Recommended RAID settings for HDD and SSD disks

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StarWind Documents

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About StarWind

StarWind is a pioneer in virtualization and a company that participated in the development of this technology from its earliest days. Now the company is among the leading vendors of software and hardware hyper-converged solutions. The company’s core product is the years-proven StarWind Virtual SAN, which allows SMB and ROBO to benefit from cost-efficient hyperconverged IT infrastructure. Having earned a reputation of reliability, StarWind created a hardware product line and is actively tapping into hyperconverged and storage appliances market. In 2016, Gartner named StarWind “Cool Vendor for Compute Platforms” following the success and popularity of StarWind HyperConverged Appliance. StarWind partners with world-known companies: Microsoft, VMware, Veeam, Intel, Dell, Mellanox, Citrix, Western Digital, etc.

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Explanation

Choosing and preparing the type of underlying storage is one of the most important steps in production environment virtualization. One of the ways to speed up the storage for read/write operations and get better reliability is using RAID arrays. The RAID controller settings are very important and with different settings used the results may vary greatly. Even SSD disks in a RAID array can demonstrate results similar to the HDD arrays in case of using wrong RAID controller settings. **Recommended settings for hardware RAID arrays based on HDD:** RAID type: RAID 10 Disk cache policy: Default (disabled by default) Write policy: Write Back Read policy: Read ahead Stripe Size: 64K **Recommended settings for hardware RAID arrays based on SSD:** RAID type: RAID 1 for 2x SSDs; RAID 5 for 3x and more SSDs, or RAID 10 for 4x and more pair SSD Disk cache policy: Default (enabled by default) Write policy: Write Through or Write Back, depends on the configuration Read policy: No read ahead. Stripe Size: 64K Disk Cache Policy: when enabled, allows writing to the cache of the disk prior to the medium - For virtual disks having SATA disks underneath, this policy is ENABLED by default; - For virtual disks having SAS disks underneath, this policy is DISABLED by default. **NOTE:** It is not recommended to use RAID 0 for 2-nodes StarWind highly-available devices due to the risk of data loss. RAID 5, 50, 6, and 60 are only supported for all-flash arrays for Image devices but can be used for VTL devices. **NOTE:** For configurations where StarWind VSAN service is running inside a virtual machine, it is recommended to passthrough RAID or HBA controller to the virtual machine.

More Information

https://www.dell.com/support/article/ca/en/cadhs1/sln163329/analyze-raid-controller-cache-policies-in-tty-log?lang=en **Recommended settings for Linux Software RAID with StarWind VSAN for vSphere.** Linux Software RAID (MDADM, MDRAID) can be used as an underlying storage device for StarWind Virtual SAN devices. **NOTE:** It is recommended to assign more vCPUs to StarWind VM which has Linux Software RAID configured. For 4k native HDD drives, chunk size must be equal to 4KiB per one drive. For SSD drives chunk size must be equal to 8KiB (which equals the size of the SSD drive page cache). The chunk size of the array should be calculated using the following formulas: RAID Level Chunk size for HDD Arrays Chunk size for SSD Arrays 0 Disk quantity * 4Kb Disk quantity * 8Kb 5 (Disk quantity - 1) * 4Kb (Disk quantity - 1) * 8Kb 6 (Disk quantity - 2) * 4Kb (Disk quantity - 2) * 8Kb 10 (Disk quantity * 4Kb)/2 (Disk quantity * 8Kb)/2 The number of disks in the RAID10 array should be equal to a power of 2 (e.g. 4,8,16...), while for RAID5 - power of 2 + 1 disk (e.g. 3,5,9...) and for RAID6 – power of 2

+ 2 disks (e.g. 4,6,10…). HDDs should be used in RAID10. SSD, NVMe disks can be used in parity arrays (RAID5, RAID6).

More Information

https://raid.wiki.kernel.org/index.php/A_guide_to_mdadm

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