

Cloud Computing

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IT381

Lecture 4



Network Basics for Cloud Computing

Cloud Networking

Why Cloud Networking

Cloud Networking Basics

Types Of Cloud Networking

Benefits of Cloud Networking

Use Cases Of Cloud Networking Services

Network Virtualization in Cloud Computing

Cloud Networking

is a service or science in which a company's networking procedure is hosted on a public or private cloud. Cloud Computing is source management in which more than one computing resources share an identical platform and customers are additionally enabled to get entry to these resources to a specific extent. Cloud networking in a similar fashion shares networking however it gives greater superior features and network features in the cloud with interconnected servers set up under cyberspace.

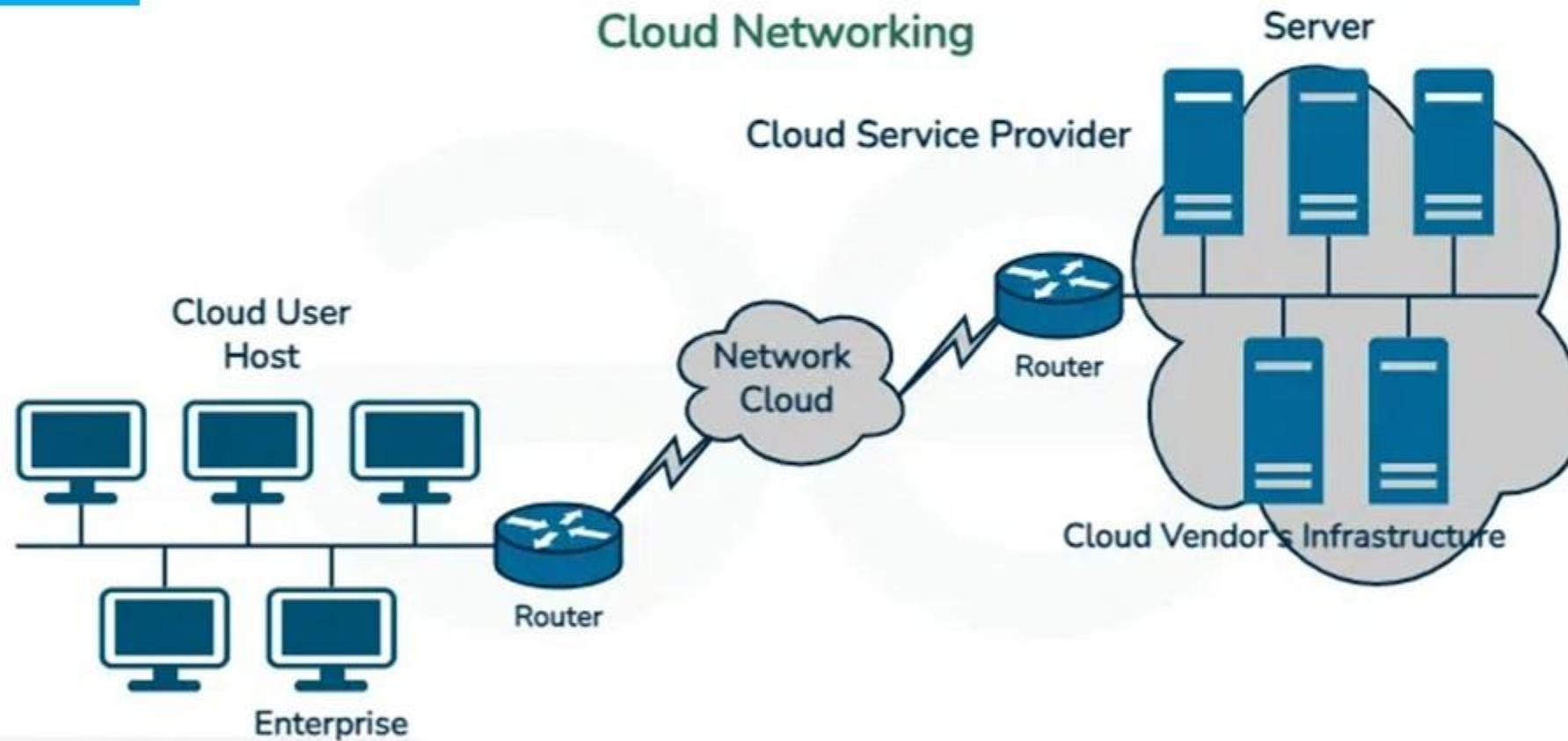
What Is Cloud Networking?

