UNIT-4

HYBRID STORAGE SOLUTIONS

① **Virtualization.-**

It is a technique of masking ~~and~~ or abstracting physical resources, which ~~it~~ simplifies the infrastructure and accomodates the increasing pace of business and technological changes. It increases the utilization and capability of IT resources.

→ **Memory Virtualization** -

Virtual memory makes an application appear as if it has its own contiguous logical memory independent of the existing physical memory resources.

A memory address space is divided into contiguous blocks of fixed-size pages.

→ **Network Virtualization** - (include VLAN concept) - Refer Unit 3 of cloud computing.
and VSAN

→ **Server Virtualization** = Refer Unit 3 of cloud computing

→ **Storage Virtualization** - Refer Unit 3 of cloud computing.

→ Implementation of ~~store the~~ Network based storage virtualization

② **Appliances** (~~Storage Virtualization Configuration~~) -

Storage Virtualization at the network is implemented using either **in-band** or the **out-of-band** methodology.
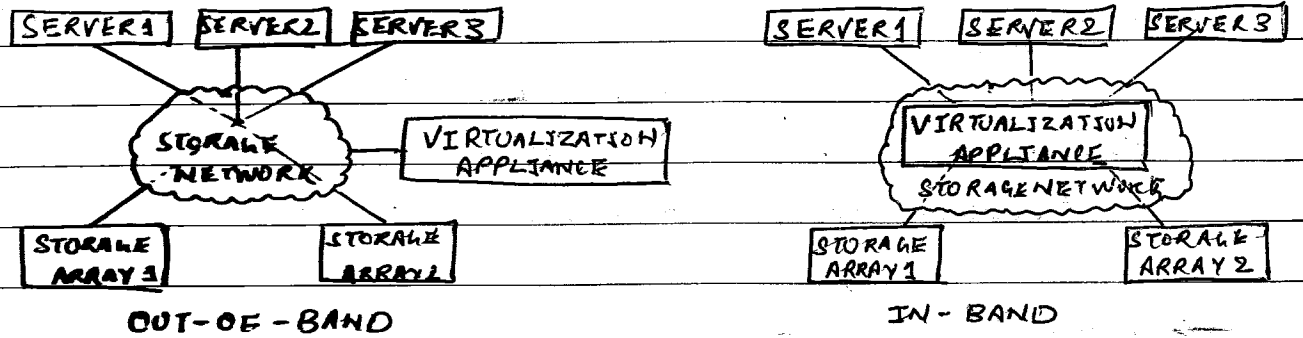
~~Virtual~~ appliance is hardware-based devices that provide SAN connectivity of one form or another.

In **in-band appliance**, handles the virtualization and function as a translation engine for the virtual configuration ~~of~~ to the physical storage. While processing, data packets are often cached by the appliance and then forwarded to the appropriate target.

Data storing and forwarding are ~~the~~ done through the appliance.

In **out-of-band appliance**, stored virtualized environment configuration which is configured external to the storage network that ~~are~~ carries the data. The data is **not** cached at the appliances beyond what would normally occur in a typical SAN configuration.

Data storing and forwarding are **not** done through the appliance

| SERVER1 | SERVER2 | SERVER3 | | SERVER1 | SERVER2 | SERVER3 |

STORAGE NETWORK — VIRTUALIZATION APPLIANCE

VIRTUALIZATION APPLIANCE / STORAGE NETWORK

| STORAGE ARRAY 1 | STORAGE ARRAY 2 | | STORAGE ARRAY 1 | STORAGE ARRAY 2 |

OUT-OF-BAND   IN-BAND

① ⓐ <u>Data center concepts and requirements</u> — Refer Unit 1 ~~Unit 2~~ of ISM, that is Overview of storage infrastructure components.

② ⓑ <u>Backup and Disaster Recovery</u> —

A Backup is a copy of production data, created and retained for the sole purpose of recovering deleted or corrupted data.

→ <u>Backup purpose / principle</u> —

Backup are performed to serve three purposes —

(1) <u>Disaster Recovery</u> — The backup copies are used for restoring data at an alternate ~~so~~ site when the primary site is incapacitated due to a disaster. Based on RTO and RPO requirements, organizations uses different backup strategies for disaster Recovery. [Refer Unit 3 of cloud computing for RTO and RPO]

Various methods are — tape-based backup; Remote replication.

(2) <u>Operational Backup</u> — It is backup of data at a point in time and is used to restore data in the event of data loss or logical corruptions that may occur during routine processing.

They are created for the active production information by using <u>incremental or differential backup techniques.</u>

(3) <u>Archival</u> — Backup is used by small and medium enterprises for long-term preservation of transaction records, e-mail messages, and other business records required for regulatory compliance. Traditional Backups are used.

** ** Backups also serves as a protection against data loss due to physical damage of storage device, software failures, virus attacks, deletion or intentional data destruction.

