HIGH AVAILABILITY

FAILOVER CLUSTER, NLB, ROUND ROBBIN

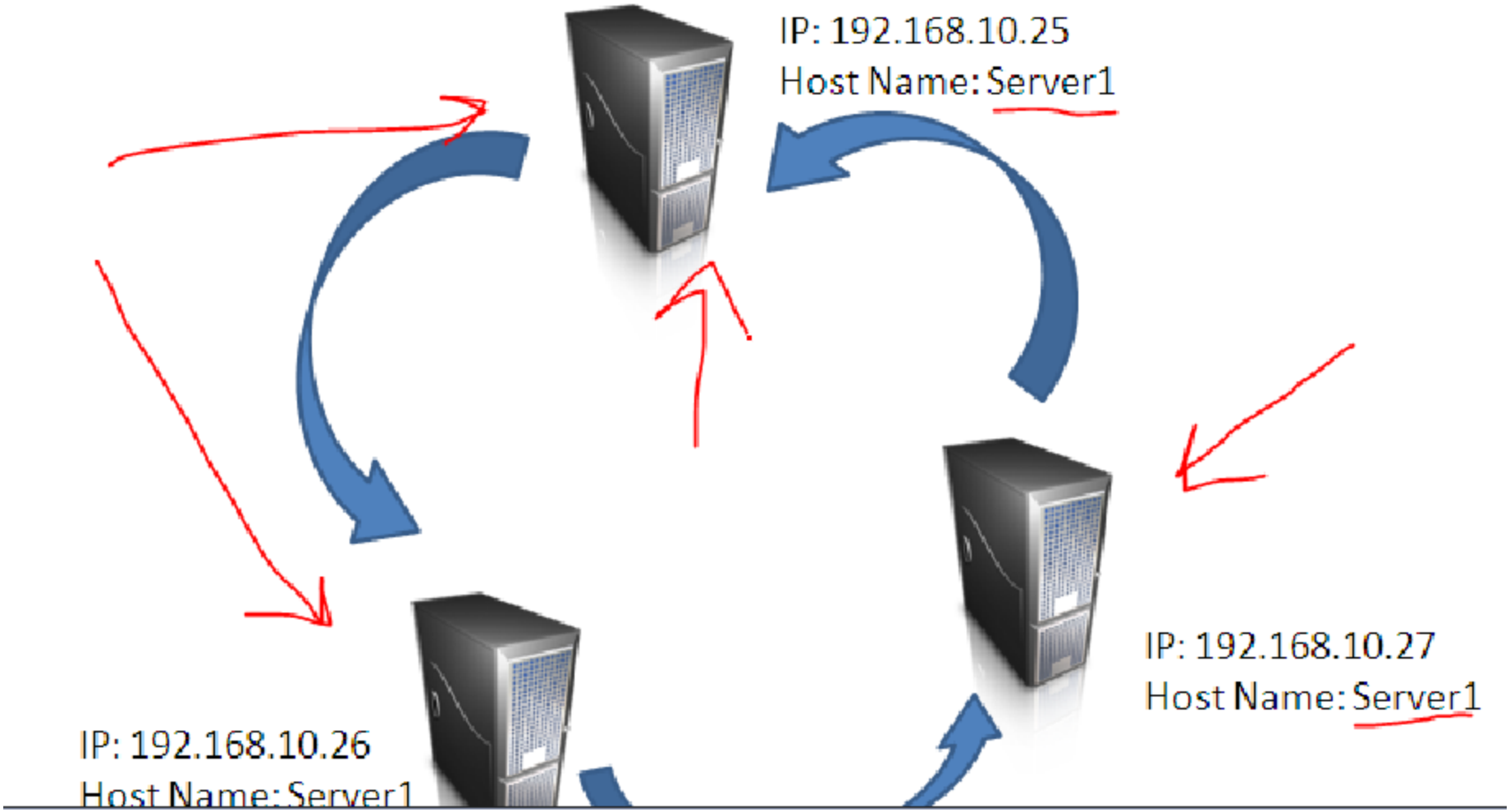
What does High Availability mean?

- High Availability uses a combination of redundancy and fault tolerance in order to provide a level of operational continuity.
- Redundancy means that there is more than one instance of resources available.
- Fault Tolerance means that resources will be available even if there is a hardware failure.

