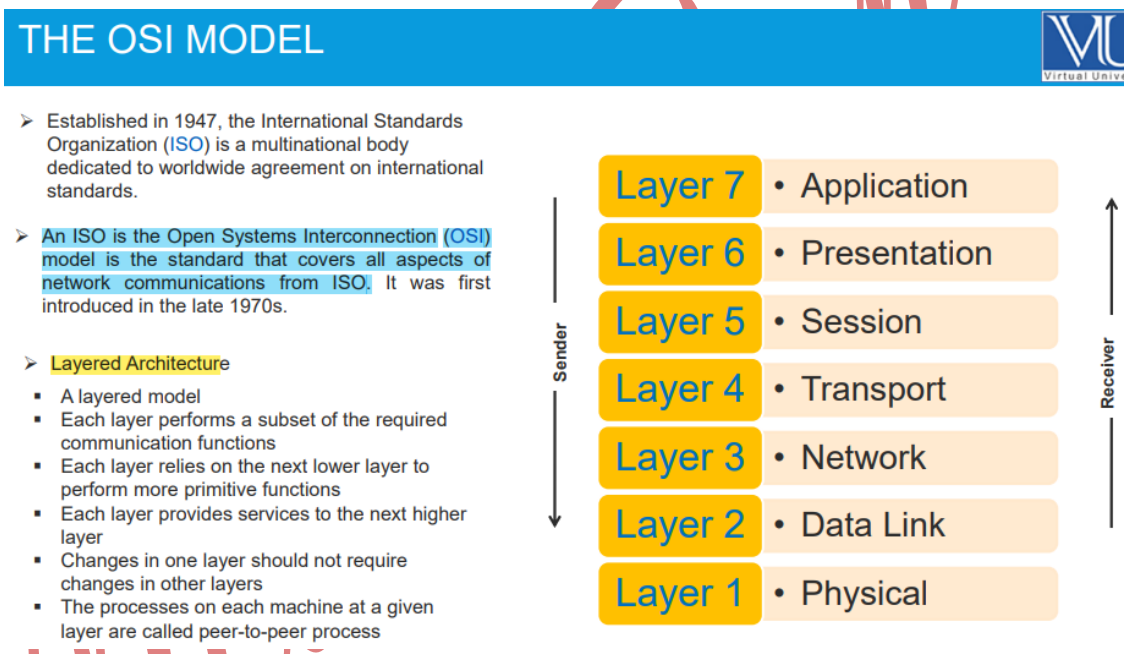
By Maha Rana

IT601 Updated Current Paper Solved

Paper.1 Solved

1- Working of OSI layer?



2-statements are written analysis and tell about 3-which type of scaling technique is?

Answer:

Horizontal scaling, a web server or web service resource is replicated and the load is divided among the replicated resources**.**

Vertical scaling: Separates out the various kinds of subservices, rather than duplicating a whole machine.

By Maha Rana

▪ It allows you to create an architecture with finer granularity, so that you can put more resources at the most intensively used stages of page creation.

4- Simple service and complex service?

Answer:

- When engineering a service, your foremost consideration should be simplicity. Strive to create the simplest solution that satisfies all the requirements.
- **Simple Services**

Maintenance	Expansion	Integration
▪ Easiest to maintain	▪ Easiest to expand	▪ Easiest to integrate with other systems

- **Complex Services**

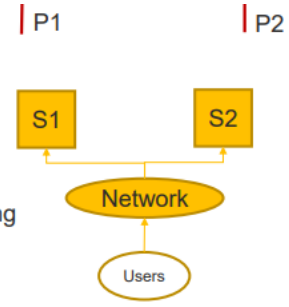
Confusion	Mistakes	Usage	Slower	Costly
▪ Leads to confusion	▪ Prone to mistakes	▪ Difficult to use	▪ Makes everything slower	▪ More expensive in setup cost and maintenance costs.

