2024S-T1 CLOD1000 - Introduction to Cloud Computing 01 (M06 Group 1)

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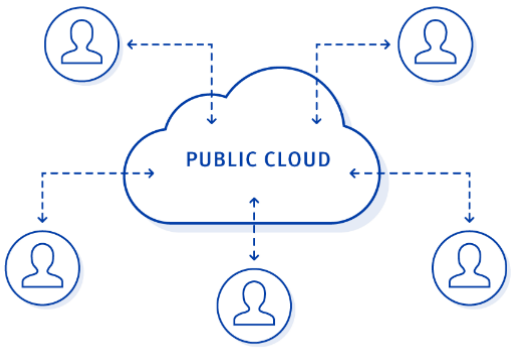
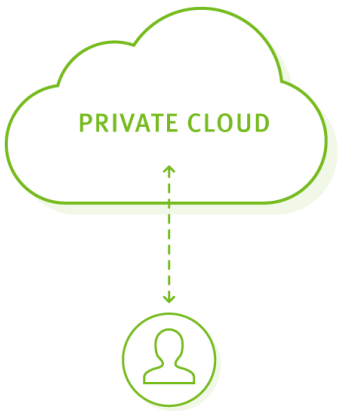
1. ***Discuss the different types of clouds?***

Public Cloud:

Public cloud is the most used type of cloud service. In a public cloud environment, the underlying hardware, which runs the virtualized applications/services, is shared with other organizations that use the same cloud service provider. The reason for this being the most common type is its affordability in terms of payment plans such as pay-as-you-go, and versatility in terms of scalability, elasticity, flexible data storage and application/services

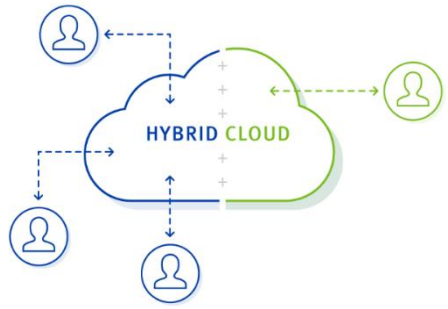


Private Cloud: The private cloud is one of the most used types of cloud services. The difference between public and private clouds lies in the fact that a private cloud has its own dedicated hardware. The underlying infrastructure is utilized exclusively by the organization that owns or leases this cloud. A private cloud has its advantages and disadvantages compared to other types of clouds, the main advantage being security and the main disadvantage being the high cost of operations. A good example of this is the US GOV Cloud, which is a dedicated private cloud for the United States government, operated by AWS.

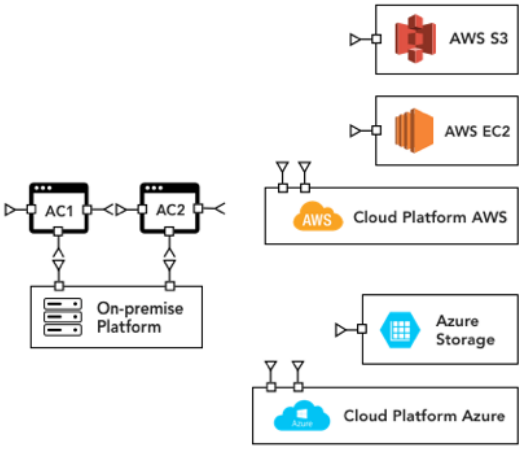


Hybrid Cloud:

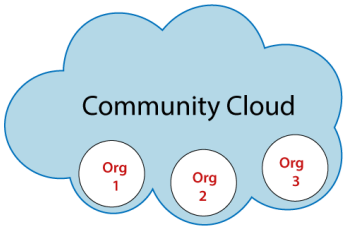
hybrid cloud is a mixture of public, private cloud, and on-premises infrastructure designed to create a single, cost-optimal IT infrastructure. Hybrid cloud architecture focuses on the mechanics of transforming portions of a company's on-premises data center into a private cloud infrastructure. Furthermore, a hybrid cloud is often the first choice for organizations looking to migrate to fully public or private cloud environments. Most cloud service providers offer a variety of resources aimed at private cloud users/organizations, such as AWS Direct Connect and storage gateways. Utilizing these solutions with a hybrid cloud offers organizations a smooth and seamless pathway for full cloud migration.



