Cloud Computing

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What is Cloud Computing?

Cloud computing is the delivery of computing services over the internet("the cloud")to offer faster innovation, flexible resources.

The computer services include servers, storage, databases, networking, software, analytics and intelligence.
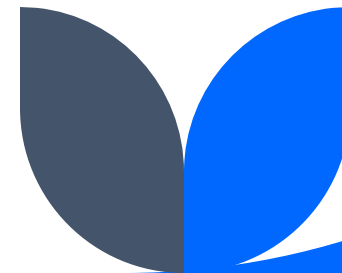
Cloud Analogies

Cloud Computing is like a Public Library.

Just as a public library provides books and resources without requiring you to own them, cloud computing provides access to computing resources and services without requiring you to own and manage them.

Cloud Computing is like a Power Grid.

Just as a power grid provides electricity to homes and businesses without requiring them to generate their own power, cloud computing provides computing power and resources to users without requiring them to manage their own infrastructure.

Benefits of Cloud Computing

COST

SPEED

GLOBAL SCALE

PRODUCTIVITY

PERFORMANCE

RELIABILITY

SECURITY

1. Cost

Cloud computing eliminates the capital expense of buying hardware and software datacenters, electricity and IT staff.

This reduces the IT costs, making budgeting easier.

2. Speed

Cloud computing can be provisioned in minutes, allowing businesses to quickly access vast amounts of computing resources.

This on-demand, self-service model gives businesses greater flexibility and reduces pressure of capacity planning.

3. Global Scale

One of the benefits of cloud computing is the ability to scale elastically.

This suggests delivering the right amount of IT resources when they are needed-for example, more or less computing power, storage, bandwidth.

4. Productivity

Onsite datacenters require time-consuming IT management tasks, such as hardware setup and software patching.

Cloud computing eliminates these tasks, freeing up IT teams to focus on more important business goals.
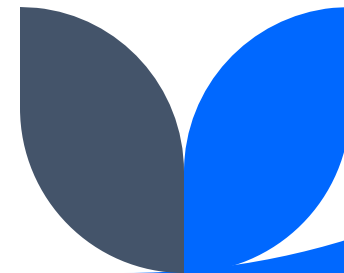
5. Performance

Cloud computing delivers high performance by providing scalable resources that can be adjusted based on workload demands, ensuring optimal efficiency.

With cloud infrastructure, businesses can access powerful computing capabilities, enabling faster processing speeds and improved application performance.

6. Reliability

Cloud computing offers high reliability through built-in redundancy and disaster recovery capabilities, ensuring minimal downtime and data loss.

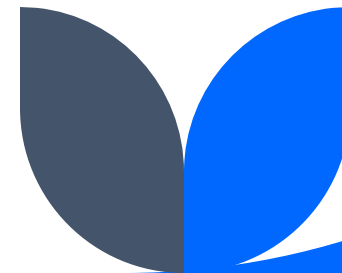It allows businesses to quickly adapt to changing demands and stay ahead of competition.
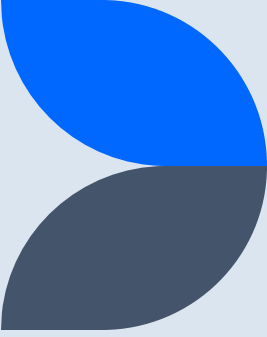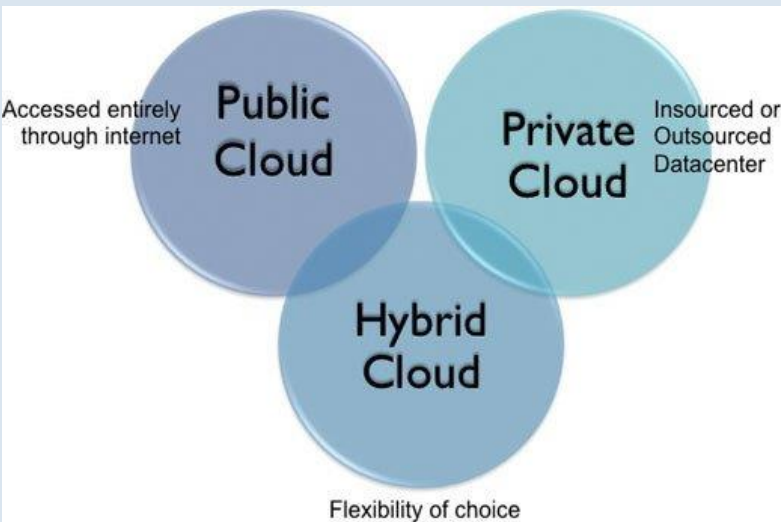
7. Security

Cloud computing provides robust security measures, including data encryption, advanced threat protection, and regular security updates, to protect data and applications.