Cloud Networking refers to the infrastructure and processes in the cloud computing environment that are involved in connecting and managing the network resources. It includes the design, deployment, and optimization of networks facilitating communication and data transfer between various services hosted on cloud platforms. Cloud networking facilitates organizations to establish secure, scalable, and high-performance network architectures following to their specific requirements.

What Is Cloud Networking?

It involves implementing virtualized networking technologies, such as virtual private clouds (VPCs), software-defined networking (SDN), and load balancing, to ensure reliable connectivity, efficient resource utilization, and seamless integration with cloud services. Ultimately, cloud networking plays a critical role in enabling organizations to leverage the benefits of cloud computing, including agility, flexibility, and cost-effectiveness, while meeting their networking needs

What Is Cloud Networking?



Why Cloud Networking?

It is in demand by many companies for its speedy and impervious delivery, fast processing, dependable transmission of information without any loss, and pocket-friendly set-up. Benefited corporations who select Cloud Networking consist of internet service providers, e-commerce, cloud service providers, community operators, and cloud service providers.

Why Cloud Networking?

It permits users to boost their networks in accordance with necessities in cloud-based services. An actual cloud network provides high-end monitoring to globally positioned servers, controls site visitors' flow between interconnected servers, protects structures with superior network safety, and offers visibility to users by means of its centralized management. The web access can be expanded and made greater reliable bandwidth to promote a couple of network features into the cloud

Why Cloud Networking?

It ensures overall performance and safety in multi-cloud surroundings so that Information technology receives greater visibility by means of supplying end-users with the necessities and experience they need. Workloads are shared between cloud surroundings using software program as provider application. Safety is given to user to get entry to web page and infrastructure by means of transferring functions to the cloud with standard security model. The gateway offers contextual access code and multi-layer firewall. Applications and offerings are given to allotted data centers in cloud environment.

Why Cloud Networking?

Software-Defined Wide Area Network is technology that makes use of bunch of networking switches and routers to virtually get entry to machine from hardware to software program deployed on white box. Confidential units and information are set up on primary branch workplace or consumer region and given unique access to administrator to get admission to its superior networking functions, cloud optimization software, and firewalls. It is massive range of array with network features deployed in cloud platform.

Why Cloud Networking?

Software-defined Wide range community offers standard load balancing approach and combines all stages of network to user experience. It offers greater visibility with assist of intelligent analytics. Giving options to every cloud user may be challenging however leverage of all offerings and supplying them special answer by means of SD-WAN from ceasing to cease applications.

Cloud Networking Basics

Cloud Networking basics include the fundamental principles and components which involving in establishing and managing network resources within a cloud environment. The following are the key aspects included in cloud networking basics:

Virtualization: Usage of virtualized networking technologies for creating virtual networks, subnets, and network interfaces, enables flexible resource allocation and isolation.

Cloud Networking Basics

Software-Defined Networking (SDN): is an approach to network management that uses abstraction to enable dynamic and programmatically efficient network configuration to create grouping and segmentation while improving network performance and monitoring in a manner more akin to cloud computing than to traditional network.

Cloud Networking Basics

Virtual Private Clouds (VPCs): A virtual private cloud (VPC) is a secure, isolated private cloud hosted within a public cloud. VPC customers can run code, store data, host websites, and do anything else they could do in an ordinary private cloud, but the private cloud is hosted remotely by a public cloud provider. (Not all private clouds are hosted in this fashion.) VPCs combine the scalability and convenience of public cloud computing with the data isolation of private cloud computing.

Cloud Networking Basics

Imagine a public cloud as a crowded restaurant, and a virtual private cloud as a reserved table in that crowded restaurant. Even though the restaurant is full of people, a table with a "Reserved" sign on it can only be accessed by the party who made the reservation. Similarly, a public cloud is crowded with various cloud customers accessing computing resources – but a VPC reserves some of those resources for use by only one customer.

Cloud Networking Basics

Monitoring and Optimization: On usage of network monitoring tools and performance optimization techniques it helps in monitor network traffic, identify bottlenecks, and optimize resource utilization for improved efficiency and cost-effectiveness.

Load Balancing: Load Balancing helps in distributing incoming network traffic across multiple servers or instances to ensure optimal performance, scalability, and fault tolerance.

