Performance

ONTAP Select

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Performance varies based on hardware configuration.

The performance of an ONTAP Select cluster can vary considerably due to the characteristics of the underlying hardware and configuration. The specific hardware configuration is the biggest factor in the performance of a particular ONTAP Select instance. Here are some of the factors that affect the performance of a specific ONTAP Select instance:

- **Core frequency**. In general, a higher frequency is preferable.
- **Single socket versus multisocket**. ONTAP Select does not use multisocket features, but the hypervisor overhead for supporting multisocket configurations accounts for some amount of deviation in total performance.
- **RAID card configuration and associated hypervisor driver**. The default driver provided by the hypervisor might need to be replaced by the hardware vendor driver.
- **Drive type and number of drives in the RAID group(s)**.
- **Hypervisor version and patch level**.

Performance: Premium HA direct-attached SSD storage

Performance information for the reference platform.

Reference platform

ONTAP Select (Premium XL) hardware (per node)

- FUJITSU PRIMERGY RX2540 M4:
  - Intel® Xeon® Gold 6142b CPU at 2.6 GHz
  - 32 physical cores (16 x 2 sockets), 64 logical
  - 256 GB RAM
  - Drives per host: 24 960GB SSD
  - ESX 6.5U1

Client hardware

- 5 x NFSv3 IBM 3550m4 clients

Configuration information

- SW RAID 1 x 9 + 2 RAID-DP (11 drives)
- 22+1 RAID-5 (RAID-0 in ONTAP) / RAID cache NVRAM
- No storage efficiency features in use (compression, deduplication, Snapshot copies, SnapMirror, and so on)

The following table lists the throughput measured against read/write workloads on a high availability (HA) pair

of ONTAP Select nodes using both software RAID and hardware RAID. Performance measurements were taken using the SIO load-generating tool.

These performance numbers are based on ONTAP Select 9.6.

Performance results for a single node (part of a four-node medium instance) ONTAP Select cluster on a direct-attached storage (DAS) SSD, with software RAID and hardware RAID

Description	Sequential Read 64KiB	Sequential Write 64KiB	Random Read 8KiB	Random Write 8KiB	Random WR/ RD (50/50) 8KiB
ONTAP Select large instance with DAS (SSD) software RAID	2171 MiBps	559 MiBps	954 MiBps	394 MiBps	564 MiBps
ONTAP Select medium instance with DAS (SSD) software RAID	2090 MiBps	592 MiBps	677 MiBps	335 MiBps	441 3MiBps
ONTAP Select medium instance with DAS (SSD) hardware RAID	2038 MiBps	520 MiBps	578 MiBps	325 MiBps	399 MiBps

64K sequential read

Details:

- SIO direct I/O enabled
- 2 nodes
- 2 x data NIC per node
- 1 x data aggregate per node (2TB hardware RAID), (8TB software RAID)
- 64 SIO procs, 1 thread per proc
- 32 volumes per node
- 1 x files per proc; files are 12000MB each

64K sequential write

Details:

- SIO direct I/O enabled
- 2 nodes
- 2 x data network interface cards (NICs) per node
- 1 x data aggregate per node (2TB hardware RAID), (4TB software RAID)
- 128 SIO procs, 1 thread per proc
- Volumes per node: 32 (hardware RAID), 16 (software RAID)
- 1 x files per proc; files are 30720MB each

8K random read

Details:

- SIO direct I/O enabled
- 2 nodes
- 2 x data NICs per node
- 1 x data aggregate per node (2TB hardware RAID), (4TB software RAID)
- 64 SIO procs, 8 threads per proc
- Volumes per node: 32
- 1 x files per proc; files are 12228MB each

8K random write

Details:

- SIO direct I/O enabled
- 2 nodes
- 2 x data NICs per node
- 1 x data aggregate per node (2TB hardware RAID), (4TB software RAID)
- 64 SIO procs, 8 threads per proc
- Volumes per node: 32
- 1 x files per proc; files are 8192MB each

8K random 50% write 50% read

Details:

- SIO direct I/O enabled
- 2 nodes
- 2 x data NICs per node
- 1 x data aggregate per node (2TB hardware RAID), (4TB software RAID)
- 64 SIO proc208 threads per proc
- Volumes per node: 32
- 1 x files per proc; files are 12228MB each

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