RAID

* Redundant array of inexpensive disks, Now days it is called Redundant Array of Independent Drive.
* Raid is just a collection of disks in a pool to become a logical volume.
* Raid contains groups or sets of Array
* A combine of Drivers make a group of disks to form a RAID Array or RAID set.
* It can be a minimum of 2 numbers of disk connected to a raid controller and make a logical volume.
* Only one RAID level can be applied in a group of disks.
* Raid are used when we need excellent performance.
* Saving our data by fault tolerance & high availability.

Types

1. Software Raid

* Have low performance because of it’s uses resource of host.
* Raid software need to load for read data from software raid volumes.
* Before loading the RAID software , OS need to boot to load the RAID software .
* No need of Physical hardware in software Raids.
* Zero cost investment.

2. Hardware Raid

-> Have high performance

-> They are dedicated RAID controller which is physically built using PCI express cards.

-> It wont use the host resource

-> They have NVRAM for cache to read and write

-> stores cache while rebuild even if there is power failure, It will store the data using battery power backup

-> Very costly investment needed for large scale.

Raids are various levels but commonly used raids are 0,1,5,6,1 0

RAID 0 (Stripping)

* Have excellent performance
* The data will be written to disk using sharing method. Half of the content will be in one disk and another half will be written to other disk.
* They write data using Round Robbin method
* In this, if any one of our drive fails we will loose our data, because using half of the data we can’t rebuild the data.
* But when comparing Write speed and Performance RAID 0 is Excellent
* We need at least 2 disks to create RAID 0.
* High Performance
* There is zero capacity loss in RAID 0
* Zero Fault Tolerance
* Write and reading will be good performance

RAID 1 (Mirroring)

* Mirroring have good performance
* Mirroring can copy of same data what we have.
* Assuming we 2 numbers of 2 TB Hard drives , Total there we have 4 TB , but in mirroring its showing only 2 TB logical Drive.
* While we save data . it will write to both 2 Tb Hard Drive.
* Minimum 2 Hard Drives are needed to create Raid 1.
* If Disk failure happen we can reproduce the raid set by replacing a new disk.
* If any one of the disk fails in Raid 1 , we can get the data from other one as there was a copy of same content in the other disk. So there is zero data loss
* Good Performance
* Half of the space will be loss in total capacity
* Full Fault tolerance
* Rebuilt will be faster
* Writing performance will be slow
* Reading will be good
* Can be used for OS and Database for small scale

Raid 5 ( Distributed Parity )

* Mostly used in Enterprise level
* It works by distributed parity method.
* Parity info will be used to rebuild the data
* It rebuilds from information left on remaining good drive.
* This will protect our data from drive failure.
* Assume we have 4 drives, if one drives fails and while we replace the failed drive we can rebuild the replaced drive from parity information.
* Parity information’s are stored in all 4 Drives , If we have 4 numbers of 1 TB hard drive.
* The parity information will be stored in 256 Gb in each drivers and other 768 Gb in each drive defined for users.
* Raid 5 can survive from single drive failure , if drive fails more than 1 will cause loss of data’s
* Excellent Performace
* Reading will be extremely good in speed
* Writing will be average
* Rebuild from parity information from all drivers
* Full fault tolerance
* 1 disk space will be under Parity
* Can be used in file server, web server, very important backups.

RAID 6 ( Two Parity Distributed Disk)

* RAID 6 is same as RAID 5 with two parity distributed disk
* Mostly used in large number of arrays
* We need minimum 4 Drives, even if there 2 drive fail we can rebuild the data while replacing new drives.
* Very slower than RAID 5, because it writes data to all 4 drivers at same time.
* Will be average in speed while we using a Hardware Raid Controller.
* If we have 6 numbers of 1 TB Hard Drives 4 drives will be used for data and 2 drives will be used for Parity.
* Good Performance
* Read performance will be good
* Write performance will be poor if we not using hardware Raid controller
* Rebuild from two parity drives
* Full Fault tolerance
* 2 disk space will be under Parity
* Can be used in large arrays
* Can be used in backup purpose, video streaming, used in large scale.

RAID 1 0 (Mirroring and Stripping)

* Raid 10 can be called as 1+0 or 0+1
* This will do both work of Mirror and Stripping.
* Mirror will be 1’st and stripe will be the 2’nd in Raid 10
* Stripe will be the first and mirror will be the second in RAID 0 + 1
* Raid 10 is better compare to 01
* Assume we have 4 numbers of drives. While writing some data to logical volume it will be saved under all 4 drives using mirror and stripe methods.
* Good read and write performance
* Here half of the space will be lost in total capacity
* Fault tolerance
* Fast rebuild from copying data
* Can be used in database storage for high performance and availability