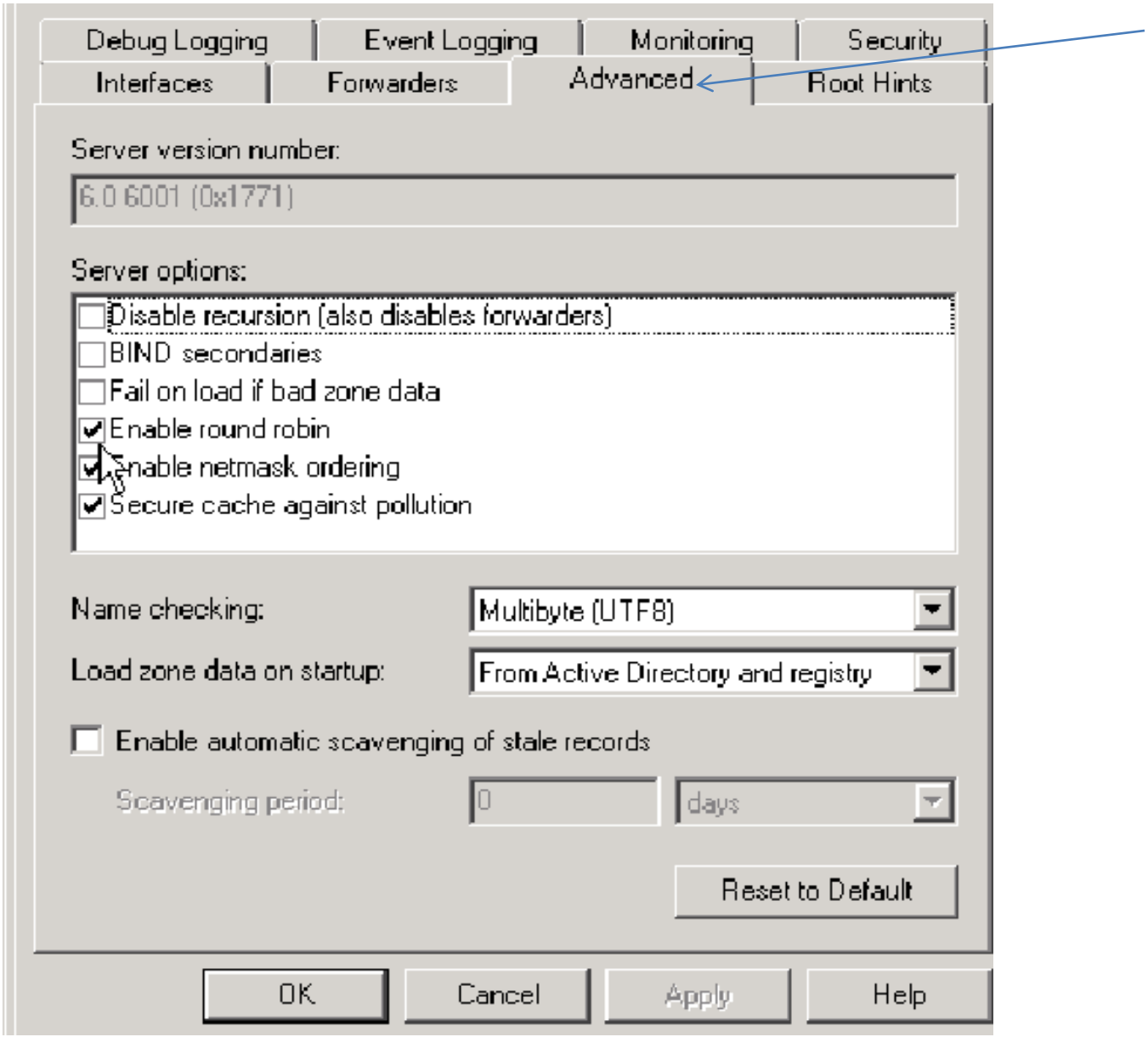
DNS Round Robin

- DNS Round Robin is used to provide more than one IP address to a single hostname.
- Each IP address represents a different physical host, and requests will be sent to each of the hosts in a rotation order.
- Netmask ordering can be used to help send requests from clients to the host closest to them.

