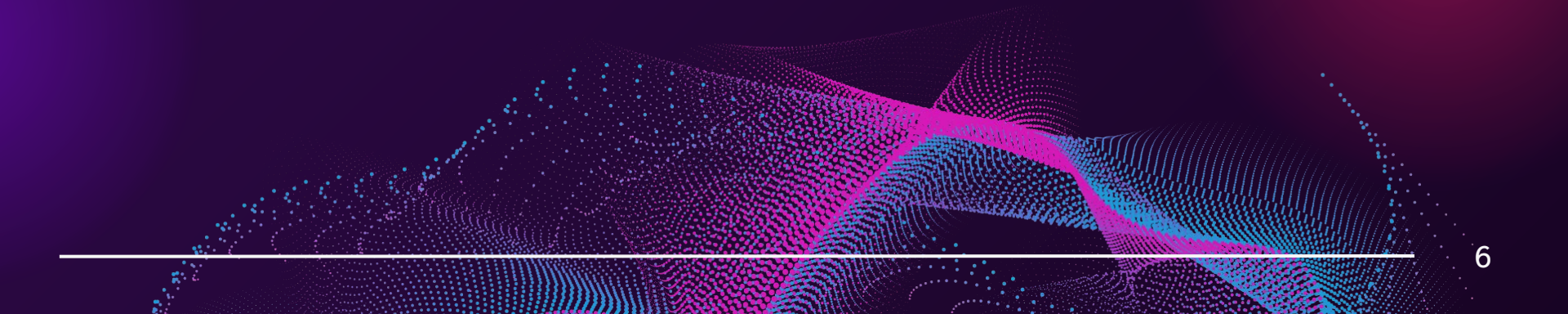
Widespread business adoption; Azure and Google Cloud introduced

## Present

Essential for data storage, AI, and machine learning

# 02 How Cloud Computing Works

Application, Architecture, Virtualization, and Network Infrastructure



# Applications of Cloud Computing

## Video Streaming: Netflix, Youtube

**It Works by:** Using cloud-based servers to store and deliver content globally.

**Some key issues are:** Buffering and latency.

**Solutions:** Adaptive bitrate streaming (like DASH) manages quality based on network conditions.

## Online Gaming

**How It Works:** Cloud servers run games and stream them to users.

**Challenges:** Requires very low latency to maintain gameplay experience.

**Solutions:** Uses distributed data centers close to users, reduces latency with efficient compression and high-speed connections.

# Cloud Networking challenges

## Network Delay

Distance between user and server affects response times.

**Solution:** Placing servers closer to the user (edge computing)

## Jitter

Variability in packet delivery times affects real-time applications.

**Solution:** Buffering and prioritized traffic management help stabilize delivery.

## Packet Loss

Causes interruptions in streaming and gaming.

**Solution**: Retransmission protocols and error correction are often used.

# Adaptive Solutions in Cloud Applications

## Buffering

Used in streaming to preload video data, smoothing playback despite network inconsistencies.

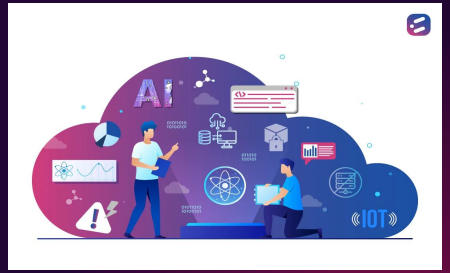
## Load Balancing

Distributes traffic across multiple servers, ensuring no single server is overloaded and maintaining performance.

## Auto-scaling

Cloud services automatically allocate more resources when demand is high and scale down during low-demand periods.

# The future of cloud computing




**Edge Computing:** Reduced latency and faster speeds, enabling better performance for applications like gaming and IoT.

**AI and Machine Learning:** Optimize resource allocation and adapt to changing network conditions.

**Hybrid Cloud Solutions:** Combining public and private clouds for improved security, control, and performance, especially in enterprise contexts.

# Sources Cited


- https://www.flaticon.com/free-icon/cloud-computing_7213255
- https://www.flaticon.com/free-icon/cloud-computing_7301969
- https://www.spiceworks.com/tech/cloud/articles/what-is-cloud-computing/
- https://www.linkedin.com/pulse/google-cloud-sejal-baweja
- https://www.alphascan.co.uk/cloud-solutions/microsoft-azure/
- https://slidesgo.com/


Thanks!