Types Of Cloud Networking

Utilization of virtualized networking technologies over the cloud environment for managing network resource is known as cloud networking. Cloud networking provides scalability and centralized management of network resources. The following are the types of cloud networking:

Types Of Cloud Networking

1. Cloud Networking

Cloud Networking comes with utilizes virtualized networking technologies to manage network resources within a cloud environment, providing scalability and centralized management.

Virtualized Infrastructure: It involves utilization of virtualized networking technologies for creating and managing the network resources over the cloud.

Scalability And Flexibility: Cloud Networking offers flexibility and scalability for organizations to dynamically adjust their network configurations to meet up their changing demands.

Types Of Cloud Networking

Centralized Management: It provides centralized management and automation of network configurations for enhancing agility and reducing administrative overhead.

2. Multi Cloud Networking

Multi Cloud Networking comes with facilitating connectivity and traffic distribution over multiple cloud service platforms with ensuring interoperability and security across diverse multi cloud environments. The following are its functionalities:

Interoperability: Facilitates connectivity and communication between multiple cloud environments and on-premises infrastructure.

Types Of Cloud Networking

Traffic Distribution: Enables load balancing and traffic routing across diverse cloud platforms to optimize performance and resource utilization.

Security and Compliance: Implements consistent security policies and compliance measures across multiple clouds, ensuring data protection and regulatory compliance.

3. Hybrid Cloud Networking

Hybrid Cloud Networking comes with involving integration of on-premises infrastructure with public and private cloud environments. It provides seamless data flexibility with hybrid connectivity.

Integration Of Environments: It develops a single network-based architecture with linking public and private cloud environments with on premised infrastructure.

Data Mobility: It helps with smoother transfer of workloads and data in between on-premise and cloud environments. It facilitates with resource optimization and agility.

Benefits of Cloud Networking

The following are the advantages of Cloud Networking:

On-Demand Self Service: Cloud computing provides required application, services, and utility to client. With login key, they can begin to use besides any human interplay and cloud service providers. It consists of storage and digital machines.

High Scalability: It requests grant of resources on large scale besides any human intervention with every service provider.

Agility: It shares the assets efficiently amongst customers and works quickly.

Multi-sharing: By distributed computing, distinctive clients from couple of areas share identical resources through fundamental infrastructure.

Benefits of Cloud Networking

Low Cost: It is very economical and can pay in accordance with its usage.

Services in pay per use Model: Application Programming Interface is given to clients to use resources and offerings and pay on service basis.

High availability and Reliability: The servers are accessible at the proper time besides any delay or disappointment.

Maintenance: It is user-friendly as they are convenient to get entry to from their location and does not require any installation set up.

Disadvantages of Cloud Networking

The following are the Disadvantages of Cloud Networking:

Dependency on internet connectivity: Cloud networking requires a strong and reliable internet connection. If the connection is slow or unreliable, it can cause performance issues and disrupt network access.

Security concerns: Cloud networks are susceptible to cyber-attacks, and security breaches can compromise the sensitive data stored on the cloud. This risk is mitigated through proper security measures, but there is always some level of vulnerability.

Disadvantages of Cloud Networking

Limited control: When you use a cloud network, you are dependent on the cloud provider to manage and maintain the network infrastructure. This can limit your control over the network and how it is managed.

Cost: Cloud networking can be expensive, particularly for large-scale enterprise networks. The costs can add up quickly, especially when you factor in the ongoing maintenance and support costs.

Lack of customization: Cloud networking solutions are typically pre-configured and may not offer the level of customization that some organizations require. This can limit your ability to tailor the network to your specific needs.

Cloud Networking Services Examples

The following are the Cloud Networking Services Examples:

Virtual Private Networking (VPN) In the Cloud: Setting the VPN services within the cloud environments helps for securing remote access and transfer the data.

Hub and Spoke Network Topology: Establishment of Hub and spoke technology helps in centralizing the traffic management and in optimizing the resource utilization.

Software-Defined Networking (SDN): On usage of SDN technologies facilitates in dynamically manage and configure the network infrastructure in cloud environments for improving agility and scalability.

Use Cases Of Cloud Networking Services

The following are the use cases of Cloud Networking Services:

Extended On-premises Networks: It facilitates with seamless integration of on-premise network infrastructure with cloud environments using VPNs for having secured communication and resource access.

Automated Network Security: Implementing automated network security facilitates with automatic patch deployment and having enforced policy-based security measures.

Use Cases Of Cloud Networking Services

Traffic Inspection and Cloud Management: Implementation of hub-spoke network topology helps in efficiently managing the network traffic and fulfilling resource based specific needs such as isolation of customers for compliance or performance reasons.