- During the engineering phase, create multiple design proposals. Consider each of them for its simplicity, manageability, cost, and so on. Revise, revise, revise.
- Good engineering is not about having the ability to create perfection in the first draft, but rather about being able to iterate over many revisions, improving each one until we have the design we want.

5- Non-Raid Approaches?

Answer:

- Non-RAID Approaches,
  - Redundant Systems vs Redundant Components
  - Distributed systems e.g Google's GFS, Hadoop's HDFS, Cassandra
  - Backups
- **Hot-Swap Components**
  - the ability to add, remove, and replace a component while the system is running
  - Not All components are hot swapable
- **Servers Should Be in Computer Rooms**



---

5. Benefits of DevOps?

Answer:

By Maha Rana

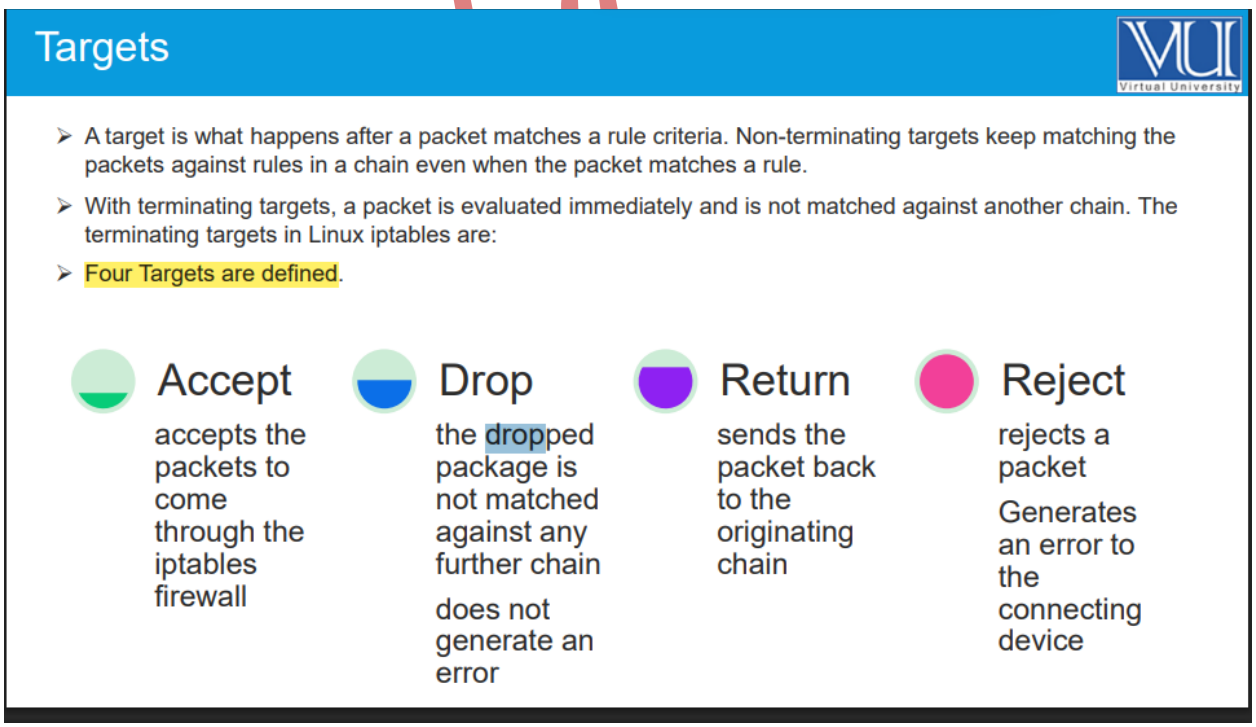
DevOps is a set of practices that combine software development (Dev) and IT operations (Ops) **to automate and streamline the software delivery process.**

Benefits of DevOps include:

- **Faster delivery of software updates.**
- **Improved collaboration between development and operations teams.**
- **Increased automation and reduced manual effort.**
- **Enhanced monitoring and faster issue resolution.**
- **Improved quality and reliability of software.**

Differentiate between Drop and Reject Targets?