Additionally, cloud providers offer secure access controls, monitoring, and incident response ensuring a secure environment for storing and processing data.

Types of Cloud Computing

Public Cloud — Accessed entirely through internet

Private Cloud — Insourced or Outsourced Datacenter

Hybrid Cloud

Flexibility of choice

There is a need to determine the type of cloud deployment, or cloud computing architecture, that the cloud services will be implemented on.

There are three different ways to deploy cloud services: on a public cloud, private cloud, or hybrid cloud.

Public Cloud

Public clouds are owned and operated by third-party cloud service providers, which deliver computing resources like servers and storage over internet.

The services are accessed using a web browser.
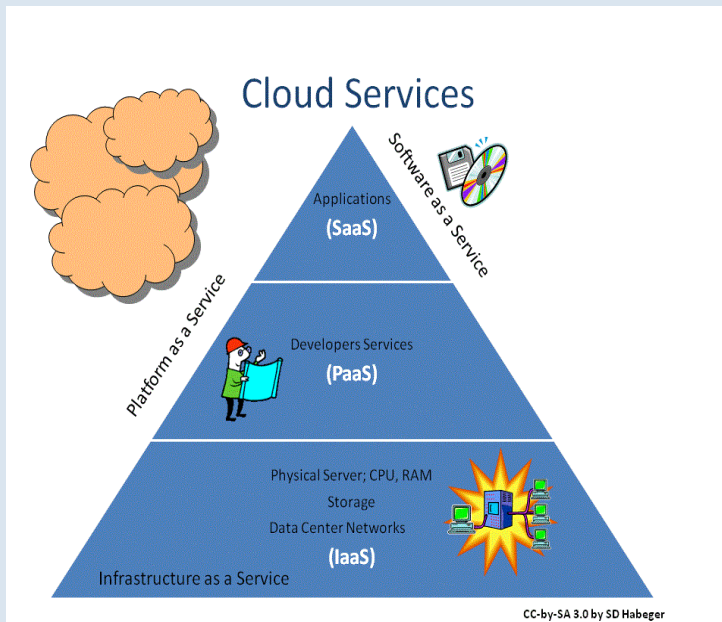
Example Microsoft Azure.

Private Cloud

Private cloud refers to a cloud computing resources used exclusively by a single business or organization.

A private cloud can be physically located on the company's onsite datacenter.

Hybrid Cloud

Hybrid clouds combine public and private clouds, bound together by technology that allows data and applications to be shared between them.

Types of Cloud Services

Cloud Services

Software as a Service

Applications
(SaaS)

Platform as a Service

Developers Services
(PaaS)

Physical Server; CPU, RAM
Storage
Data Center Networks
(IaaS)

Infrastructure as a Service
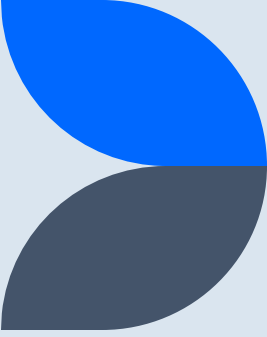
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Most cloud computing services fall into four broad categories:

1. Infrastructure as a service (IaaS)

2. Platform as a service (PaaS)

3. Serverless

4. Software as a service (Saas)

These are sometimes called cloud computing "stack" because they build on top of one another.

IaaS

The most basic category of cloud computing services. It is a cloud computing model that provides virtualized computing resources over the internet.

