Assignment-5

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Q1. Explain the concept of LUN?

Ans:- In simple terms, a logical unit number (LUN) is a slice or portion of a configured set of disks that is presentable to a host and mounted as a volume within the OS.

Internal architecture and front end connections aside, the primary reason for purchasing a disk array is to provide data storage capacity through presenting a number of physical disks, and making them available and configurable to the IT administrator for the purposes of distributing portions of that capacity (e.g. volumes) to specific applications.

The disks in an array are usually configured into smaller sets (RAID groups) to provide protection against failure. These RAID groups define the manner in which the group of physical disks handle data when it is written to the disks within that group (and as such, the way in which that data is protected). However, a RAID group (being the underlying structure of that group of physical disks), is not presentable to the host. In order to do this, an administrator must create a LUN which can be presented to and mounted on a host operating system.

In terms of LUN management, the LUN can either be configured as a small ‘slice’ of the total usable capacity of the RAID group, or configured to use the total space available within that RAID group, (dependant on the requirements of the application that it wishes to use it). The logical unit number (LUN), when presented to the host, shows as a mountable volume of the same capacity as the ‘slice’ configured by the administrator, hiding any remaining capacity on that RAID group. Any remaining capacity can then be 'sliced' into additional logical unit number (LUNs) as required.

Q2. What is Multipathing? How is it different from Path?

Ans:- Multipathing is the technique of creating more than one physical path between the server and its storage devices. It results in better fault tolerance and performance enhancement. Oracle VM supports multipath I/O out of the box. Oracle VM Servers are installed with multipathing enabled because it is a requirement for SAN disks to be discovered by Oracle VM Manager.

Multipathing is a technique that lets you use more than one physical **path** that transfers data between the host and an external storage device. In case of a failure of any element in the SAN network, such as an adapter, switch, or cable, ESXi can switch to another physical **path**, which does not use the failed component.

Q3. Discuss HA Clusters and its nodes Configurations?

Ans:- Computing environments configured to provide nearly full-time availability are known as high availability systems. Such systems typically have redundant hardware and software that makes the system available despite failures. Well-designed high availability systems avoid having single points-of-failure. Any hardware or software component that can fail has a redundant component of the same type.

Cluster Components and High Availability

This section describes high availability and cluster components in the following sections:

- Cluster Nodes
- Cluster Interconnects
- Storage Devices
- Operating System Software and Cluster Managers
- Database Software

Cluster Nodes

Real Application Clusters environments are fully redundant because all nodes access all the disks in the cluster. The failure of one node does not affect another node's ability to process transactions. As long as the cluster has one

surviving node, all database clients can process all transactions, although subject to increased response times due to capacity constraints on the one node.

Cluster Interconnects:

Interconnect redundancy is often overlooked in clustered systems. This is because the mean time to failure (MTTF) is generally several years. Therefore, cluster interconnect redundancy might not be a high priority. Also, depending on the system and sophistication level, a redundant cluster interconnect could be cost prohibitive and have insufficient business justification.

However, a redundant cluster interconnect is an important aspect of a fully redundant cluster. Without this, a system is not truly free of single points-of-failure. Cluster interconnects can fail for a variety of reasons and not all of them are accounted for. Nor can the be accounted for when manufacturer MTTF metrics are provided. Interconnects can fail due to either device malfunctions, such as an oscillator failure in a switch interconnect, or because of human error.

Storage Devices

Real Application Clusters operate on a single image of the data; all nodes in the cluster access the same set of data files. Database administrators are encouraged to use hardware-based mirroring to maintain redundant media. In this regard, Real Application Clusters are no different from single instance Oracle. Disk redundancy depends on the underlying hardware and software mirroring in use, such as a Redundant Array of Independent Disks (RAID).

Operating System Software and Cluster Managers

Real Application Clusters environments have full node redundancy; each node runs its own operating system copy. Hence, the same considerations about node redundancy also apply to the operating system. The Cluster Manager (CM) is an extension of the operating system. Since the Cluster Manager software is also installed on all the nodes of the cluster, full redundancy is assured.

Database Software

In Real Application Clusters, Oracle executables (such as Oracle home) are installed on the local disks of each node and an instance runs on each node of the

cluster. Note that if your supports a cluster file system (CFS) then only one copy of Oracle home will be installed. All instances have equal access to all data and can process any transactions. In this way, Real Application Clusters ensure full database software redundancy.

Disaster Planning

Real Application Clusters are primarily a single site, high availability solution. This means the nodes in the cluster generally exist within the same building, if not the same room. Thus, disaster planning can be critical. Disaster planning covers planning for fires, floods, hurricanes, earthquakes, terrorism, and so on. Depending on how mission critical your system is, and the propensity of your system's location for such disasters, disaster planning could be an important high availability component.

Oracle offers other solutions such as Oracle9*i* Data Guard and Oracle Replication to facilitate more comprehensive disaster recovery planning. You can use these solutions with Real Application Clusters where one cluster hosts the primary database and another remote system or cluster hosts the disaster recovery database. However, Real Application Clusters are not required on either site for purposes of disaster recovery.

Q4. What is the difference between Active-Active and Active passive clusters?

