325663

DATA CENTRE TCHNO... UNIT 1

Q. Explain Different Design Factors for Data Centre Networks.

ANS. Designing Data Centre Networks involves certain ~~criteria~~ critical factors to ensure efficient, reliable, and scalable operations. Here are Some key Considerations :

① Scalability

The network should be able to grow with the increasing demands of data centre. This includes planning for future expansions and ensuring that the network can handle additional servers, Storage and applications Without performance degradation.

Ex: Implementing modular switches and routers that can be easily upgraded ore expanded.

(ii) Redundancy

It ensures that there are backup system in place to maintain network operations in case of hardware failures and other issues.

Ex: Using dual power supplies in switches and having multiple network paths to prevent single points of faliure.

(iii) Security

Protecting the data centre network from unauthorized access, attacks and data breaches is crucial. This involves implementing firewalls, IDS and security access controlls.

Ex: Installing firewalls and VPN's to secure data transfer and access

(iv) Performance

Ensuring high network performance is essential for smooth operation of application and services. This involves optimizing network configura using high speed network equipment

(v) Manageability:

The network should be easy to manage and monitor. This inclu
using Centrallized management tools and clear documentation.

(vi) Cost

Balancing performance and cost is important to ensure the data center network is both effective and economical. This involves selecting cost-effective hardware and software solutions without compromising on quality.

By Considering All these factors, data center network designers can create robust, scalable and efficient network that support critical operations.

Q. What is Virtualization.

ANS Virtualization in DCT is the process of Creating a virtual version of a physical data centre. This involves using software to mimic the functionallity of physical hardware, such as servers, storage devices and networks.
The key component in this process is a hypervisor, which is a software layer that allows multiple VMS to run on a single physical machine.

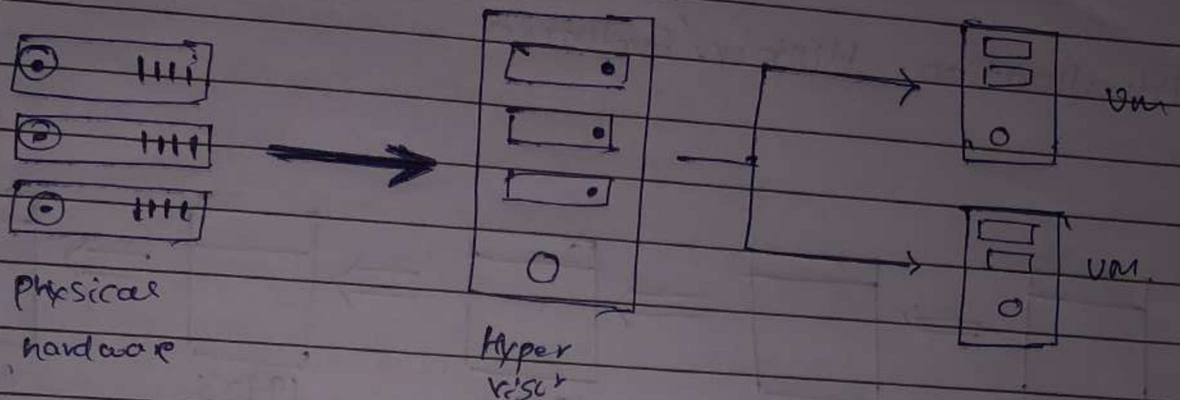
Benefits:

(i) Reduces need of physical hardware, leading to lower capital & operational expenses

(ii) ~~Sca~~ Easily scale resources up or down based on demand

(iii) Maximizes the use of available hardware resources

(iv) Simplifies backup and recovery process



Ex:

Imagine you have a single powerful physical server with 64GB RAM, 16CPU cores, and 2TB Storage.

An hypervisor is installed on physical server, which will act as an middle layer allowing multiple VM's to run on single physical machine. Installing vMware Exi on server