Answer:



By Maha Rana

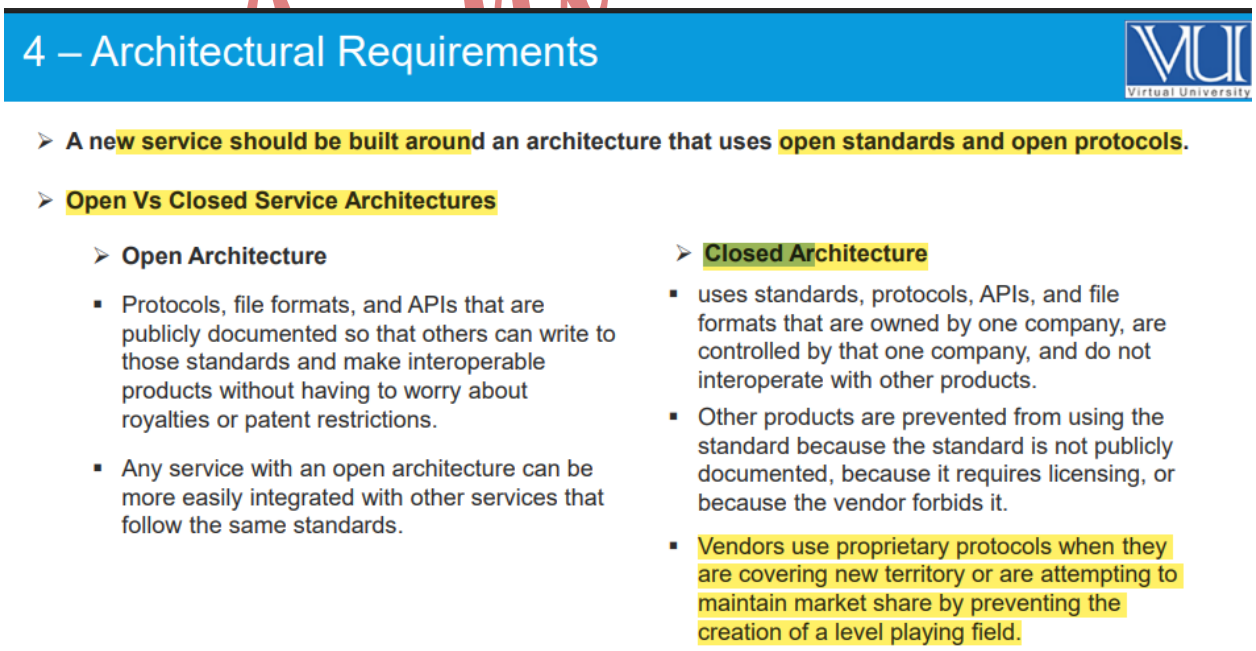
Paper.2 Solved

Non-RAID Examples?

Non-RAID setups typically utilize single or independent drives without redundancy. The slides do not explicitly list non-RAID examples, but relevant systems include:

- Standalone storage systems.
- USB external hard drives.
- Basic server storage setups without RAID (e.g., local disks on individual machines).
- Network-Attached Storage (NAS) configured without RAID.

Open or Closed Architecture?



By Maha Rana

NFSv4 features?

1. **Stateful Protocol:** Tracks client-server state, improving locking mechanisms and caching efficiency.
2. **Security Enhancements:** Uses Kerberos for authentication and data encryption.
3. **Unified Namespace:** Combines file and directory operations into a single, coherent namespace.
4. **Performance Improvements**: Reduces overhead through improved protocol handling.
5. **Firewall Compatibility**: Operates on a single port (TCP 2049), making it firewall-friendly

Steps to start a program on dynamic Web server through rpc. Explain with an example?

