Modernize your data center for today's workloads with Intel® Solid State Drives (SSDs)

Step one—replace your HDDs with SSDs

- Your data center requires enterprise-level reliability with consistent performance.
- Your business requires an aggressively low total cost of ownership.
- You need the performance and throughput to drive today's virtualized and Big Data workloads.
- Intel's Data Center SSDs can dramatically improve the performance and efficiency of your data center's servers.

Different technology, new dynamics.

Solid-State Drive technology is fundamentally different than the technology used with traditional hard disk drives. The removal of the mechanical process used by HDDs for reading a spinning disk and replacing it with SSD solid state technology provides extreme performance, increased throughput, and advanced reliability for the data center.

How do I choose—there are so many options? Firmware controls the important characteristics of each manufacturer's SSDs. Each accomplishes the same task—store data—but they all contain different performance and reliability features. Much like Chrome, Firefox, and Explorer all access the Web, but with different speed and features.

Intel's SSD firmware is written to provide fast, consistent performance and uniform endurance with low overhead. And something other manufactures cannot match—reducing the probability of Silent Data Corruption (SDC) to virtually zero. SDC are errors in the data sent to the drive which are not reported or corrected (silent) by the server and its subsystems. SDC is also a problem in HDDs, but is thought to be more prevalent in SDDs. Not only does Intel provide protection from SDC, but they also are the only vendor to do specific testing of their SSD drives at Los Alamos Nuclear Science Center to minimize the impact of specific causes of SDC, other competitors do not test for.

Highlights

- **Extreme Performance**
  Up to 460,000 random IOPS

- **Fast Throughput**
  Up to 2,800 MB/s sequential throughput

- **Outstanding Consistency**
  Maximum latency of <500 µs 99.9% of the time

- **Solid Reliability**
  Virtually zero percent chance of Silent Data Corruption

The "Big 4" of Selecting a Data Center Solid State Drive

Selecting the best SSD for your applications and data center requires understanding the new dynamics of solid state storage. Application characteristics such as sequential read/write and random read/write profile are critical to the selection of the best SSD for your $ in your data center.

Overall, there are four major characteristics to look for when evaluating a SSD for the data center:

1 **Performance** – How often can the storage device perform a data transfer measured by Input/Output Instructions per Second (IOPS?)

» *Intel Data Center SATA and PCIe NVMe SSDs 75,000 to 460,000 Random IOPs respectively*

» *As a comparison, 15K SAS HDDs provide up to 230 IOPS—**Increase frequency of data transfer performance a minimum of 300X with SSDs***

2 **Throughput** – How fast is the speed of the data transfer measured by sequential read/write MB/sec.?

» *Intel Data Center SATA and PCIe NVMe SSDs provide 500 MB/s to 2,800 MB/s sequential throughput respectively*

» *As a comparison 15K SAS HDDs provide only up to 250MB/s sequential throughput—**Increase speed of data transfer 2x to over 10X with SSDs***

3 **Consistency** – How often does the drive perform at a high rate? SSDs in RAID arrays must wait for the last drive to write before moving to the next instruction. Uneven drive performance can slow an entire RAID system far below a SSDs advertised maximum performance. **Consistency is more important than maximum performance.**

» *Intel SSDs have a tested maximum latency of <500 µs 99.9% of the time*

» *Other SSD manufactures do not test for consistency or make it a priority*

4 **Reliability** – How long does the drive last and what data protection features does it have?

» *Intel SSDs provide up to 10 Drive Writes per Day or 36.5 PB data written*

» *Provides AES 256-bit Advanced Encryption Standard (AES) data protection*

» *Intel SSDs have 5 year warranty; competitors offer 3 year*

» *Provide End-to-end Data Protection for data reliability*

» *Have power-loss protection features with built in self-test*

» *Virtually zero percent chance of Silent Data Corruption*

Which is the Most Important is Application Dependent

Intel SSDs **high write IOPS** are important to *On-line transaction processing (OLTP), email servers, and database applications* that have a high amount of random I/O requests.

» The **fast throughput** of Intel SSDs are important for applications that *work with large files and require a large number of sequential I/O operations such as video-on-demand, medical imaging, and web applications.*

» An SSD's **consistency** is a measure of how the drive performs in the data center. It can be more important than overall peak performance, especially in *RAID environments.*

» Intel SSD **reliability** is important for performance in a *RAID environment,* reducing silent data corruption and protecting data with 256-bit AES encryption

Overall, Intel SSDs provide servers with the best combination of performance, throughput, and reliability!