DNS Round Robin



Each Server will take its turn serving the clients needs



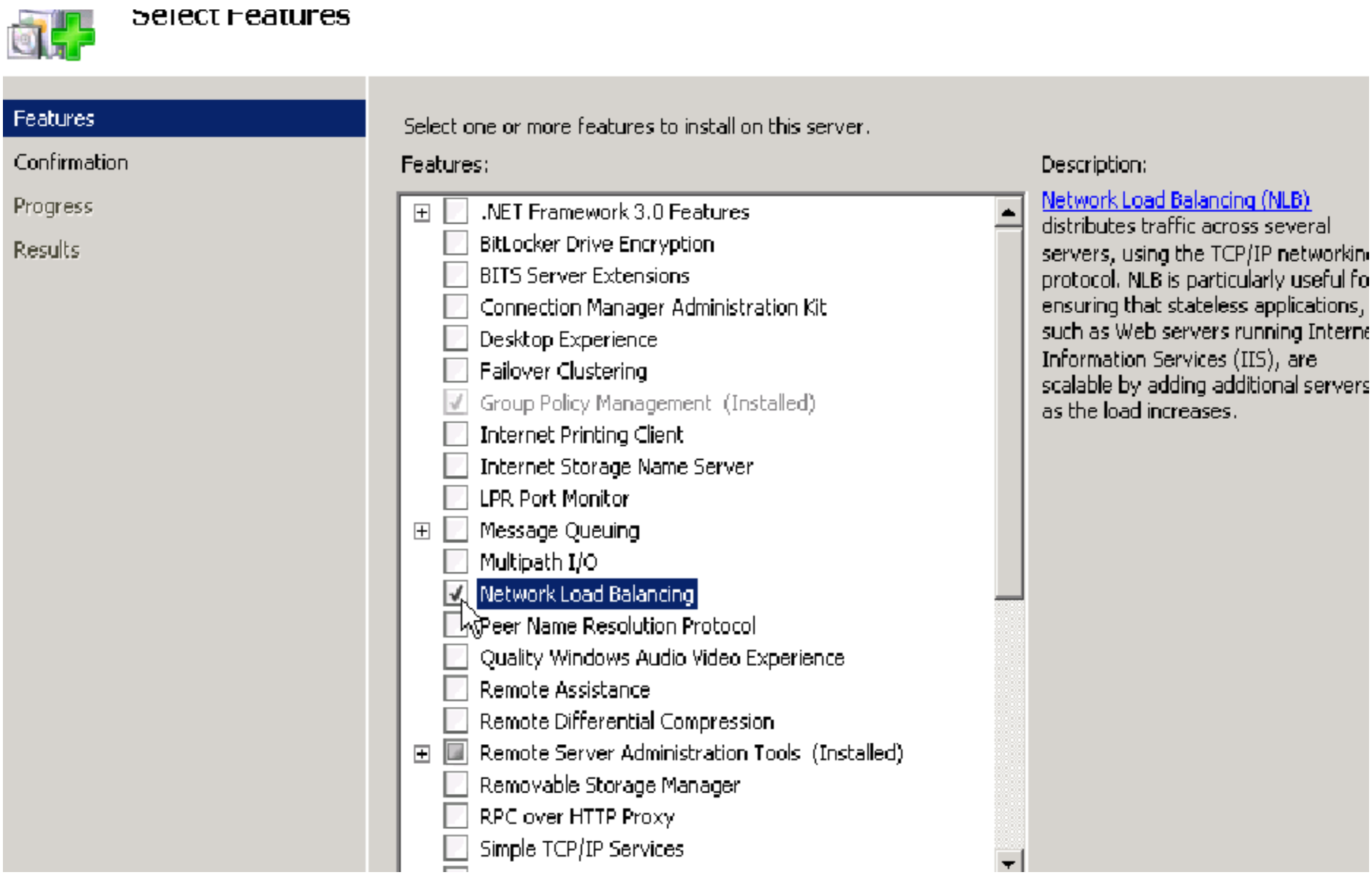
Properties of the DNS SERVER

Network Load Balancing (NLB)

- Network Load Balancing uses a more sophisticated form of distribution than DNS Round Robin.
- All of the servers within an NLB cluster communicate with each other using heartbeats and convergence.
- With NLB, clients are directed to the server which is most readily available to serve that client.
- Windows Server 2008 includes a utility called the Network Load Balancing Manager to easily manage NLB clusters.