A remote procedure call is an inter-process communication technique used for client-server-based applications.

- A stub program on client machine is called
- Stub makes a system call to send the message to the server along with the parameters.
- The message is transferred to the server by the client's operating system. The message is received by server OS is passed to server stub.
- Server stub removes the parameters.
- Server stub calls server procedure.

Service Plans?

By Maha Rana

Services described in the slides align with principles of system and network administration:

- **Common Services**: DNS, DHCP, Web server, and Database.
- **Service Management Tasks**: Include monitoring, troubleshooting, and updates.
- **Backup Services**: Scheduling and managing backups both locally and remotely.
- **User Management Services**: Adding/removing accounts and handling permissions.

Support Document Plan?

- **Components**:
  - **Installation and Configuration Records**.
  - **Change Management Logs**: For updates and maintenance.
  - **User Manuals**: Documentation for users to understand their roles and access levels.
  - **Troubleshooting Guides**: Steps to resolve common issues.
  - **Backup Strategies**: Documentation for recovery procedures.
- **Tools for Document Support**:
  - Use version control systems (like Git) to track changes.
  - Ensure documentation is accessible to authorized personnel.

Paper.3 Solved

By Maha Rana

1. IP Address Classes?

IP addresses are categorized into five classes (A to E) based on the first octet:

Class	Address Range	Subnet Mask	Purpose
A	0.0.0.0 to 127.255.255.255	255.0.0.0	Large networks (Government/ISPs)
B	128.0.0.0 to 191.255.255.255	255.255.0.0	Medium networks (Universities)
C	192.0.0.0 to 223.255.255.255	255.255.255.0	Small networks (Offices/Home)
D	224.0.0.0 to 239.255.255.255	N/A	Multicasting purposes
E	240.0.0.0 to 255.255.255.255	N/A	Reserved for research

2. Two Types of Out-of-Band Management?

- **Two Types of Remote management techniques**
  - Integrated Out-of-Band Management
  - Non-integrated Out-of-Band Management

---

3. Types of IT Services?

IT services cover several areas:

1. **Infrastructure Services**:
   - Network management, hardware support, virtualization, and cloud hosting.
2. **Application Services**:
   - Development, deployment, and maintenance of business applications.

3. **Security Services**:
    - Firewall configurations, malware prevention, and user access controls.
4. **Backup and Recovery**:
    - Data backup, disaster recovery solutions.
5. **Support Services**:
    - Helpdesk, incident response, and system monitoring.

---

4. Simple Service vs. Complex Service?

Aspect	Simple Service	Complex Service
Definition	Single-function service (e.g., DNS lookup)	Multifunction systems (e.g., ERP software)
Scalability	Easy to scale	Difficult to scale and maintain
Setup	Quick and straightforward	Requires detailed planning and setup
Examples	File sharing	Cloud computing platforms

6. NFS Misbehaviour Issues?

NFS misbehaviour typically deal with:

- **Causes**:
    - Stale file handles due to server crashes or reboots.
    - Incorrect mount options.
    - Network latency or interruptions.
- **Solutions**:
    - Verify NFS server configuration.
    - Use proper NFS version and mount options (e.g., hard, intr).