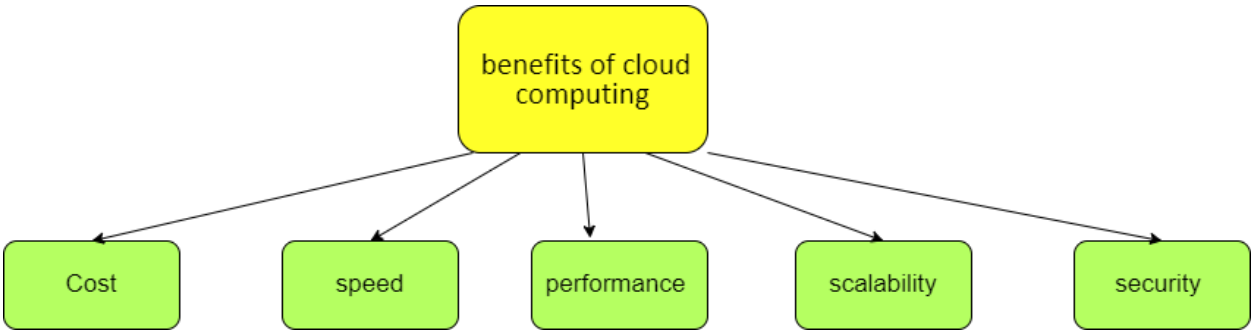
Multi-Cloud: Using multiple cloud services provided by various third-party companies is a common method. This approach is used to leverage the best features of each cloud service provider. Furthermore, this type can also serve as a failsafe in scenarios where one cloud service provider experiences an outage or goes out of service. This strategy can also be utilized as a safety mechanism to avoid censorship.



Community Cloud: This is offered by a group of organizations using the same private cloud. This solution offers a secure and regulatory compliant environment for organizations that use the community cloud. A notable example of this is a set of regional hospitals that use the same cloud to store and manage medical records.



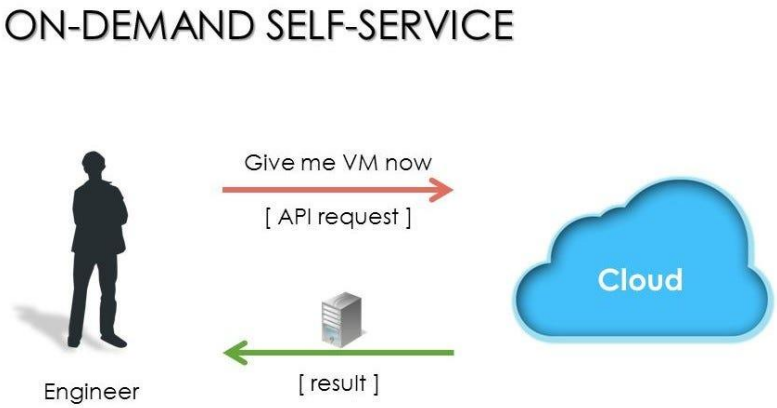
2. ***Discuss the benefits of cloud computing?***



