Hewlett Packard Enterprise

HPE Scalable Storage with Intel® Enterprise Edition for Lustre*

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High Performance Storage Solution

Meets Demanding I/O requirements

Performance measured for an Apollo 4520 building block:

- Up to 17 GiB/s Read/15 GiB/s Writes with EDR[1]
- Up to 16 GiB/s Reads and Writes with OPA[1]
- Up to 21GiB/s Reads and 15GiB/s Writes with all SSD's[2]

Designed for PB-Scale Data Sets

Density Optimized Design For Scale

- Dense Storage Design Translates to Lower $/GB
- Linear performance and capacity scaling

Innovative Software Features

Leading Edge Yet Enterprise Ready Solution

- ZFS RAID provides Snapshot, Compression & Error Correction
- HPE integration with Intel Manager for Lustre

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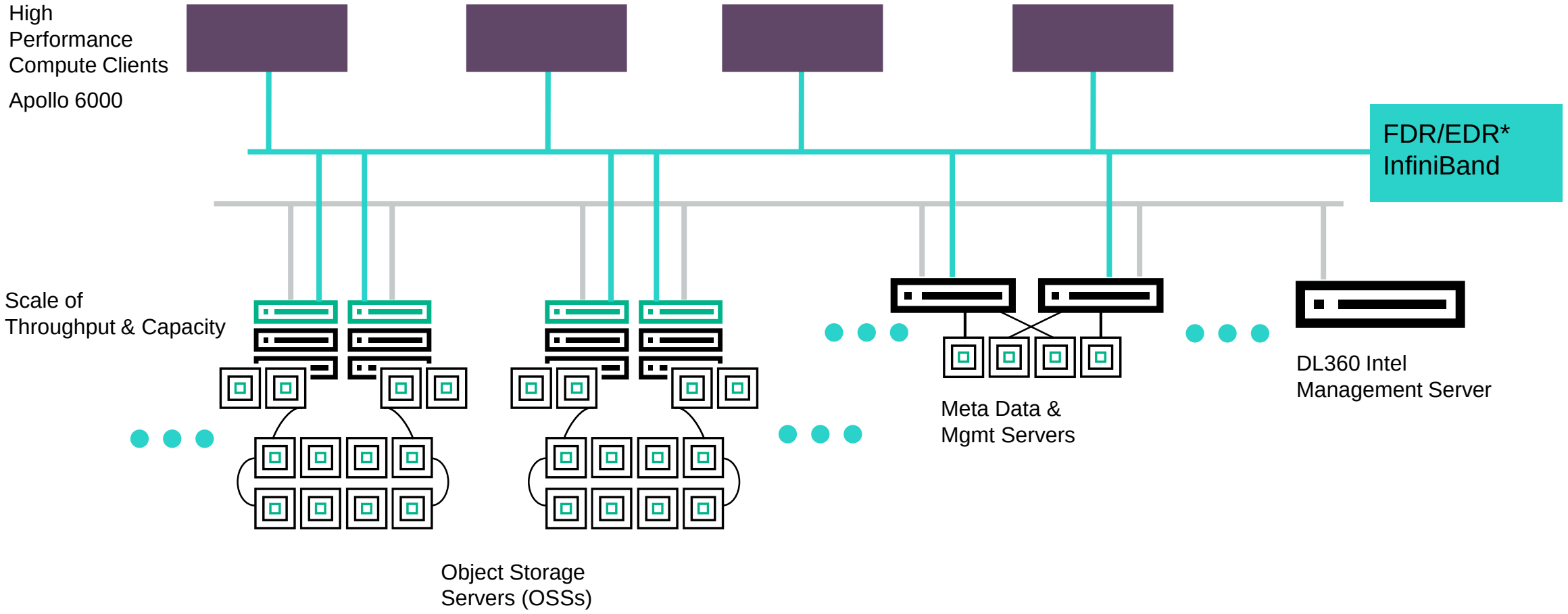
Enterprise Lustre* Storage Environment Architecture