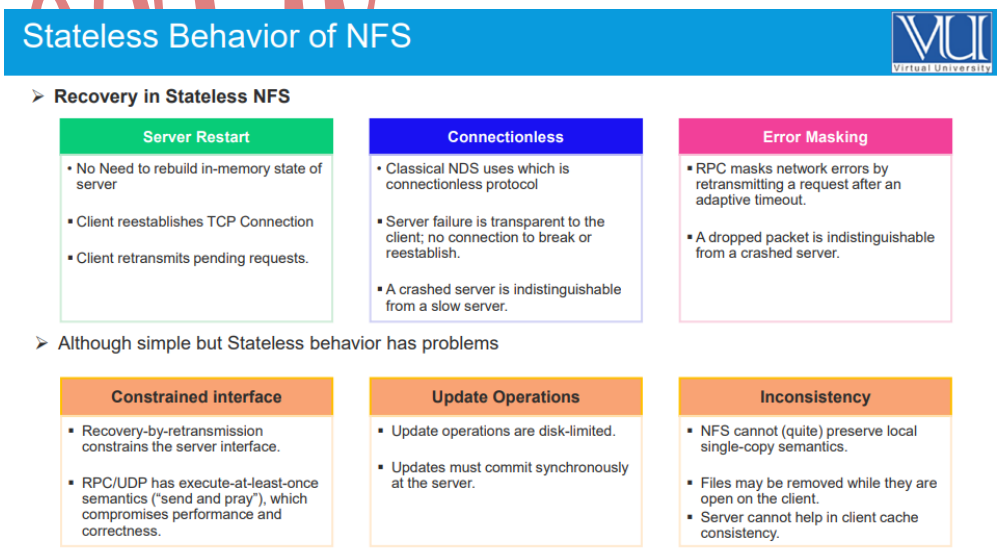
- Check network stability and ensure permissions are correctly configured.

Paper.4 Solved

1. DAS, NAS, and SAN – Differences?

Aspect	DAS (Direct Attached Storage)	NAS (Network Attached Storage)	SAN (Storage Area Network)
Definition	Directly attached to a server.	Shared storage connected to a network.	High-performance network of storage devices.
Connection	Connected via interfaces like SATA, SCSI.	Connected over Ethernet.	Connected via Fibre Channel or iSCSI.
Management	Managed at server level.	Centralized management via NAS appliances.	Managed as a block-level network.
Use Case	Single-server, local storage.	File sharing and backups.	Enterprise-level storage needs.
Performance	High performance, low latency.	Moderate performance.	Best for performance and scalability.
Examples	External hard drives.	Synology or QNAP devices.	Dell EMC, NetApp, HP SAN.

2. Stateless Behavior of NFS (Network File System)



By Maha Rana

3. DROP vs. REJECT in Firewall Targets?

Behavior	DROP	REJECT
Response	Silently drops the packet.	Actively sends a rejection response.
Use Case	For security; does not reveal system info.	For diagnostics; informs the sender.
Example Command	`iptables -A INPUT -p tcp --dport 22 -j DROP`	`iptables -A INPUT -p tcp --dport 22 -j REJECT`
Impact on Sender	Causes timeout for the sender.	Sender receives immediate rejection message.

4. Questions on SLA (Service Level Agreement) and SRM (Service Request Model)

Example SLA Questions?

1. **What key metrics are measured in an SLA?**
    - Response time, uptime, resolution time, etc.
2. **How do SLAs ensure accountability in service delivery?**
    - By clearly defining service standards, penalties, and rewards.

Example SRM Questions?

1. **What are the main stages in a Service Request Model?**
    - Request initiation, approval, fulfillment, and closure.
2. **Differentiate between incidents and service requests.**
    - Incidents resolve service disruptions, while service requests are for standard services like access provisioning.

By Maha Rana

5. Types of Out-of-Band Management

Type	Description
Serial Console Access	Direct connection via RS-232 serial ports for managing networking or server devices.
Dedicated Management Interfaces	Interfaces like iDRAC (Dell) or iLO (HP) for remote hardware access and monitoring.
KVM Over IP	Keyboard, Video, Mouse over IP networks for real-time remote system access.
Integrated Lights-Out Tools	Management platforms providing hardware-level access, even if OS crashes (e.g., AMT in Intel chips).

Paper.5 Solved

1. Communication ke liye jo message pass hota hai, uska naam kya hai?

The message that is passed during communication is called a **packet**.