With infrastructure as a service (IaaS), businesses can rent essential computing infrastructure like servers, storage, networking, and other hardware components, without the need to invest in and maintain physical hardware.
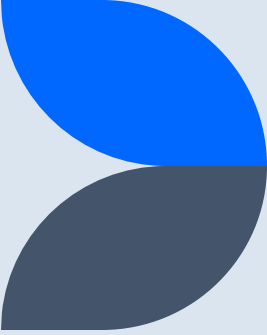
Features Of IaaS

1. **Virtualized Resources**: IaaS provides virtual machines, virtual networks, storage, and other resources that are typically hosted in a data center.

2. **Scalability**: It allows businesses to scale resources up or down depending on demand, ensuring that they only pay for what they use.

3. **Pay-as-you-go Pricing**: Users are billed based on consumption (e.g., per hour or per resource usage), which helps reduce capital expenses.

Paas

PaaS (Platform as a Service) is a cloud computing model that provides a platform and environment for developers to build, deploy, and manage applications without dealing with the underlying hardware or software infrastructure.

Features Of Paas

1. **Development Tools**: PaaS platforms provide built-in development tools such as integrated development environments (IDEs), database management, and version control.

2. **Middleware**: PaaS includes middleware, such as databases, message queuing, and caching, which helps developers focus on the application logic rather than low-level infrastructure concerns.

3. **Support for Multiple Programming Languages**: Most PaaS providers offer support for various programming languages and frameworks (e.g., Java, Python, Node.js, Ruby).

Serverless

Overlapping with PaaS, serverless computing focuses on building app functionality without spending time continually managing the servers and infrastructure required to do so.

Features Of Serverless Computing

1. **No Server Management**: Developers don't need to provision, scale, or manage servers. All infrastructure concerns are handled by the cloud provider.

2. **Event-Driven**: Serverless applications are typically triggered by events such as HTTP requests, file uploads, database changes, or scheduled tasks.
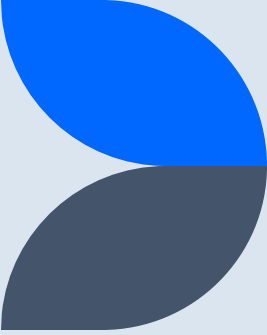
Saas

Software as a service (SaaS) is a method for delivering software applications over the internet, on demand and typically on a subscription basis.

With SaaS, cloud providers host and manage the software application and underlying infrastructure, and handle any maintenance, like software upgrades and security patching.
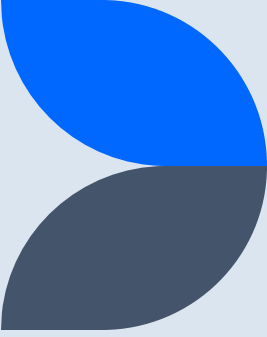
Features Of Saas

1. **Web-Based Access**: SaaS applications are accessed through a web browser, that is the users do not need to install or maintain the software on their own computers or servers.

2. **Security**: SaaS providers implement robust security measures, including encryption, data backup, disaster recovery, and access control to protect users' data.

3. **Automatic Updates and Maintenance**: The service provider manages software updates, patches, security fixes, and bug fixes, ensuring that the application remains current and secure without requiring user intervention.
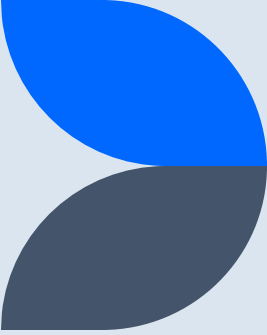
Examples

Cloud Service Model	Example Providers	What it provides
IaaS	AWS, Microsoft Azure, Google Cloud Platform	Virtualized infrastructure (servers, storage, networking, etc.)
Paas	Google App Engine, Microsoft Azure App Service, Heroku	Platform and environment for developing, managing, and deploying apps.
Saas	Google Workspace, Zoom	Fully functional software applications available over the internet.
Serverless	AWS Lambda, Google Cloud Functions, Azure Functions	Event-driven scalable execution without managing servers.

How Netflix Powers Global Streaming with Cloud Computing

Netflix, one of the world's largest streaming platforms, is an excellent example of a company that leverages cloud computing to deliver its services efficiently and at scale.

