

# Cloud Computing

Cloud Computing is a computer paradigm where information and software are kept and retrieved via the internet, as opposed to being stored on a personal computer or server located locally. Cloud computing allows for on-demand access to a wide range of computing resources, such as storage, processing power, and software applications, without requiring the user to maintain physical infrastructure.

## [4 Types of Clouds]

- Public clouds are services provided by third-party providers over the internet. These services may include servers, storage, and applications. They are cost effective and assure high scalability, easy to set up. On the other hand, those cloud services have security issues since they are able to be accessed by third-party, and also the performance highly depends on the network being so unstable.
- Private cloud is a computing service offered either over the internet or a private internal network, only to select users. Since it is dedicated to a single organisation, it offers improved security compared to a public cloud. Nevertheless, Private clouds are more expensive than public clouds, and might not offer the high level of scalability. Setting up and managing a private cloud can be more complicated, too.
- Community cloud is a cloud service model that provides a shared infrastructure for specific community users with common business objectives, concerns, or needs. Community clouds are more cost-effective than private clouds as costs are shared among multiple users. On the other hand, the management of a community cloud can be complex, especially if multiple organisations are involved.
- Hybrid cloud is a computing environment that combines a public cloud and a private cloud by allowing data and applications to be shared between them. Hybrid clouds offer the flexibility to use the public cloud's scalability and the private cloud's security where necessary, with optimised costs. However, Managing a hybrid cloud can be complex due to the need to manage both public and private clouds. Also, it can be more

challenging to manage and monitor data and services across multiple platforms.

## Hardware Components

- **Servers:** In a cloud computing environment, servers are the workhorses. They perform the computational tasks and also store data. In an organisation, servers can support a wide variety of operations and services, including hosting databases, running applications, and providing IT services.
- **Storage Devices:** Cloud service providers use storage devices like SSDs and HDDs to store customer data. They can host a range of data, from databases to multimedia files. For organisations, using cloud storage can help save costs, provide accessibility from anywhere, and allow easy sharing of data.
- **Networking Equipment:** This includes the switches, routers, and other devices that connect servers together and to the Internet. This equipment is critical for ensuring reliable and fast connections, allowing data to move smoothly within the cloud environment.
- **Power Supplies and Cooling Systems:** Cloud data centres require a large amount of electricity to run servers and cool them down to avoid overheating. These components are critical to ensure the continuity and efficiency of the operations.
- **Security Devices:** This includes physical security devices such as biometric authentication systems and cameras, as well as network security devices like firewalls. They are important to protect the data centre from physical and digital breaches.

## Software Components

- **Cloud Management Platforms:** These include software tools like OpenStack that provide a way to manage and orchestrate the various cloud resources. These tools are responsible for provisioning, metering, and billing of resources, as well as ensuring high availability of applications.

- **Virtualization Software:** This is a key component of cloud computing that allows the creation of virtual machines (VMs) or containers. Virtualization enables the running of multiple independent virtual operating systems on a single physical server, thereby improving the efficiency and flexibility of resource utilisation.
- **Operating Systems:** Cloud servers run on operating systems like Linux or Windows Server that manage the server's hardware and software resources and provide services for executing applications.
- **Middleware:** This is software that provides services to other software applications beyond those available from the operating system. Middleware can include web servers, application servers, content management systems, and similar tools that support application development and delivery.
- **Software as a Service (SaaS) Platforms:** These are on-demand software platforms that are provided over the internet. They can range from email and collaboration tools to customer relationship management (CRM) and enterprise resource planning (ERP) applications. SaaS allows organisations to use software without having to install and run applications on their own computers or data centres, which can result in significant cost savings.

### Network Attached Storage (NAS)

Network Attached Storage, or NAS, is a data storage device that connects to a network and provides file-level access to multiple clients. It is essentially a single storage device that serves files over Ethernet and is relatively inexpensive and easy to set up. NAS systems are perfect for small businesses or home users needing large amounts of cost-effective storage that multiple users can easily share.

### Storage Area Network (SAN)

A Storage Area Network, or SAN, is a network of storage devices that provide block-level data storage. These devices can connect to servers and appear as attached drives, allowing for high speed, low latency connections. SANs are highly scalable, both in terms of capacity and performance, and are used in

environments where large amounts of data must be accessed quickly and where the storage needs can rapidly increase.

- SAN is generally a better choice for larger enterprises with high data requirements and strict performance needs. It offers high performance, supports a large amount of data, and can work well in virtualized environments, making it a good fit for cloud computing models.
- NAS would be a suitable choice for smaller businesses or businesses with lower data requirements. It is easier to manage and can work well for businesses looking to get some of the benefits of cloud storage without a huge investment.
- Mass Storage solutions can be utilised like Amazon S3, Google Cloud Storage, or Azure Blob Storage. These offer virtually unlimited storage space, high durability, and availability.