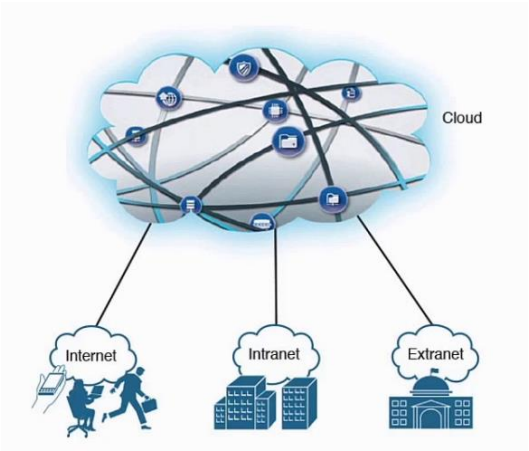
1. **Cost**: Cloud computing offers cost-saving potential for businesses by eliminating the need for maintaining independent IT infrastructure. It facilitates efficient resource allocation through its service offerings.
2. **Speed**: Cloud computing enables swift transmission, storage, and distribution of information compared to traditional methods. It facilitates immediate data sharing and collection, as well as rapid access to additional resources and software.
3. **Performance**: Cloud service providers leverage cutting-edge equipment and multiple server locations to deliver top-notch services. This is especially beneficial for companies utilizing resource-intensive applications, ensuring smooth application operation.
4. **Scalability**: Cloud computing adjusts to the financial and operational needs of individual businesses, providing tailored services. It grants access to computing resources on-demand, allowing companies to focus on growth areas while supporting scalability.
5. **Security**: Cloud platforms offer an extra layer of security for digital data protection. Storing data in the cloud ensures redundancy and backup options, enhancing digital infrastructure security, mitigating risks, and bolstering reliability.

3. ***What are the basic characteristics of cloud computing?***

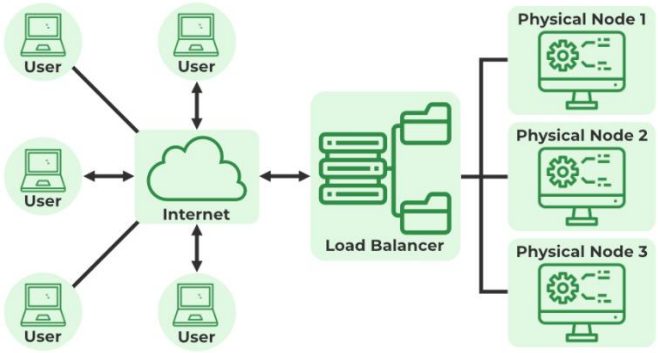
On-demand self-service: Users can automatically provision computing resources such as server tine and network storage as much as they need without human interaction with each services



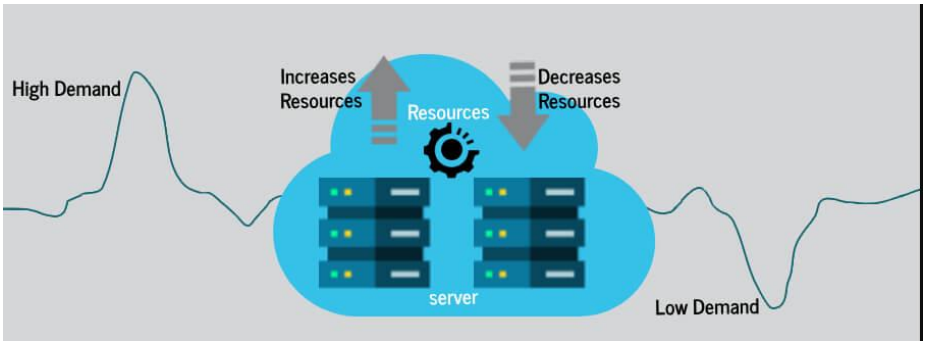
Broad Network Access: Resources are available over the network and accessed through standard mechanisms that promote use by thin or thick client platforms(e.g. Smart Phones, Tabs, Laptops, Desktops)