1.   **IaaS (Infrastructure as a Service)**:

Netflix uses **Amazon Web Services (AWS)**, an IaaS provider, for computing power, storage, and database management.

By moving its infrastructure to the cloud, Netflix no longer relies on physical servers and data centers. This allows them to easily scale their infrastructure based on demand and provides flexibility in managing global operations.

1.AWS EC2 (Elastic Compute Cloud): For running servers and applications.

2.AWS S3 (Simple Storage Service): For storing video content, user data, and logs.

3.AWS CloudFront: For content delivery (CDN), ensuring fast and reliable streaming experiences for users worldwide.
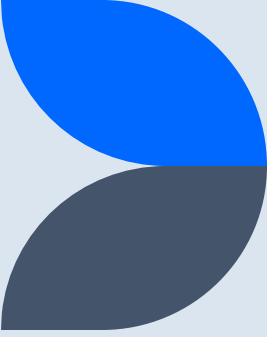
2. **PaaS (Platform as a Service)**:

Netflix uses **PaaS** tools for deployment and management of its applications.

Cloud-based services help developers rapidly build, test, and deploy new features and updates to the streaming platform.
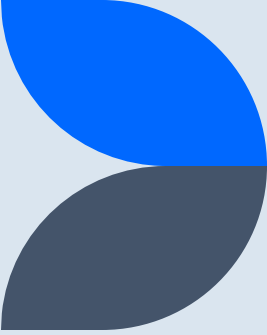
1. **AWS Lambda**: Used for serverless computing to run backend functions, such as video recommendations, without the need for server management.

2. **AWS Elastic Beanstalk**: A platform that simplifies the process of deploying and scaling web applications and services, enabling Netflix to focus on application logic without worrying about infrastructure.

3. SaaS (Software as a Service):

While Netflix is primarily known for its own platform (a SaaS offering), it also integrates other SaaS tools to manage operations and improve efficiency.

1. **Slack**: Used for team communication and collaboration across Netflix's global workforce.

2. **Zendesk**: For customer service and support management, helping Netflix address subscriber issues quickly and efficiently.

4. Serverless Computing:

Netflix also uses **serverless computing** (e.g., **AWS Lambda**) for certain use cases, like processing millions of user interactions (such as ratings, reviews, and recommendations) in real-time, without managing servers.

1. **AWS Lambda** enables Netflix to scale these interactions automatically based on demand, providing seamless user experiences.

Conclusion

Cloud computing has revolutionized how businesses and individuals' access and use computing resources. By offering flexible, scalable, and cost-efficient solutions, it enables organizations to run applications, store data, and manage infrastructure without the need for physical hardware. The key benefits of cloud computing include:

- **Scalability**: Cloud resources can be easily scaled up or down to meet changing demands, ensuring efficient usage of resources.

- **Cost Efficiency**: With pay-as-you-go models, cloud computing helps businesses reduce the capital expense of owning and maintaining physical servers.

- **Accessibility**: Cloud services are available anywhere with an internet connection, promoting flexibility and remote work.

- **Reliability**: Built-in redundancy and disaster recovery features minimize downtime, providing high availability for applications and services.

- **Security**: Cloud providers invest in advanced security technologies and practices, ensuring that data is protected from unauthorized access.
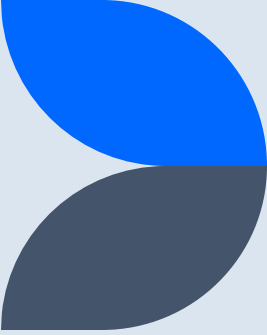
Cloud computing is categorized into several service models:

- **IaaS (Infrastructure as a Service)**: Provides virtualized computing resources over the internet (e.g., AWS, Microsoft Azure).

- **PaaS (Platform as a Service)**: Offers a platform for developers to build, deploy, and manage applications (e.g., Google App Engine, Heroku).

- **SaaS (Software as a Service)**: Delivers software applications over the internet, eliminating the need for local installations (e.g., Google Workspace, Netflix).

- **Serverless**: Allows developers to focus on code execution without managing servers (e.g., AWS Lambda, Azure Functions).

As the technology continues to evolve, the adoption of cloud computing is expected to grow, further shaping the future of IT and business operations worldwide.

Thank you