

Internet Application Development

Lab No 07

Rao Abdul Saboor

Modern Server Hardware

1. Develop a Dell Xeon based server specification?
2. What are different RAID levels and corresponding applications?
3. Make a comparison of HDD vs SSD?

Qs1: Develop a Dell Xeon based server specification?

Specifications for a Dell server based on Intel Xeon processors might include:

Processor:

Intel Xeon Scalable processors, such as the Xeon Gold or Xeon Platinum series, providing high performance and reliability for server workloads.

Memory:

DDR4 ECC RAM modules for error correction and stability, with capacity ranging from 32GB to several terabytes depending on the server's requirements.

Storage:

Options for multiple hard drives or solid-state drives (SSDs) in various configurations, including RAID setups for redundancy and performance.

RAID Controller:

Dell PERC (PowerEdge RAID Controller) for managing RAID configurations.

Networking:

Dual or quad-port Gigabit Ethernet or 10 Gigabit Ethernet network adapters for high-speed data transfer and connectivity.

Expansion Slots:

PCIe slots for adding additional networking cards, storage controllers, or other expansion cards as needed.

Management:

Integrated Dell Remote Access Controller (iDRAC) for remote server management and monitoring.

Power Supply:

Redundant power supplies for reliability and uptime. Form Factor: Rack-mountable or tower configuration depending on the deployment environment.

Server Model: Dell PowerEdge R740/R740xd

Processor: 2 x Intel Xeon Gold 6248R 3.0GHz, 24 cores each (48 cores total)

Memory: 256GB DDR4 ECC Registered RAM (expandable to 1.5TB)

Storage:

2 x 480GB SATA SSD (for OS and applications)

4 x 4TB SAS HDD (for data storage)

RAID Controller: Dell PERC H730P RAID Controller with 2GB NV Cache

Network Controller: 4 x 1GbE Ports, 2 x 10GbE Ports.

Power Supply: Dual redundant 1100W power supplies

Operating System: Windows Server 2019 Datacenter Edition

Remote Management: iDRAC9 Enterprise

Warranty: 3 years ProSupport with Next Business Day Onsite Service

Qs2: What are different RAID levels and corresponding applications?

RAID (Redundant Array of Independent Disks) is a data storage virtualization technology that combines multiple physical disk drive components into one or more logical units for data redundancy, performance improvement, or both. There are several RAID levels, each offering different configurations of redundancy, performance, and capacity utilization. Here are the most common RAID levels and their corresponding applications:

RAID 0 (Striping):

- Data is divided ("striped") across multiple disks without parity or mirroring.
- Offers increased performance by spreading data across multiple drives.
- No redundancy, so if one drive fails, all data is lost.
- **Application:** Ideal for applications where performance is critical, but data redundancy is not required, such as video editing, gaming, and temporary storage.

RAID 1 (Mirroring):

- Data is mirrored across two or more drives.
- Provides redundancy by duplicating data across drives.
- Read performance is typically good but write performance can be slower due to the need to write data to multiple disks.
- **Application:** Suitable for applications where data integrity and fault tolerance are critical, such as operating system drives, database servers, and small business servers.

RAID 5 (Striping with Distributed Parity):

- Data is striped across multiple drives, and parity information is distributed across all drives.

- Provides both performance improvement and redundancy.
- Requires a minimum of three drives.
- Offers good read performance and decent write performance.
- Can tolerate the failure of one drive without data loss.
- **Application:** Commonly used in file and application servers, email servers, and for general-purpose storage where a balance of performance and redundancy is required.

RAID 6 (Striping with Dual Parity):

- Like RAID 5 but with an additional parity block.
- Can tolerate the failure of two drives without data loss.
- Requires a minimum of four drives.
- Offers better fault tolerance than RAID 5 but with slightly reduced performance due to the additional parity calculations.
- **Application:** Suitable for environments where data protection is critical, such as enterprise storage systems, large-scale databases, and archival storage.

RAID 10 (RAID 1+0 or Mirrored-Striping):

- Combines RAID 1 (mirroring) and RAID 0 (striping).
- Data is mirrored and then striped across multiple drives.
- Offers excellent performance and fault tolerance.
- Requires a minimum of four drives.
- Can tolerate multiple drive failures depending on which drives fail.
- **Application:** Often used in high-performance environments such as database servers, virtualization hosts, and mission-critical applications where both performance and redundancy are paramount.

Qs3: Make a comparison of HDD vs SSD?

Factor	HDD	SSD
Speed	Slower than SSD	Significantly faster
Durability and Reliability	Susceptible to physical shock and wear	More durable and reliable due to lack of moving parts
Noise and Heat	Generates noise and heat	Silent operation, generates less heat
Capacity and Cost	Larger capacities, lower cost per GB	Smaller capacities, higher cost per GB (but decreasing)
Power Consumption	Consumes more power	Consumes less power
Fragmentation	Prone to fragmentation	No fragmentation issues
Lifespan	Limited write cycles per cell, wear leveling issues	Improved durability and lifespan