Used for web server farms

The Heartbeat allows the servers in the cluster to communicate with each other.



Added as feature not a Role

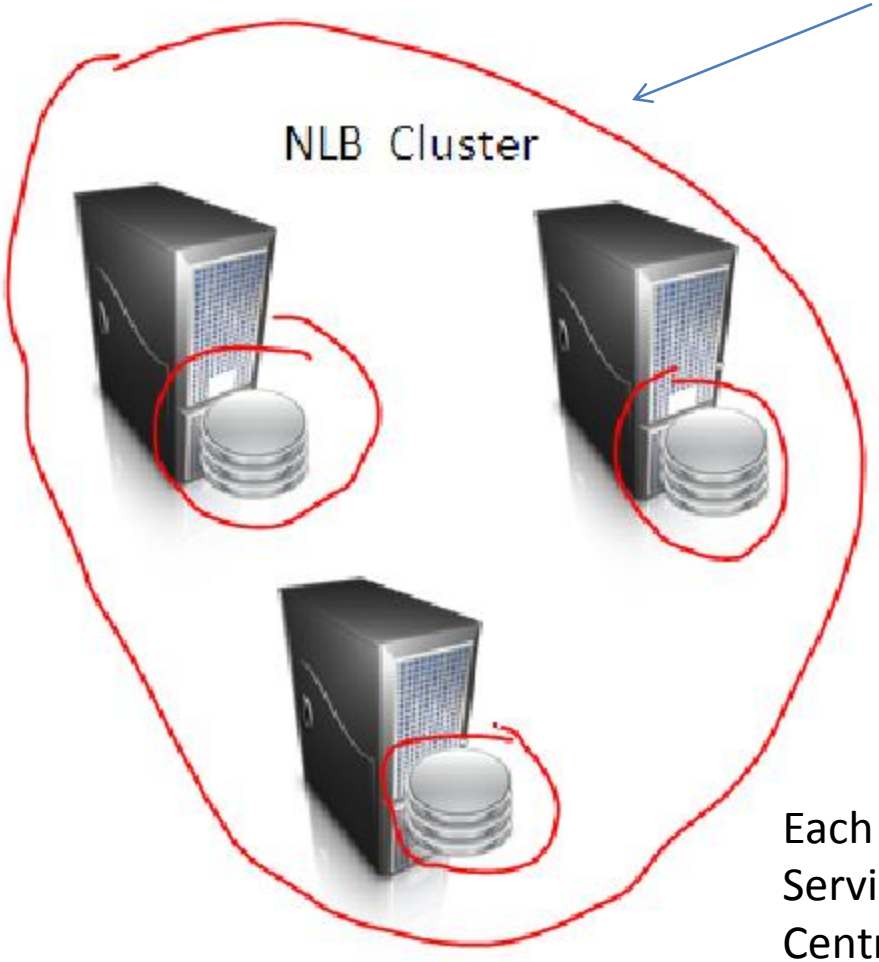
Failover Clustering

- DNS Round Robin and Network Load Balancing are used for services and applications which maintain an internal data store.
- Failover Clustering is used for applications which use an external and/or shared data store.
  Eg. SQL Server
- Servers in a Failover Cluster use shared data.
- Servers using NLB each maintain a copy of the data.
- Failover Clusters typically use a shared disk technology such as RAID or a SAN.

Servers in a shared cluster use shared storage whereas NLB servers each maintain a copy of the Data themselves.