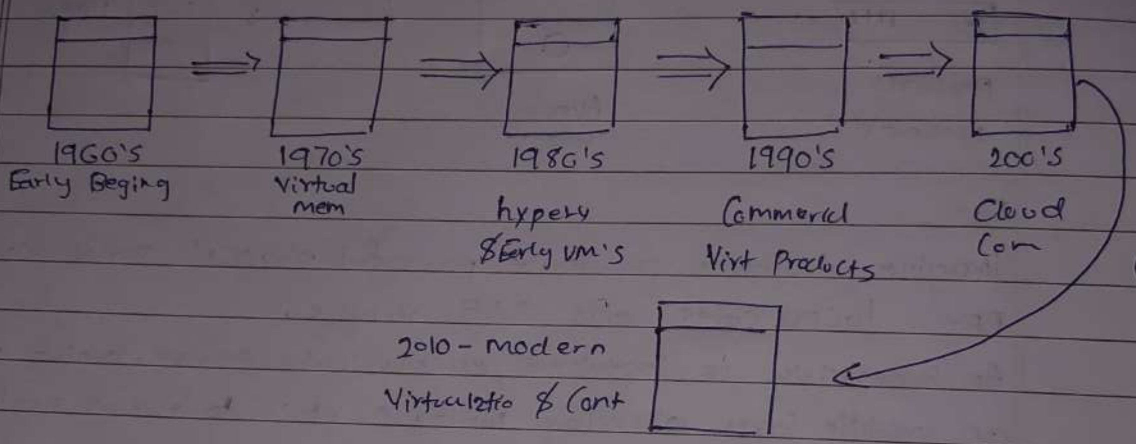
And then Creating several VMs. Each VM is software-based emulation on physical computer with its own OS and apps.

- VM 1 : Allocated 8GB RAM, 4CPU Cores and 500GB storage running a Linux OS for a web server
- VM 2 : Allocated 16GB RAM, 4CPU cores and 1TB storage running on Windows OS for a DB server.

Each VM operates independtly, as if it were running on its own physical hardware. This setup Maximizes the utilizati.n of physical server resources, reduces costs by consolidating hardware.

Q· Virtualization History/Evolution

ANS·



·1960's Early Begining

Virtualization began with time·sharing systems that allowed multip user to share a single Computer's resurces maximizing efficiently. IBM's CP-40 & CP-67 wer the pioneer systems that enabled multiple VM to run on a single physical machine, laying the foundation of modern virtualization.

·1970's Virtual Memory.

IBm system introduced virtual memory Capabilities allowing Cration of independent VM's that could operate as if they ~~where~~ on separate physical machine. This was a significant step in virtualiza technology.

·1980's Hypervisor & Early VM's

The Development of hypervisor, such as IBm VM/370, allowed multiple OS to run on single physical machine by providing a virtual layer that manage hardware resource. That layer was known as HYPERVISOR.

•1990's Commercial Virtualization Products:
In 1999, VMware introduced its first product, VM workstation, Which allowed users to run multiple OS on a single machine. This made virtualization more accessible and practical for commercial use. Microsoft entered the virtualization space in 2001 by acquiring Connectix, integrating virtual PC into its ecosystem.

•2000's

Server Virtualization:
Virtualization technology matured, enabling more efficient server utilization and reducing hardware costs. Hypervisors like VMware ESXi and Microsoft Hyper-V became Industry Standard.

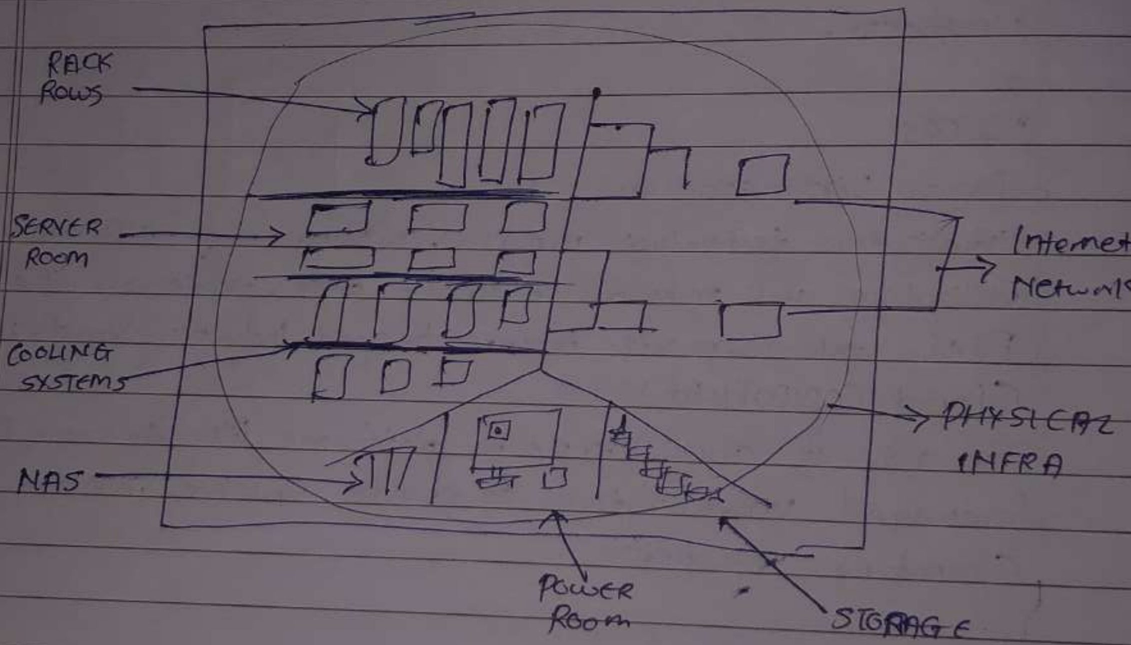
Cloud COMPUTING:
The rise of cloud computing platforms like Amazon EC2 in 2006 leveraged virtualization to provide scalable, on-demand computing resources