Scale Out Configuration



Benefits of using Intel Enterprise Edition for Lustre with ZFS

Challenge	Intel® EE for Lustre* Feature
Simplified Management	– Delivers easily managed Lustre* file system – Smart default configuration – Intuitive alerts and reports
File system Health	– Real Time System Monitoring – Capture, manages and reports statistics
System Integration	– Rigorously tested for stability, efficiency and reliability
Data Life Cycle	– Complete POSIX solution for long term archiving – Storage tiering to lowering the TCO of solution
Long Term Support	– Global 24x7 HPE Support – Align with the Intel Ecosystem including the next generation of Intel Processor, Coprocessor and Fabric

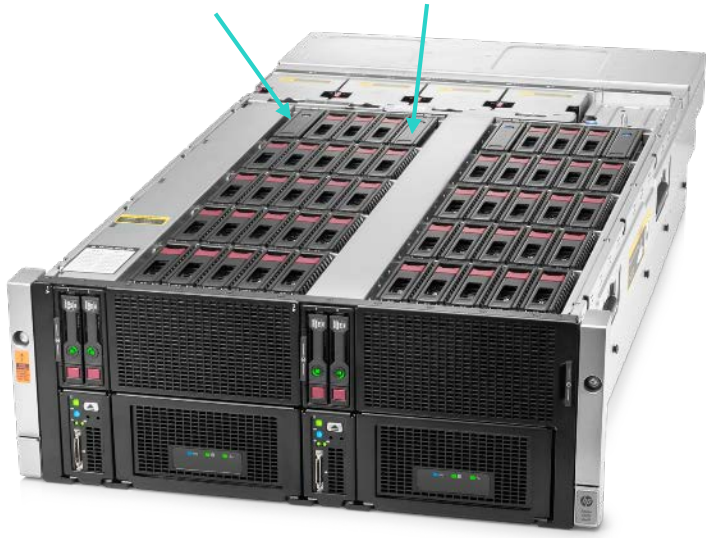
ZFS Value ADD

- **Hybrid Storage Pool** (ARC+L2ARC+ZIL*)
  - L2ARC – Intel SSD devices help speed up random & small file read I/O
  - Adaptive Replacement Cache (DRAM)
- **Copy on Write (COW)** – Improves write performance by transforming random I/O into sequential I/O. Protects Lustre* from unaligned write I/O
- **Checksum on data block** – in conjunction with the LNET checksum provides an end-to-end data protection for Lustre*. Data is check-summed and self repairing to avoid silent corruption.
- **Always consistent on disk** – With ZFS, there's never a need for a file system check (fsck).
- **Re-silvering** – Rebuilding an array depends on the space used and not on the size of the HDD failed
- **Scrubbing** – Automatic and online data correction
- **Manageability** – Easy aggregation of multiple devices into a single OST making it simple to manage, simple to troubleshoot
- **Compression** – compression can be enabled to maximize the ROI
- **Snapshot** - Snapshot the Lustre* targets prior to maintenance for worry free updates.

*Coming Soon

HPE Apollo 4520: System Details

SAS expanders in LFF drive bays



Feature	Server tray details
Processors	Up to 2 **Intel® Broadwell Xeon E5-2600 v4** processors
Memory	**16** DIMMs (8 per processor), registered, DDR4(2400/2133) w/ ECC
Drive Support	– 46 LFF SAS(12 Gb) drives in 2 server nodes – Includes support of SFF drives in converter – Hot pluggable SAS expanders – Support for Dual M.2 SSDs
Network	Dual-Port 1GbE with FlexibleLOM support Support for EDR InfiniBand and Omni-Path
Expansion	Up to **4 Low Profile PCIe Gen3 Slots** **Support for x16 HPC I/O module**
Display	SUV port, Video, Power/Health/UID Buttons and LEDs
Management	iLO 4 + one optional dedicated iLO NIC port
Other Features	**4U chassis height**, hot-plug redundant fans, HPE Gen9 Flex Slot power supplies (AC and DC versions), Support for dual M.2 SSDs
JBOD Expansion	Expand up to 6 D6020 Series JBODs

