

IT601 Updated Current Paper Solved

Paper.1 Solved

1- Working of OSI layer?

Answer:

The Open Systems Interconnection (OSI) model is a conceptual framework that divides network communication into seven distinct layers. Each layer has specific functions and interacts with adjacent layers.

Layers of OSI Model and their Functions:

- ✚ **Physical Layer:** Handles the physical transmission of data bits over the network medium (e.g., cables, wireless).
- ✚ **Data Link Layer:** Responsible for error detection and correction, framing data into packets, and managing access to the physical medium.
- ✚ **Network Layer:** Handles logical addressing (IP addresses), routing, and packet forwarding.
- ✚ **Transport Layer:** Provides reliable end-to-end communication, flow control, and error recovery.
- ✚ **Session Layer:** Establishes, manages, and terminates communication sessions between applications.

✚ **Presentation Layer:** Handles data formatting, encryption, and compression.

✚ **Application Layer:** Provides services to user applications, such as email, file transfer, and web browsing.

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

Answer:

Scaling techniques are methods used to increase the capacity of a system to handle a growing workload. **There are two main types of scaling:**

✚ **Vertical Scaling:** Adding more resources (CPU, memory, storage) to an existing server. This is also known as "scaling up."

✚ **Horizontal Scaling:** Adding more servers to a cluster or pool. This is also known as "scaling out."

4- Simple service and complex service?

Answer:

✚ **Simple Service:** A service that can be easily implemented and managed, often with minimal dependencies. Examples include a web server serving static content or a database server.

✚ **Complex Service:** A service that requires more intricate implementation and

management, often involving multiple components, dependencies, and integrations. Examples include a distributed system with multiple micro services or a complex application with many features.

5- Non-Raid Approaches?

Answer:

- **RAID (Redundant Array of Independent Disks)** is a technology used to improve data reliability and performance by combining multiple physical disks into a single logical unit. Non-RAID approaches for data storage include:
- **JBOD (Just a Bunch of Disks):** Connecting multiple disks without any redundancy or performance enhancement.
 - **Spanning:** Distributing data across multiple disks without redundancy.
 - **Concatenation:** Combining multiple disks to create a single large volume.

5. Benefits of DevOps?

Answer:

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.**

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- * 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:

In networking, **both "drop" and "reject"** are actions that can be taken when a packet cannot be processed or forwarded. However, they have different implications:

- * **Drop:** The packet is silently discarded without any notification to the sender.
- * **Reject:** The packet is discarded and an ICMP (Internet Control Message Protocol) error message is sent back to the sender, indicating the reason for the rejection.

Paper.2 Solved

Non-RAID Examples?

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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.
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Open or Closed Architecture?

From the slides, architecture types might refer to:

- **Open Architecture:** Systems designed for compatibility and flexibility, allowing integration with different hardware and software. Examples include Linux and other open-source environments.
 - **Closed Architecture:** Proprietary systems where the software or hardware design is restricted, such as Windows Server or Apple products.
-

Long

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"Long" in IT-related terminology usually depends on the context. If you're asking about long-term setups or durability:

- It could imply the **longevity of hardware/software systems**.
 - Reliability metrics (MTBF, MTTR, etc.) may also apply for assessing system sustainability.
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NFSv4 Advancements?

Key advancements of **NFSv4** as compared to earlier versions (NFSv3) may include:

- **Security Improvements:** Support for stronger authentication mechanisms using Kerberos.
 - **Stateful Protocol:** Unlike earlier stateless protocols, NFSv4 can handle client-server state for improved caching and performance.
 - **Unified Namespace:** Combines features for file and directory operations.
 - **Access Control:** Supports ACLs (Access Control Lists) for better permission handling.
 - **Firewall-Friendly:** Operates over a single port (TCP 2049), making it easier to configure through firewalls.
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Service Plans?

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?

The support document plan might align with creating and maintaining comprehensive documentation as part of system administration best practices:

- **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

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?

Out-of-band (OOB) management allows administrators to manage servers remotely, even if the primary network is down. Two types of OOB are:

1. Serial Console Access:

- Uses a serial port to establish a direct connection to the hardware.
- Suitable for managing networking equipment like routers and switches.