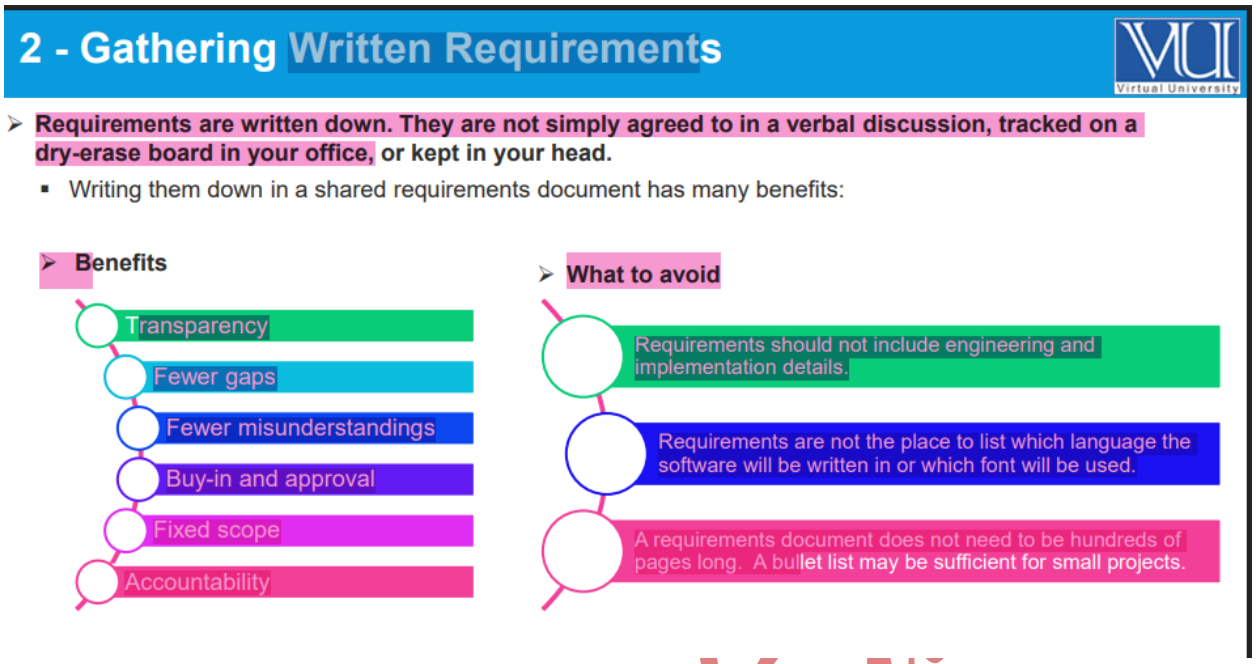
- A **packet** is a small unit of data that is broken down from a larger message for efficient transmission over a network.
- Each packet contains important information such as the **source address**, **destination address**, and the **actual data** being sent.

Example:

In the **TCP/IP protocol**, data is divided into packets, and each packet travels across the network independently to reach the destination, where the data is reassembled.

2. Benefits of Written Requirements

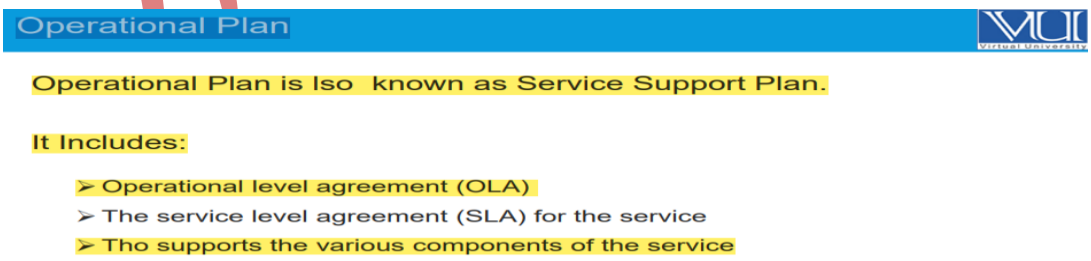
By Maha Rana



3. Protocols of MAP (Manufacturing Automation Protocol)

1. **Token Bus**:
    - Ensures deterministic access to the network for industrial automation devices.
    - Used for real-time data exchange.
2. **ISO Transport Protocol Class 4**:
    - Provides reliable, connection-oriented communication.