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Flexible I/O Choices to Meet Your $/GB and $/Bandwidth Targets

x16 I/O module supports for EDR InfiniBand and Intel® Omni-Path

Choice of:
Three x8 and one x16 PCIe 3.0 slots for highest bandwidth

OR

Four x8 PCIe 3.0 slots and one FlexibleLOM for greatest flexibility

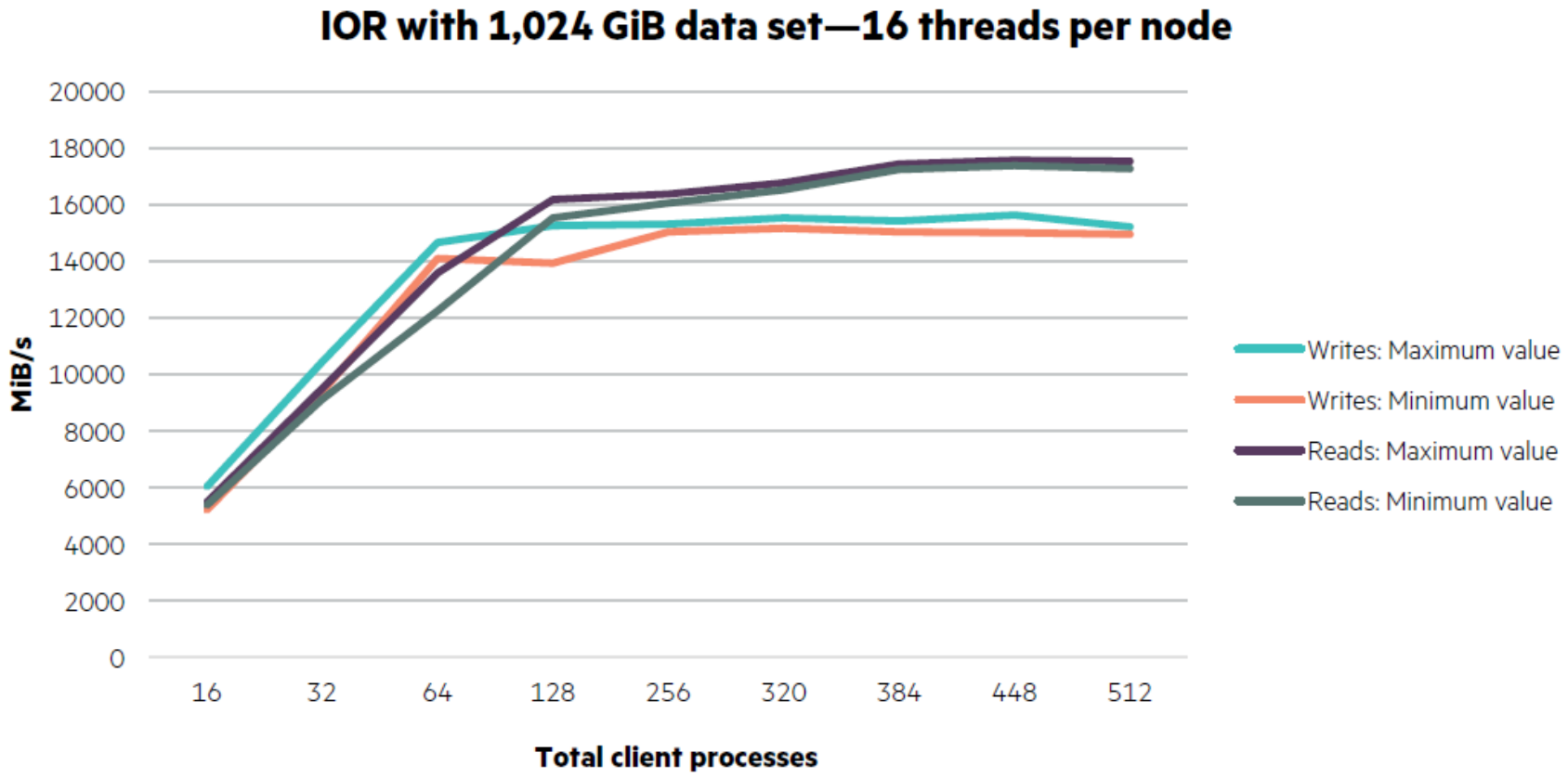
HPE Advanced Power Manager 2.0

(4) Flex Slot, hot-swap power supplies
- Shared across both server nodes for power efficiency
- 800W and 1400W options