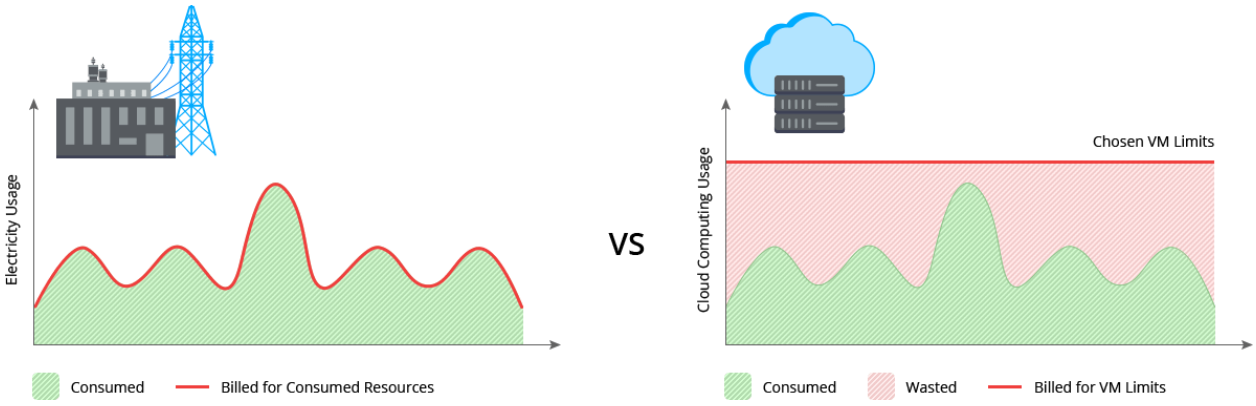
Resource pooling: The providers computing resources are pooled to serve multiple consumers using multiple consumers using a multi-tenant model, where physical and virtual resources dynamically assigned and reassigned according to consumer demand



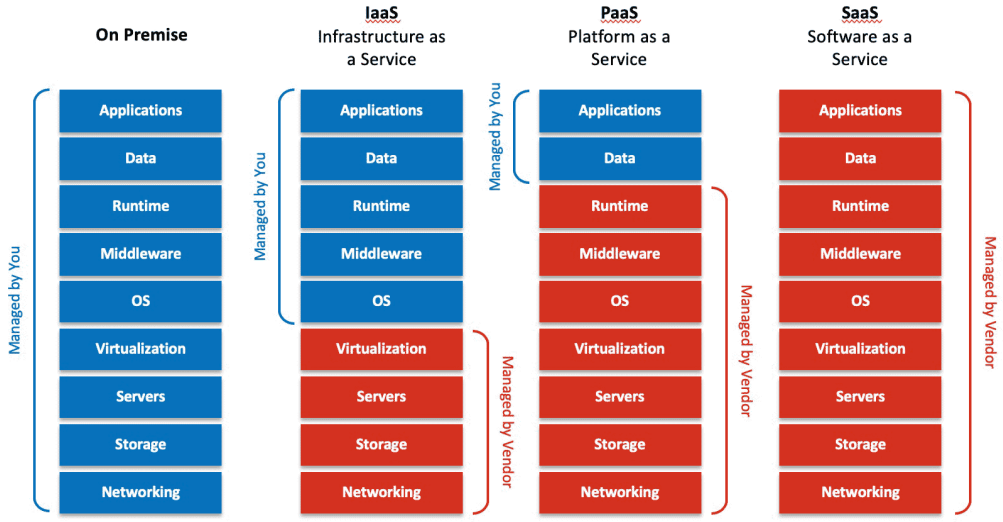
Rapid Elasticity: Capabilities can be elastically provisioned or released, in some cases automatically, to scale rapidly outward or inward commensurate with demand.



Pay-as-you-go: This Model allows you to pay for cloud services based on actual usage. You are billed only for the resources consumed. It eliminates the need for upfront capital investment and allows to scaling up or down



4. ***What is the classification of Cloud Computing services?***



Infrastructure as a Service (IaaS): This service provides virtualized computing resources over the internet. IaaS offers Computer Hardware, Storage and Networking but not the operating systems or applications

Platform as a Service (PaaS): This provides a platform allowing customers to develop, run, and mange applications without the complexity of building and maintaining the infrastructure typically associated with developing and launching an app.

Software as a Service (SaaS): This provides software distribution model in which a plication are hosted by a third-party provider and made available to customers over the internet, SaaS offers cloud-managed application as well as the underlying platform and infrastructure

5. ***<u>How can a company benefit from cloud computing?</u>***

Following are some of the benefits a company can gain by using cloud computing:

- **Cost Reduction** - Cloud Computing results in decreased initial expenses, impacting on a company's Capital Expenditure (Cap Ex). It operates on a pay-as-you-go pricing structure, meaning companies only pay for the resources and computing time they utilize, removing the necessity to purchase significant hardware upfront. This shift contributes to Operational Expenditure (Op Ex). The diagram below illustrates several distinctions between Cap Ex and Op Ex.