2. Dedicated Management Interfaces (e.g., iLO, iDRAC):

- Built-in interfaces for server management.
 - Allows control of power states, BIOS configurations, and remote access to servers.
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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.
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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)

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NFS is typically stateless in design, especially in earlier versions (e.g., NFSv3):

- **Definition:** Statelessness means the server does not retain information about client requests or sessions. Each client request contains all the necessary data for execution.
- **Pros:**
 - Simplifies server recovery.
 - Clients can continue sending requests after failures without resynchronization.
- **Cons:**
 - Challenges handling disconnected states or errors like stale file handles.
- **Stateful NFS (NFSv4):** Adds state retention for enhanced security, locking mechanisms, and performance.

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	<pre>iptables -A INPUT -p tcp --dport 22 -j DROP</pre>	<pre>iptables -A INPUT -p tcp --dport 22 -j REJECT</pre>
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.

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).

6. Scenario-Based Questions on VPN (Virtual Private Network)

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Example Scenario Questions:

Scenario 1: Recommending a VPN Protocol

Recommendation:

- **Protocol:** OpenVPN is recommended for the company to allow secure remote access for employees.

Reasons:

1. Security:

- OpenVPN supports AES-256 encryption, ensuring strong data protection.
- It uses SSL/TLS for key exchange, making it resistant to attacks.

2. Cross-Platform Compatibility:

- OpenVPN works across Windows, macOS, Linux, iOS, and Android, ensuring accessibility for diverse employee devices.

3. Customization:

- Highly configurable for both site-to-site and remote-access VPNs.

4. Ease of Integration:

- OpenVPN can traverse firewalls and network address translation (NAT) because it operates on standard TCP or UDP ports.

For simpler setups with high-speed requirements, **IPsec** could be an alternative if hardware VPN appliances are in use.

Scenario 2: Troubleshooting VPN Performance Issues

Steps to Troubleshoot:

1. Analyze Bandwidth Usage:

- Use monitoring tools (e.g., NetFlow or Wireshark) to check if the slow performance is due to high usage.
- Confirm if the VPN server has sufficient bandwidth for the connected users.

2. Check VPN Server Locations:

- Ensure users in specific regions are connected to the geographically closest VPN server.
- Consider setting up additional servers in that region to reduce latency.

3. Encryption Level:

- High encryption levels (e.g., AES-256) increase CPU utilization and impact performance.
- Reduce to AES-128 or disable compression if suitable for the situation.

4. Network Latency and Packet Loss:

- Run a traceroute or ping test to check latency between users and the VPN server.
- If the connection is unreliable, investigate intermediate hops.

5. Server Resources:

- Evaluate if the VPN server has sufficient CPU and memory to handle concurrent connections.
- Check server logs for overload or errors.

6. Configuration Optimization:

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- For OpenVPN, optimize MTU settings to minimize packet fragmentation.
- Ensure TCP/UDP ports are properly configured to avoid firewall bottlenecks.

7. DNS Resolution:

- Check DNS server performance as slow resolutions can affect overall VPN performance.

8. Feedback from Users:

- Collect reports from affected users to pinpoint patterns or specific activities causing the slowdown.

9. Testing:

- Simulate VPN connections from the affected region using tools or by connecting directly as an admin to verify the issue.

Outcome: After troubleshooting, adjust configurations or resources as necessary to improve VPN performance.

Paper.5 Solved

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

Jo message communication mein pass hota hai, usay **Packet** kehte hain.

- **Packet:** Network communication ke liye data chhote-chhote packets mein todh diya jata hai, jo network par efficiently transfer hote hain.
Example: TCP/IP protocol mein, har packet ke sath source, destination address, aur data hota hai.

2. Benefits of Written Requirements

1. **Clarity:** Provides a clear understanding of project objectives, scope, and constraints.
 2. **Accountability:** Acts as a record to hold stakeholders accountable.
 3. **Conflict Resolution:** Resolves ambiguity by specifying what is expected.
 4. **Training Reference:** Can be used for educating new team members or stakeholders.
 5. **Improved Collaboration:** Serves as a common point of reference between teams.
 6. **Traceability:** Ensures traceability between requirements and project deliverables.
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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.
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4. Components of an Operational Plan

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1. **Objectives:** Clear, measurable goals that need to be achieved.
 2. **Activities:** Step-by-step tasks required to meet objectives.
 3. **Resources:** People, tools, and materials necessary for executing activities.
 4. **Timeline:** Scheduled timeframes for completing each task.
 5. **Budget:** Detailed cost estimates for executing the plan.
 6. **Monitoring and Evaluation:** Methods for tracking progress and performance.
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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.
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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

7. NFSv4 - 5 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.

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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. I hope this file helps you a lot, and please remember me in your prayers.

Best wishes for Finals!

Maha 😊