Ans- **Active-active**

- **Setup:** Two Adaptive Servers are configured as companion servers, each with independent workloads. These companions run on the primary and secondary nodes, respectively, as individual servers until one fails over.
- **Failover:** When fail over occurs, the secondary companion takes over the devices, client connections, and so on from the primary companion. The secondary companion services the failed-over clients, as well as any new clients, until the primary companion fails back and resumes its activities.

- **Failback:** Failback is a planned event during which the primary companion takes back its devices and client connections from the secondary companion to resume its services.

- **Client connection failover:** During failover, clients connect to the secondary companion to resubmit their uncommitted transactions. During failback, clients connect to the primary companion to resubmit their transactions. Clients with the failover property reestablish their connections automatically.

Active-passive

- **Setup:** A single Adaptive Server runs either on the primary node or on the secondary node. The Adaptive Server runs on the primary node before a fail over and the secondary node after fail over.

- **Failover:** When a system fails over, the Adaptive Server and its associated resources are relocated to, and restarted on, the secondary node.

- **Failback:** Failback is a planned fail over or relocation of the Adaptive Server and its resources to the primary node. Failback is not required, but can be done for administrative purposes.

- **Client connection failover:** During failover and failback, clients connect to the same Adaptive Server to resubmit uncommitted transactions. Clients with the failover property reestablish their connections automatically.

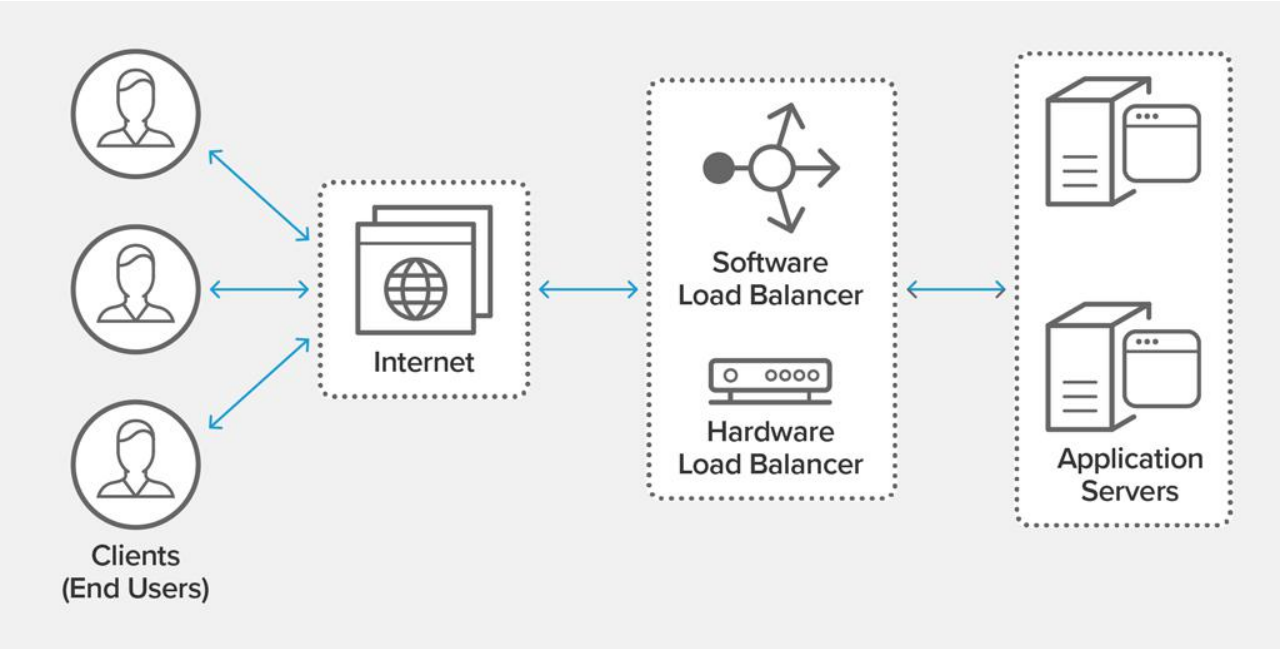
Q5. What do you mean by load-balancing ? Why is it necessary?

Ans:- **Load balancing** refers to efficiently distributing incoming network traffic across a group of backend servers, also known as a *server farm* or *server pool*. Modern high- traffic websites must serve hundreds of thousands, if not millions, of concurrent requests from users or clients and return the correct text, images, video, or application data, all in a fast and reliable manner. To cost- effectively scale to meet these high volumes, modern computing best practice generally requires adding more servers.

A load balancer acts as the "traffic cop" sitting in front of your servers and routing client requests across all servers capable of fulfilling those requests in a

manner that maximizes speed and capacity utilization and ensures that no one server is overworked, which could degrade performance. If a single server goes down, the load balancer redirects traffic to the remaining online servers. When a new server is added to the server group, the load balancer automatically starts to send requests to it.
In this manner, a load balancer performs the following functions:

- Distributes client requests or network load efficiently across multiple servers
- Ensures high availability and reliability by sending requests only to servers that are online
- Provides the flexibility to add or subtract servers as demand dictates



load balancing diagram

Benefits of Load Balancing

- Reduced Downtime
- Scalable
- Redundancy
- Flexibility
- Efficiency
- Global Server Load Balancing