- **Automated Updates and Maintenance** – Cloud providers handle the upkeep of a company's infrastructure and ensure that software updates are applied automatically. This diminishes labor and maintenance expenses.
- **Flexibility** – With the expansion of an organization, the demand for resources increases. Cloud providers offer services that accommodate such growth by allowing the addition or reduction of resources according to usage and requirements. Consequently, capacity limitations are avoided.
- **Dependability and Accessibility** – Downtime can result in significant losses for organizations. Cloud computing guarantees application availability (uptime) through tools like Load Balancers, Automatic Failovers, redundancy, data backups, and swift recovery measures.

    - **Security** – Cloud providers prioritize security by implementing advanced techniques and employing skilled security professionals to safeguard company data. Cloud services continuously monitor data to detect and mitigate threats such as DDoS attacks.

- **Global Reach** – Cloud computing enables companies to expand globally without the high costs of infrastructure setup. Resources can be deployed in multiple regions to minimize latency based on proximity to users. Cloud Edge networks further enhance data accessibility for all users.

- **Business Intelligence** – Cloud services offer data analysis capabilities and generate reports to recommend best practices and maximize cost savings. Organizations can leverage gathered data to gain insights into resource usage and forecast future expenses based on historical and current data.

6. ***<u>Explain cloud computing success factors and measurement from business organizations 'success in adapting could computing as solution.</u>***

Success Factors:

- **Scalability:** The ability to scale resources up or down as needed without significant delays or capital expenditure

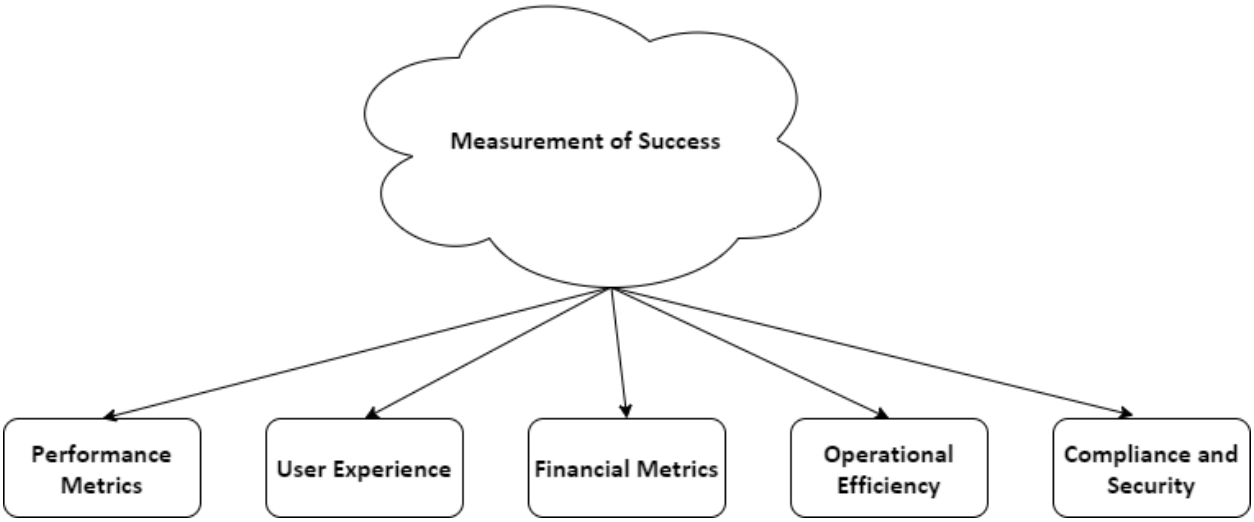
- **Flexibility:** Offering a rang of services that can be tailored to specific business need including IaaS, PaaS and SaaS