3. Components of an Operational Plan



By Maha Rana

5. Non-RAID Examples

1. **Single Disk Setup**: A single hard drive without redundancy.
2. **JBOD (Just a Bunch of Disks)**: Multiple drives combined without striping or mirroring.
3. **USB Flash Drives**: Standalone storage devices with no RAID capabilities.

---

6. DAS, SAN, NAS – Differences

Aspect	DAS	NAS	SAN
Connection	Directly attached to server	Shared over a network	Dedicated storage network
Protocol	SCSI, SATA	SMB, NFS	Fibre Channel, iSCSI
Use Case	Small setups	File sharing and backups	High-performance enterprise storage
Examples	External HDDs	Synology NAS	Dell EMC SAN

Paper 6 solved:

1. **Benefits of written requirement?**

- Benefits

  Transparency
- Fewer gaps
- Fewer misunderstandings
- Buy-in and approval
- Fixed scope Accountability

By Maha Rana

2. **Being a part of help desk planning team what kind of processing you will choose in the planning and execution phase ?**

Key Considerations OF HELP **desk for planning**

- A Friendly Face
- Reflect Corporate Culture
- Enough Staff
- Scope of Support
- How to Get Help

Key Considerations OF HELP**execution phases**

- Processes for Staff
- Escalation Process
- Defining “Emergency” Request-Tracking
- Statistical Improvements

5 benefits of server appliances strategy to an organisation differentiate the scaling type used in multiple machine web server ?

- Reduces resources
- Time to Service
- Less Expertise
- Performance
- Reliablity
- Specialized Features

A newly hide Linux system administrator wants to establish internet

connectivity? what kind of the IP table he use and list the chain for that table ?

Linux firewall iptables has four default tables.

Filter

Decides what packet get in and what packets get out of network

NAT

Applies the NAT Rules, Used to alter source/destination packets

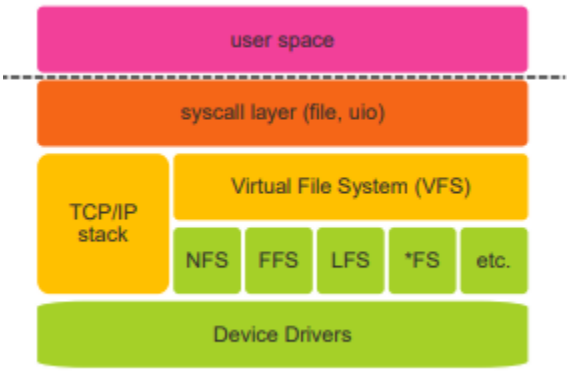
What is IP-KVM and how it helps the SA?

Keyboard, video screen, and mouse (KVM) switch is a device that allows many machines share a single.

An IPKVM switch provides the remote console access.

▪ An IP-KVM is a KVM switch that can be accessed remotely. This eliminates the need for any monitors, keyboards, or mice in the computer room. You simply run a client on your workstation that connects to the IP-KVM

draw a diagram where VFS lies in the operating system stack??



By Maha Rana

NFS ki diagram banana thi ke os stack pr kese hota ye?

NFS operates at multiple layers of the OS stack, primarily in the **Application, Transport, and Network layers**

open architecture close architecture

Open Architecture: Systems designed for compatibility and flexibility, allowing integration with different hardware and software. Examples include Linux and other open-source environment

Closed Architecture: Proprietary systems where the software or hardware design is restricted, such as Windows Server or Apple products.

