



# Performance

## ONTAP Select

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# Performance

## ONTAP Select performance overview

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 multsocket.** ONTAP Select does not use multsocket features, but the hypervisor overhead for supporting multsocket 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.**

## ONTAP Select 9.6 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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