MANAGING AND MONITORING —

① **Industry Management Standards** —

(1) **SNMP** (Simple Network Management Protocol) —

A network management protocol used to monitor, the health and performance of network -attached devices.

It was the standard used to manage multi-vendor SAN environments.

Advantages —

(1) Simple design , (2) Widely Used , (3) Easy to implement

(4) Simple connectionless protocol on the transport level.

Disadvantages —

(1) Unavailability of automatic discovery function.

(2) Weak modelling constructs

(3) Lack of transactional support.

(2) **SMI-S** (Storage Management Initiative - Specification) —

It is based on WBEM (Web -based Information model Enterprise management) technology, and the DMTF's CIM (Common Information Model).

The initiative was formally created to enable broad interoperability among heterogeneous storage vendor systems and to enable better management solutions that span these environments. This initiative is known as Storage Management Initiative (SMI).

SMI-S form a normalized, abstracted model to which a storage infrastructure's physical and logical components can be mapped, and which can be used by management applications such as storage resource management, device management and data management for standardized, end-to-end control of storage resources.

STORAGE RESOURCE MANAGEMENT	CONTAINER MANAGEMENT	DATA MANAGEMENT
	Management Tools	
SMI-S		
	Managed Objects	
PHYSICAL COMPONENTS		LOGICAL COMPONENTS
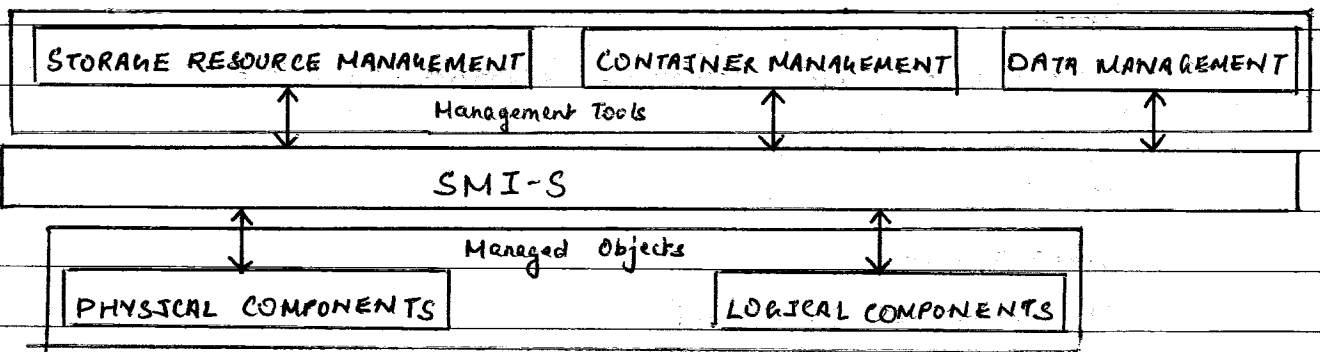
Advantages -

(1) Ability to report on multi-vendor storage environments more easily.

(2) A common user interface instead of multiple, vendor-specific applications for each storage platform.

(3) Common management of storage replication in a multi-vendor storage environment

(4) Reduced management costs.

Features -

(1) Common data model

(2) Interconnect Independence

(3) Multilayer Management

(4) Legacy system accommodation

(5) Policy-based management.

(3) CIM (Common Information Model) -

It is a language and methodology for describing management elements. A CIM schema includes models for systems, applications, networks and devices.

This schema also enables applications from different vendors working on different platforms to describe the management data in a standard format so that it can be shared among a variety of management applications.

Advantages -

(1) An agent can perform management functions on its own.

(2) Support authorization

(3) Access Control

(4) Security locks

(5) No security, upgrades and recovery.

Disadvantages -

(1) Needs more system resources as compared to SNMP

(2) Very difficult to program

(3) full implementation

Advantages -

(1) Increase integration speed

(2) Reduces mapping between applications

(3) Reduces Data Modelling and Scheme design effort.

(4) Interoperability

(5) Economical Maintainance

Disadvantages -

(1) Additional translation (adapter) layer.

(2) Lacking standards

(3) Initial Maintainence issues

② <u>Standard framework applications</u> -

       Standard framework interface(s) is used by storage management applications.

       Support for multi-vendor applications using the common framework.

③ <u>Key management metrics</u> -

① <u>Accessibility</u> refers to the <u>availability</u> of a component to perform a denied operation.

② <u>Capacity</u> refers to the amount of storage infrastructure resources available.

③ <u>Performance</u> evaluates how efficiently different storage infrastructure components are performing and helps to identify bottlenecks.

④ <u>Security</u> helps to track and prevent authorized access and login failures, whether accidential or malicious.

⑤ <u>Threshold</u> is a magnitude after which alerts are issued while monitoring.