

Introduction:-

Q) What is meant by "filesystem"?

A) It is a system, that controls how data is stored and retrieved. The structure and logic rules, used to manage the groups of data and their names, is called a file system.

Q) What are some aspects/characteristics, of a file system?

A) They are:-

i) Space Management

ii) Filenames

iii) Maintaining Integrity

iv) Directories.

→ Now we are going to discuss, a few types of file systems, namely NAS, DAS, NAT and iSCSI.

a) NAS - (Network Attached Storage)

→ It is a dedicated storage device, that is stored on a local network, like LAN

→ It functions like a computer, comprising of hard disk drives, SSD (Solid State Drives) and a RAID (Redundant Array of Independent Disks) controller, which helps in organizing physical components of a NAS like Keyboard, USB, WLAN, into a virtual drive. It acts as a centralized server computer.

Working:-

→ NAS Systems are essentially file servers, that have been optimized for storing data, in local networks. Access to the LAN, is done via the Windows SMB (Server Message Blocks), NFS (Network File System) or FTP (File Transfer Protocol).

→ SMB, FTP, or NFS are used, as the system's transfer protocols.

Features:-

- i) Provides control to the users, in accessing saved data, on a common network.
- ii) Administration, of NAS, is managed, through a GUI (Graphic User Interface).

- iv) It offers expandability to a large number of devices.
- v) Provides reliability and security of stored data.
- vi) Advanced features, such as snapshots, is provided.

Clustered NAS

It is a file system, that runs simultaneously on multiple servers. The additional feature is its ability to distribute data and metadata, across the cluster nodes or storage devices.

Software Examples:-

FreeNAS, NAS4Free (both are open source software)

b) DAS (Direct Attached Storage)

- This is the arrangement of attaching a digital storage device, to a computer, thereby accessing it.
- The filesystem of the DAS is defined and controlled by the operating system of the PC, to which the DAS is connected to.

Working:-

- A typical DAS System, is made up of an external storage device, such as hard drives or optical disc drives, being connected to the user's PC, through a HBA (Host Bus Adapter). The main protocols used for DAS connections are ATA, SATA and eSATA.

Features:-

- i) DAS is less expensive, as compared to NAS
- ii) DAS is not shareable - It is because DAS is exclusive only to the server, that it is connected to, hence not exposed to security breaches.
- iii) It is not generous, in terms of size and volume.
- iv) It does not match the performance provided by NAS and other file systems.
- v) It does not provide features like snapshots.

c) iSCSI (Internet Small Computer Systems Interface)

- iSCSI is a transport layer protocol, that describes how SCSI packets should be transported over a TCP/IP network.
- It makes it possible to set up a shared-storage network, where multiple servers and clients can access central storage resources, as if the storage device was locally connected.

Working:-

Aspirin iSCSI works by transporting data, between an iSCSI initiator on a server and an iSCSI target on a storage device. The iSCSI protocol encapsulates SCSI Commands and assemble the data, in packets for the TCP/IP Layer. Packets are sent over the network, using a point-to-point connection.

Further, the iSCSI protocol disassembles the packets, separating the SCSI commands so that the OS will see the storage as if it was a locally connected SCSI device, that is formatted

Security :-

- i) Authentication - Here the CHAP (Challenge-Handshake Authentication Protocol) method is used between iSCSI targets and initiators, to prove their identity. But CHAP is itself vulnerable to dictionary attacks and spoofing.
- ii) Logical Network Isolation - This is a method, done to ensure only valid initiators connect to storage arrays. Administrators most commonly run on iSCSI over logically isolated backchannel networks.

Features:-

- i) It is cost-effective
- ii) It provides flexibility
- iii) Its performance is a drawback, due to usage of Host Bus Adapter.
- iv) Increased Storage utilization & manageability is achieved.

Conclusion:-

We can define NAS, as the best storage filesystem, that is available today. It is reliable, versatile and extensible in nature.

Bibliography:-

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