- **Cost-Effectiveness:** Reducing upfront capital expenses and shifting to an operational expenditure model with pay-as-you-go pricing

- **Accessibility:** Provides remote access to service and application from various devices and locations

- **Security:** Implementing robust security measurements to protect data and comply with regulatory requirements

Measurement of Success:



- **Performance Metrics:** Evaluating the performance of cloud services against predefined baselines and service level agreements (SLAs).
- **User Experience:** Assessing the ease of use, accessibility, and satisfaction of end-users with cloud services.
- **Financial Metrics:** Analyzing cost savings, return on investment (ROI), and total cost of ownership (TCO) compared to traditional IT infrastructure.
- **Operational Efficiency:** Measuring improvements in operational processes, such as reduced time to market for new services or products.
- **Compliance and Security:** Ensuring adherence to regulatory standards and measuring the effectiveness of security controls**.**

7. ***<u>Explain the security key points & Considerations?</u>***

Public Key Foundation (PKI): A system used to make, make due, disseminate, use, store, and renounce computerized declarations and oversee public/confidential key encryption1. It's fundamental for character, approval, and encryption administrations in cloud security2.

Declaration Authority (CA): The focal power of confidence in PKI that verifies the character of elements in the network3.

Enlistment Authority (RA): Liable for giving authentications as allowed by the CA. Authentication Information base: Stores endorsement demands and disavowed declarations.

Normal Codes:

- **AES (High level Encryption Standard):** A balanced block figure with key choices of 128, 192, and 256 pieces, broadly took on for encoding delicate data4.
- **3DES (Triple Information Encryption Standard):** An expansion of DES, involving three encryption keys for a triple encryption capability on each block of information.
- **RSA:** A topsy-turvy encryption convention utilizing a private and public key pair, usually utilized in cloud implementations56.
- **DSA (Advanced Mark Calculation):** Like RSA however slower for encryption and quicker for decryption7.

Security Endorsements and Keys: Utilized for getting administrations and client validation, with everyday tasks preoccupied by cloud suppliers for simplicity of use8. Encryption Advances: Like IPSec, SSL/TLS, and different codes, are vital for safeguarding information on the way and very still.

Access Control: Executing fitting access controls like leg tendons, job based admittance control (RBAC), and multifaceted validation (MFA) to get assets and administrations.

Consistence and Administrative Necessities: Guaranteeing adherence to norms like HIPAA, SOC 2/3, and FedRAMP, which oversee the security and protection of information.

Security Arrangements: Laying out and applying security strategies to cloud tasks, including information grouping, division, and encryption.

8. ***What is Security management in terms of Cloud Computing?***

As to registering, security the executives allude to the method used to check the accessibility, classification, and respectability of data and assets that are saved and available in the cloud. To get the security of cloud-based frameworks and administrations, an assortment of specialized strategies, approaches, cycles, and access rules are utilized.

Some key aspects of security management in cloud computing include:

1. **Identity and Access Management**: This includes controlling client personalities, approval, and validation to ensure that no other individual can get to the cloud's assets. It includes putting multifaceted verification, job based admittance controls, major areas of strength for and arrangements into training.

2. **Data Protection**: To forestall undesirable access, information should be scrambled both on the way and very still. It likewise includes putting reinforcement and recuperation plans, secure information cancellation strategies, and information misfortune anticipation measures right into it.

3. **Network Security:** This implies defending the distributed computing industry's correspondence channels and organization foundation. To safeguard against network-based assaults, it includes setting up firewalls, interruption recognition and anticipation frameworks, and secure virtual confidential organizations (VPNs).

4. **Vulnerability Management:** This incorporates routinely investigating the cloud foundation for weaknesses, dissecting it, and applying patches and moves up to fix them. To find what's more, address any security blemishes, entrance testing is likewise included.

5. **Incident Response and Forensics**: This includes putting a grasped occurrence reaction intend to manage security issues, as compromised frameworks or information breaks. It includes recognizing security occasions almost immediately, responding to them rapidly, doing legal examinations, and setting up approaches to prevent them from reoccurring.