Subnets were given and we have to tell the classes of them (it was a table

Given IP Address	First Octet	Class	Default Subnet Mask
10.0.0.1	10	Class A	255.0.0.0
172.16.5.1	172	Class B	255.255.0.0
192.168.1.1	192	Class C	255.255.255.0
224.0.0.5	224	Class D	N/A (Multicast)
250.1.2.3	250	Class E	N/A (Experimental)

Class	First Octet Range	Default Subnet Mask	Usage
Class A	1 – 126	255.0.0.0	Large networks
Class B	128 – 191	255.255.0.0	Medium networks
Class C	192 – 223	255.255.255.0	Small networks
Class D	224 – 239	N/A (Used for Multicasting)	Special use (Multicast)
Class E	240 – 255	N/A (Experimental)	Research & Development

By Maha Rana

Two scaling technologies and their working

horizontal scaling:

a web server or web service resource is replicated and the load is divided among the replicated resources**.**

Vertical scaling:

Separates out the various kinds of subservices, rather than duplicating a whole machine

types of web server:

Apache HTTP

NGINX

Microsoft IIS

Apache Tomcat

Ip tables ki commands likhni thi chain rules k sath, ip address given tha

▪ sudoiptables -A -i -p -s --dport–j

iptables -A INPUT -s 192.168.1.100 -j ACCEPT

Write 5 new features that are added to NFSv4:

Stateful Protocol: Tracks client-server state, improving locking mechanisms and caching efficiency.

Security Enhancements: Uses Kerberos for authentication and data encryption.

Unified Namespace: Combines file and directory operations into a single, coherent namespace.

Performance Improvements: Reduces overhead through improved protocol handling.

Firewall Compatibility: Operates on a single port (TCP 2049), making it firewall-friendly

Steps to start a program on dynamic Web server through rpc. Explain with an example

A remote procedure call is an inter-process communication technique used for client-server-based applications.

- A stub program on client machine is called
- Stub makes a system call to send the message to the server along with the parameters.
- The message is transferred to the server by the client's operating system.
- The message is received by server OS is passed to server stub.
- Server stub removes the parameters.
- Server stub calls server procedure.

Features of Mod Security:

It can protect the server from various attacks.

▪ It uses the regular expressions and rule sets to block the attacks.

▪ It works as a firewall.

It could work either embedded or as a reverse proxy.

Scenerio tha, jis m we have to tell k kon se records ki need hai. It was related

to A and AAAA maybe.

A record (ipv4)

Maps a domain name to an IPv4 address

AAAA Record (IPv6)

- **Maps a domain name to an IPv6 address**
- They help browsers and applications **resolve domain names** to the correct IP address.
- Websites and applications use these records to support both IPv4 and IPv6 users.
- They ensure **backward compatibility** (A record for older networks, AAAA for modern networks).

Binary code given tha usko base64 mein convert krna tha, binary code k 3 sets thy each set mein 8 digits thy

Divides binary data into 24 bit blocks

• Each block is then divided into 6 bit chunks

• Each 6-bit section is interpreted as one character causes 25% overhead

aik table tha bits type btane thy for 3 examples that is: simple text, long textual script, personal photograps, jin k liye options thi 7 bits, 8 bits, base64

Simple Text (e.g., "Hello")	**7 bits**	**ASCII characters mostly use 7-bit encoding (e.g., A = 1000001).**
Long Textual Script (e.g., Articles, Books)	**8 bits**	Modern text encoding (UTF-8) usually uses 8-bit representation per character.
Personal Photographs	**Base64**	Binary image data is encoded in Base64 for

(Images, Media Files)	text-based transmission (e.g., email, web).

By Maha Rana

May Allah grant you success, ease your efforts, and bless you with wisdom and perseverance. Keep your faith strong, for with prayer, every challenge becomes an opportunity. And please remember me in your prayers.

I hope this file helps you a lot; I have tried my best to find the most relevant and authenticated answers for the questions. However, in some cases, the questions might slightly differ from the ones in your slides. I recommend that every student kindly verify the answers on their own before using them. I am not responsible for any discrepancies.

Best wishes for Finals!