**Unit - 4**

**SAN vs NAS**

| **Key** | **Storage Area Network (SAN)** | **Network Attached Storage (NAS)** |
| --- | --- | --- |
| **Stands for** | SAN stands for Storage Area Network. | NAS stands for Network Attached Storage. |
| **Data Identification** | Data is identified by disk blocks. | Data is identified by file names and byte offsets. |
| **Managed by** | File system is managed by servers. | File system is managed by the head unit (like a CPU). |
| **Cost** | More expensive than NAS. | Less expensive than SAN. |
| **Protocols** | Uses SCSI, SATA, Fibre Channel protocols. | Uses File server protocols (NFS, CIFS, SMB). |
| **Users** | Used in professional and enterprise environments. | Commonly used in households and small to medium-sized businesses. |
| **Connections** | Requires dedicated Fibre Channel connections and Ethernet for file traffic. | Connects easily to existing Ethernet networks. |
| **Backup and Recovery** | Block-by-block copying technique used for backup and recovery. | File-based backups and recovery techniques. |
| **Performance** | High performance suitable for high-speed traffic systems. | Not ideal for high-speed traffic environments. |
| **Scalability** | Can scale by adding more storage controllers or expanding arrays. | Scalable in high-end models, with clustering and scale-out options. |
| **Latency** | Lower latency compared to NAS. | Higher latency compared to SAN. |
| **Virtualization Support** | Supports virtualization. | Does not support virtualization. |
| **Management Complexity** | More complex to manage and requires specialized knowledge. | Easier to manage with a simpler interface. |
| **Network Dependency** | Independent of LAN, uses a dedicated Fibre Channel network. | Depends on TCP/IP networks and LAN. |
| **Network Bottlenecks** | Not affected by network traffic bottlenecks. | Affected by network traffic bottlenecks. |
| **Conclusion** | Ideal for large businesses with centralized storage needs and high performance. | Best for smaller businesses or home use, prioritizing ease of access and file sharing. |
| **Diagram** | 0*c1wnTPKRW1C_4oVn (1400×934) | 0*c1wnTPKRW1C_4oVn (1400×934) |

**ISCSI (Internet Small Computer Systems Interface)**

It is an internet protocol which works on the top of TCP (Transport Control Protocol). It is a protocol which is used for linking the data storage components or facilities.

Using the SCSI commands over the TCP/IP network, it transfers the data over the intranet.

It allows the block-level SCSI data transport between the client and the storage over the Transport control protocol/Internet protocol networks. It can also be used for transmitting the data over the LAN, WAN, or the internet.

It connects the computing devices to the network storage. This internet protocol uses the initiators for sending the commands of SCSI to the storage devices on the remote servers.

Fibre Channel is also an iSCSI, which is used for creating the SAN (Storage Area Network). ISCI uses the two ports of TCP, whose names are 80 and 3260. It also offers the high-level encryption of data packets which are being transferred.

How Does iSCSI work?

In Iscsi, block-level data is transferred between the client (iSCSI initiator) and the storage device (iSCSI target). There are lots of iSCSI devices that allow this communication between the client and the storage devices.

When an application or end-user sends a request to access a file, the server converts the SCSI commands into the iSCSI command, and after then packets are sent over the IP network using the point-to-point connection. When the packets have arrived at the receiving side, then the iSCSI protocol disassembles the packets. It then converts these packets into SCSI commands and, finally, issue them to the storage.

**Advantages of iSCSI:**

1. It uses the TCP/IP protocol to enable long-distance IP routing without the requirement of any external gateway hardware. And, it also increases flexibility by using the TCP/IP.
2. It uses the standard ethernet, so there is no need for any expensive component to be built.
3. As compared to the Fibre channel, it offers the cheap connectivity network for transferring the files at the block level.
4. Reusability is also another advantage of iSCSI. The existing server can also be reused for the iSCSI implementation.
5. As it is used for block storage, so it is very fast and efficient than other file transfer protocols (FTP).
6. It is very simple to understand and configure, so users do not need much knowledge about the iSCSI storage system.

**FCIP**

**FCoE**

**Techniques for Big data processing**

**HDFS**

**HIVE**