Cloud Computing Vs Cloud Networking

The following is the comparison table of cloud computing and cloud networking:

Aspect	Cloud Computing	Cloud Networking
Definition	It facilitates with delivery the services over the internet.	It facilitates with managing and optimizing network infrastructure.
Key Components	It contains components such as Virtual Machines, Storage, Databases	It contains components such as VPCs, SDN, Routing.

Cloud Computing Vs Cloud Networking

The following is the comparison table of cloud computing and cloud networking:

Aspect	Cloud Computing	Cloud Networking
Benefits	Scalability, Cost-effectiveness, flexibility	Enhanced Security, efficient traffic management
Key Providers	AWS , Microsoft Azure , GCP	Cisco, VMware, cloud Providers
Use Cases	It helps in hosting applications, data analytics and AI/ ML	It secures remote access, traffic routing and resource optimization.

Why Should We care About Cloud Networking?

The following are the reasons to care about cloud networking:

Enhanced Connectivity And Flexibility: Cloud Networking provides seamless connectivity between on-premises and cloud environments by offering flexibility to access resources from anywhere, anytime and from any device.

Improved Security and Compliance: Proper implementation of cloud networking solutions and security measures helps in encryption and access controls with ensuring protection of sensitive data with regulatory requirements.

Cost Efficiency And Scalability: Cloud Networking supports organizations to scale their network infrastructure as per their needs. It provides cost effective solutions for both small and large enterprises.

What Make a Successful Multi Cloud Networking Strategy?

A successful multi-cloud networking strategy depends on seamless integration, strong security and efficient management. It involves in establishment of resilient connectivity between cloud platforms using technologies such as VPNs and SDN. On following the security measures such as encryption and access controls must be consistently applied across all clouds for safeguarding sensitive data.

Usage of effective management tools facilitates in centralized monitoring and controlling for having optimized utilization of resources. Organizations can enhance the strengths of multiple clouds for minimizing complexities and maximize the benefits of their cloud environments.

What IT Teams Are Responsible For Cloud Networking?

IT teams are responsible for cloud networking for handling the following tasks:

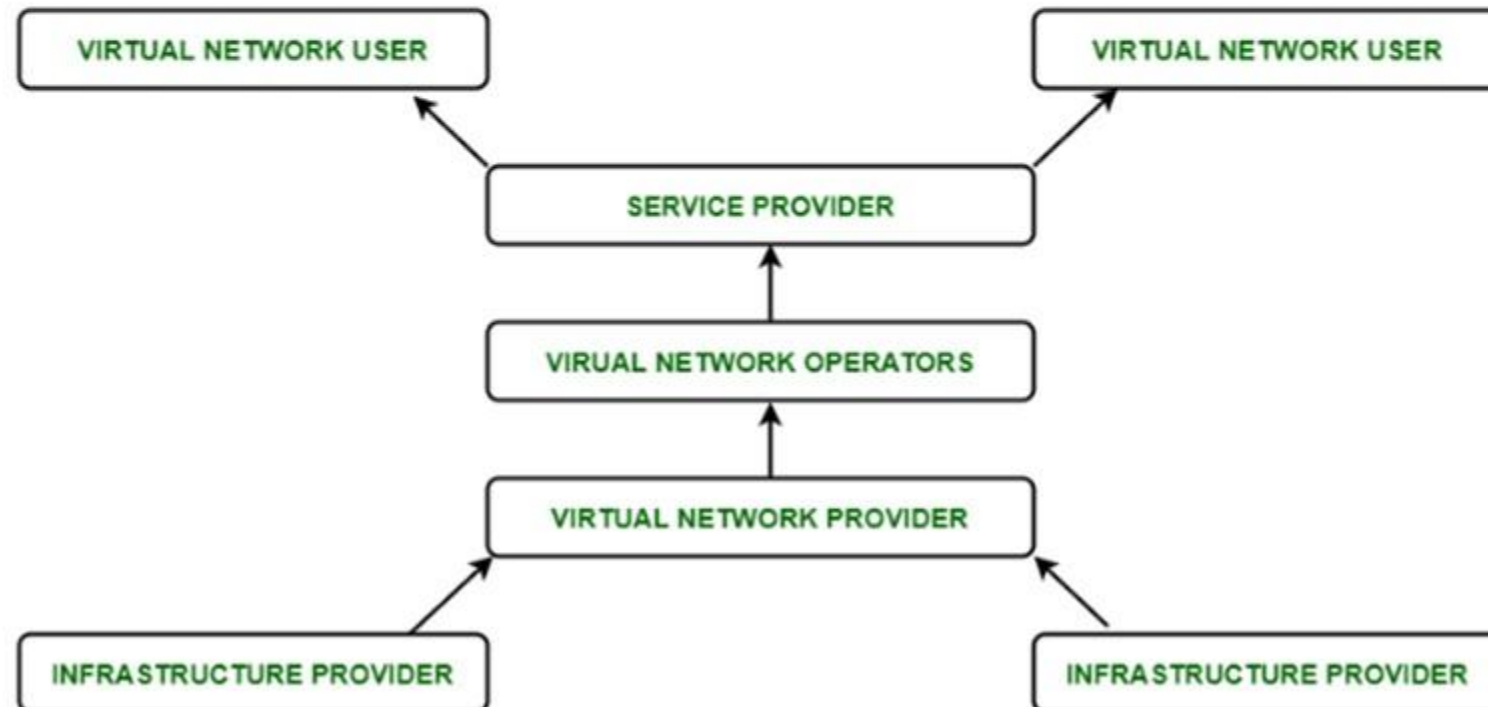
Network Architecture Design and Implementation: To ensure designing and deploying network architectures facilitates with seamless connectivity between on-premises infrastructure and cloud environments.