NLB vs. Failover Clusters

Each Server maintain its own copy of the data



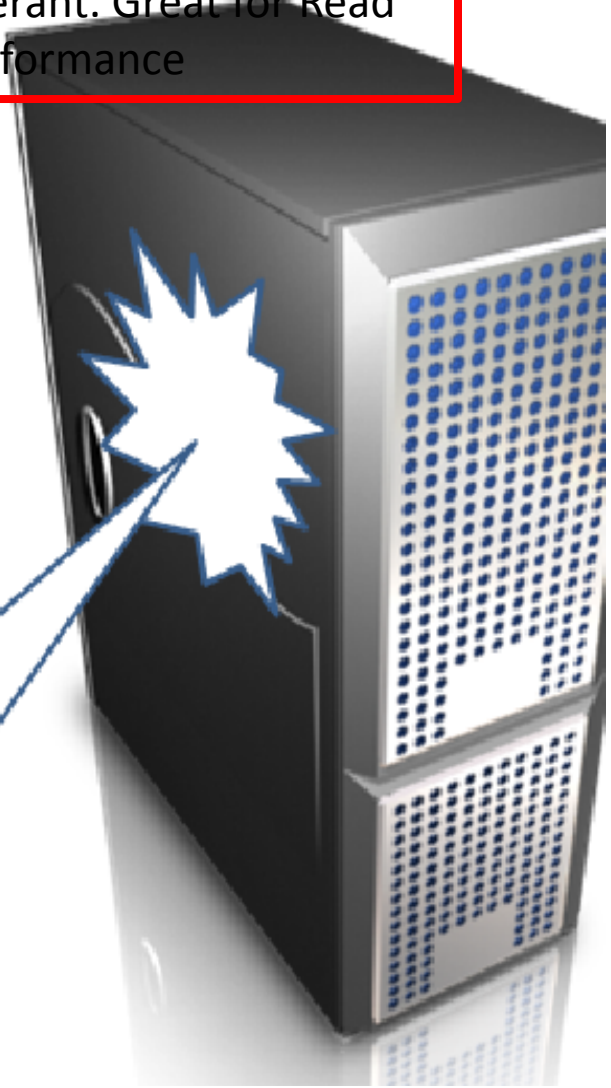
Each of the servers are providing the same Services, but they all receive their data from one Central storage place

Using RAID

Redundant array of independent disks

- RAID 0 – Striping
- RAID 1 – Mirroring
- RAID 5 – Striping with Parity
- RAID 10 – Striped Mirrors

Striping the data across all the drives. Not fault tolerant. Great for Read performance



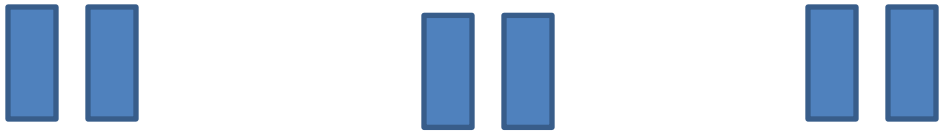
Using 2 hard drives. Everything that is written to one drive gets duplicated to the other drive. Fault tolerant

Same as Raid 0 except that on each pass through a parity block is written. If one drive goes bad then we would go to the parity block of the other drive and use that to restore the data.

Write takes longer because we have to calculate the parity

RAID 1+0

Referred to as RAID 10 is a bunch of mirrors that are striped.
For example if you had 6 hard drives they would be configured like this:



Mirror 1 Mirror 2 Mirror 3

Three mirrors then those mirrors would also be striped.

Working with SANs

Storage Area Network

- **LUN** — A Logical Unit Number (LUN) is a number assigned to a logical unit. This logical unit can be a single disk or an array of disks.
- **VDS** — **API which allows an Administrator to use standard windows tools regardless of the type of storage that is being used.**
- **MPIO** — Multipath I/O (MPIO) is a feature which allows a server to use multiple data paths to a storage device.
  Remember that multiple servers might be trying to access one area of storage
- **iSCSI** — iSCSI is a protocol which utilizes traditional networking technologies. iSCSI is typically used with existing Ethernet networks.
- **FC** — Fiber Channel (FC) provides a direct secure connection to the data store which will typically be separate from an existing Ethernet network.

Quorum Models (used by Failover Clusters)

Quorum is the number of elements that must be online for that cluster to continue Running.

- **Node Majority**
  - Typically used when there is an odd number of cluster nodes. Will remain available as long as more than half the nodes are available.
- **Node and Disk Majority**
  - Typically used when there is an even number of cluster nodes. Will remain available as long as half of the nodes and the witness disk are available.
- **Node and File Share Majority**
  - Used in the same way that Node and Disk Majority is used except that there is a witness share instead of a witness disk.
- **No Majority: Disk Only**