•2010's
Technologies like Docker emerged, providing a lightweight form of virtualization. Enterprise began to adopt hybrid and multicloud strategies to seamelessly integrate on premise & cloud resources.

Today Virtualization is an cornerstone of modern IT infrastrce, enabling everything from simple server consolidation to complex -server based services.

Q. Architecture of DATA CENTRE

Ans A data centre is an specialized facilty designed to house computer systems and related components, such as telecommuni and storage systems. It ensures that org have a seure and reliable environment to run IT operation and store their data.



①Physical Infra

This includes the building itself and all physical components ~~based on~~ housed with. This design ensures safety, accessibility and efficient space utilization.

(ii) SERVER ROOM.

A dedicated space within the data centre where servers are Critical hardware are housed. Designed to ensure optimal perform and security.

(iii) RACKS.

Metals frames used to mount servers, storage devices, and networking hardware. They provide organized and efficient use of space

(iv) COOLING SYSTEM

System designed to remove heat generated by equipment to maintain optimal operating temperatures. Includes air conditioning, liquid cooling and hot/cold aisle containment.

(v) NETWORK ATTATCHED STORAGE [NAS].

A file-level storage architecture that provides shared storage to multiple users over a network. Allows for centralized data storage and management.

(vi) INTERNET NETWORK

The data centre's network infra, including, switches, routers and firewalls, that enables communication both within data centre and with external networks.

(vii) POWER ROOM

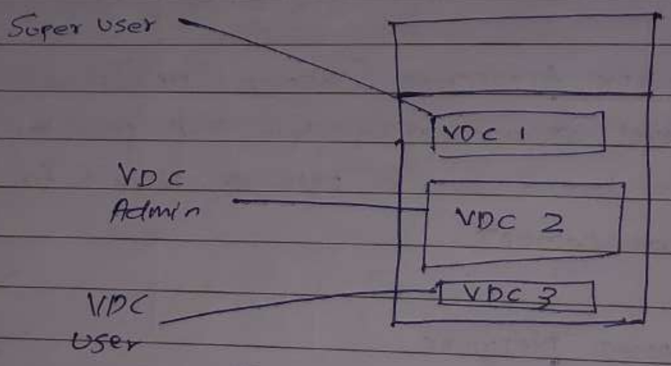
A dedicated power room /area housing the power infra, including UPS systems, backup generators and power distribution units (PDUs)

(viii) STORAGE

Various storage solution SAN (Storage Net Area), NAS and cloud storage These system ensure data is stored securely and can be accessed efficiently.

Q5. Explain VDC

Ans: VDC stands for · Virtual Device Contexts.
VCD's are a feature that enables a single physical network device like a switch, to be partitioned into multiple logical parts. This capability is prominently found in Cisco Nexus 700 series switches. Each VDC operates independently, with its own set of resources, configuration and management, providing significant and isolation network management



(i) SUPER USER

It has the highest level of controll over all VDC's within the device. This user can create modify and delete VDC's.

- Full access to manage and configure all VDC's
- Ability to allocate resources and assign ~~maintenanc~~ adminstrative role within each VDC.

Ex: An IT director responsible for the overall network infrastucture, ensuring that each VDC is operating optimally.

(ii) VDC Admin

Manages a specific VDC. This user is responsible for configuring and VDC allocated to them.

- Full controlled within their assigned VDC, including resources management and network config.
- Cannot access or modify other VDC's.

Ex: A network admin who oversees the production VDC, ensuring it meets Company's operational req.

(iii) VDC user

Has limited access to a specific VDC, typically for monitoring and usage purposes.

- Read-only access or limited config abilities assigned within their VDC.

Ex: A developer given access to test VDC to monitor application performance without making any network changes.

These Roles ensure that a single physical device can be effectively partioned and managed, providing flexibility and security within a data centre.