Configuration and Management of Networking Technologies: Configuring and managing the VPNs, SDN solutions and other networking technologies is responsible for IT teams to enable a secured communication and data transfer.

Network Security Implementation: Implementation of strong security measures such as access controls, Encryption, Assigning Access Roles and permissions to prevent unauthorized access to cloud resources are the responsibilities of IT teams to handle them.

Network Virtualization in Cloud Computing

Network Virtualization is a process of logically grouping physical networks and making them operate as single or multiple independent networks called Virtual Networks.



Tools for Network Virtualization :

Physical switch OS:

It is where the OS must have the functionality of network virtualization.

The basic functionality of the OS is to give the application or the executing process with a simple set of instructions. System calls that are generated by the OS and executed through the library are comparable to the service primitives given at the interface between the application and the network through the SAP (Service Access Point).

Tools for Network Virtualization :

Hypervisor:

It is which uses third-party software or built-in networking and the functionalities of network virtualization.

The hypervisor is used to create a virtual switch and configuring virtual networks on it. The third-party software is installed onto the hypervisor, and it replaces the native networking functionality of the hypervisor. A hypervisor allows us to have various VMs all working optimally on a single piece of computer hardware.

Tools for Network Virtualization :

Functions of Network Virtualization :

- It enables the functional grouping of nodes in a virtual network.
- It enables the virtual network to share network resources.
- It allows communication between nodes in a virtual network without routing of frames.
- It restricts management traffic.
- It enforces routing for communication between virtual networks.

Network Virtualization in Virtual Data Center :