HPE Scalable Storage with Intel Enterprise Edition For Lustre*

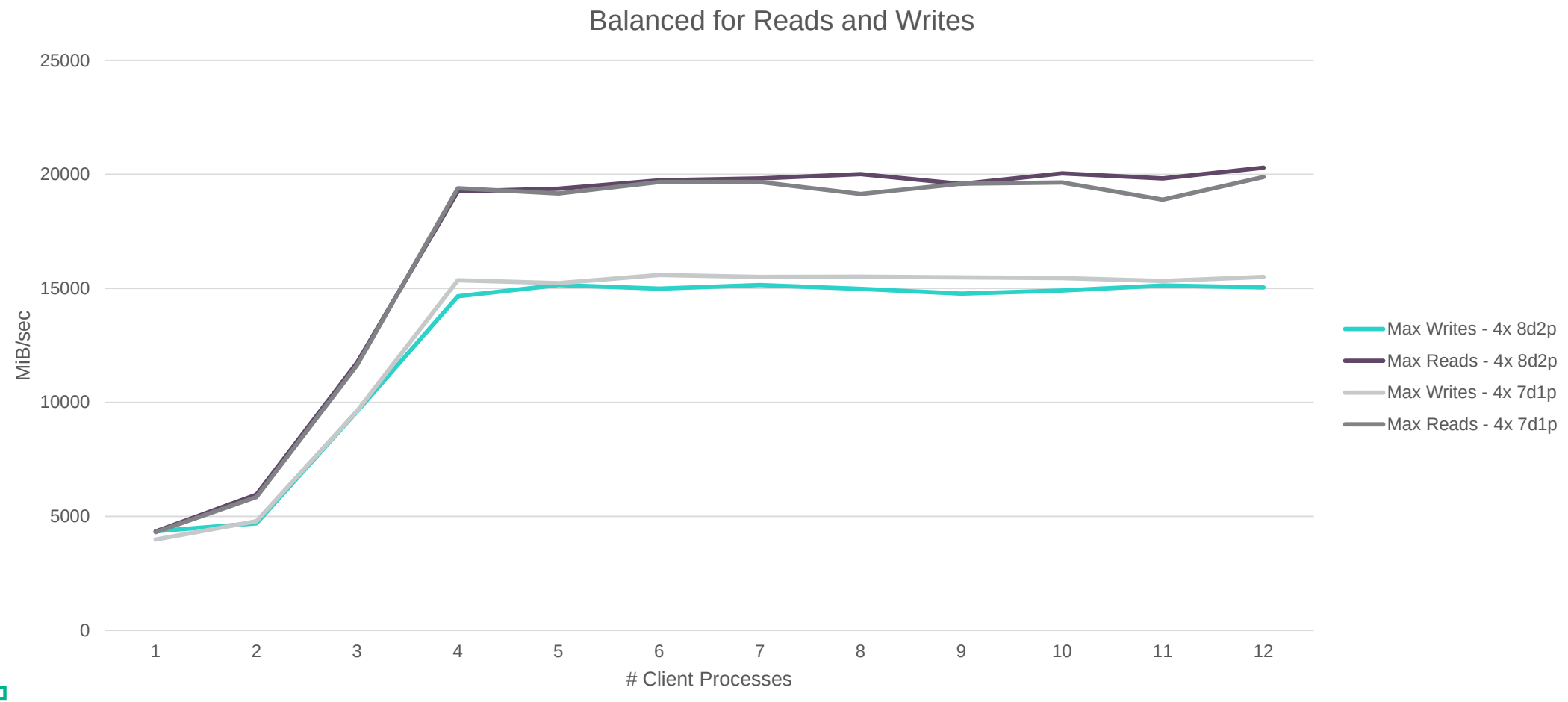
Performance with single Apollo 4520 and two D6020 JBODs (all HDDs)

Peak Writes: 15,630 MiB/s
Peak Reads: 17,568 MiB/s



HPE Scalable Storage with Intel Enterprise Edition For Lustre*

Performance with Single Apollo 4520 and SSDs



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Call to Action

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Craig Belusar
Manager, HPE Servers, Scale Out Storage
Email: craig.belusar@hpe.com

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