1. Physical Network

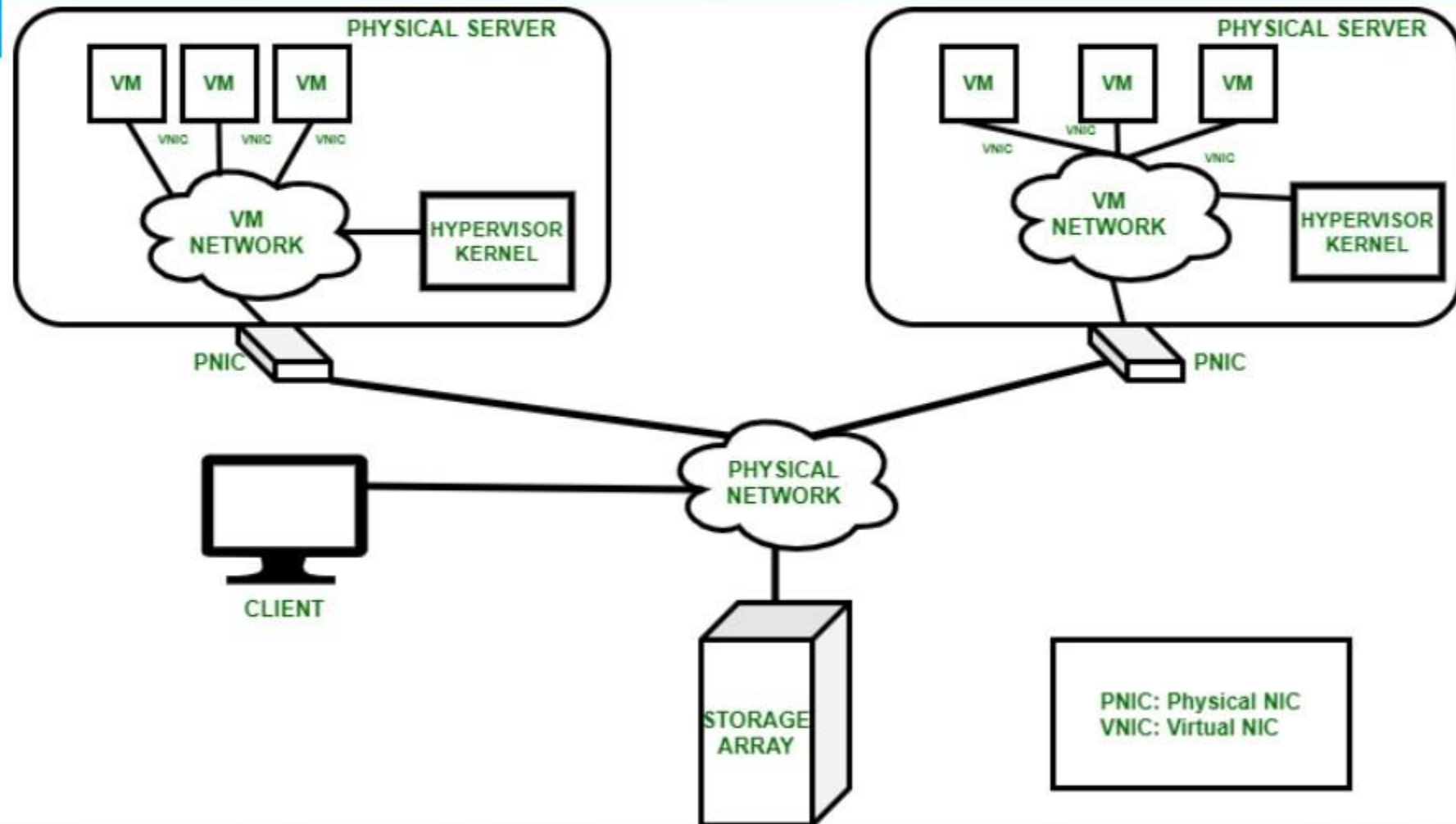
- Physical components: Network adapters, switches, bridges, repeaters, routers and hubs.
- Grants connectivity among physical servers running a hypervisor, between physical servers and storage systems and between physical servers and clients.

Network Virtualization in Virtual Data Center :

2. VM Network

- Consists of virtual switches.
- Provides connectivity to hypervisor kernel.
- Connects to the physical network.
- Resides inside the physical server.

Network Virtualization in Virtual Data Center :



Network Virtualization in Virtual Data Center :

Advantages of Network Virtualization :

- **Improves manageability:** Grouping and regrouping of nodes are eased. Configuration of VM is allowed from a centralized management workstation using management software.
- **Reduces CAPEX:** The requirement to set up separate physical networks for different node groups is reduced.

Network Virtualization in Virtual Data Center :

Advantages of Network Virtualization :

- **Improves utilization:** Multiple VMs are enabled to share the same physical network which enhances the utilization of network resource.
- **Enhances performance:** Network broadcast is restricted and VM performance is improved.
- **Enhances security:** Sensitive data is isolated from one VM to another VM.

Access to nodes is restricted in a VM from another VM.

Network Virtualization in Virtual Data Center :

Disadvantages of Network Virtualization :

- It needs to manage IT in the abstract.
- It needs to coexist with physical devices in a cloud-integrated hybrid environment.
- Increased complexity.
- Upfront cost.

Applications of Network Virtualization :

- Network virtualization may be used in the development of application testing to mimic real-world hardware and system software.
- It helps us to integrate several physical networks into a single network or separate single physical networks into multiple analytical networks.
- In the field of application performance engineering, network virtualization allows the simulation of connections between applications, services, dependencies, and end-users for software testing.

Applications of Network Virtualization :

- It helps us to deploy applications in a quicker time frame, thereby supporting a faster go-to-market.
- Network virtualization helps the software testing teams to derive actual results with expected instances and congestion issues in a networked environment.



Thank You