Overview

HP Solid State Drives (SSDs) for Workstations

Introduction

Solid State Drives (SSDs) are fast becoming a real force with respect to storage in the computer industry. With no moving parts, storage is no longer bound by mechanical barriers to higher performance. HP SSDs for workstations offer overall performance significantly beyond that of SAS 15k rpm HDDs (Hard Disk Drives).

SSDs should be considered for most workstations since the number of processor cores and overall processing power can be limited by the I/O performance of the storage subsystem. For applications where 15k rpm HDDs deliver a performance improvement over standard SATA HDDs, an HP SSD will likely deliver even better performance.

Solid State Drives measure Access Time in microseconds (65 to 85) as opposed to the best HDDs (15k rpm) being measured in milliseconds (~6ms); the SSD is about 70 times faster. In addition, the extremely high average sustained read performance (up to 560MB/s) is considerably higher than the average sustained read performance of 15k rpm HDDs available today (180MB/s to 250MB/s*). The result is a much higher performance potential. Random IOPs (I/O Operations per second) are in a class of their own, up to 20X faster than 15k rpm HDDs. This obviously helps with database operations but it also helps with OS and application performance. Users experience faster boot and data load times, faster application loading and snappier system response. This is especially true where the workflow has a large percentage of random reads and writes.

SSDs help lower the acoustical emissions of the workstation. No moving parts means SSDs inherently have no acoustic emissions, e.g. noise. Furthermore, they consume much less power than Workstation class HDDs so less air is needed for cooling. The result is lower system fan speeds and therefore, lower acoustics.

SSDs tend to be more rugged than hard drives with respect to shock and vibration because SSDs have no moving parts.

* Based on HP and third party tests.

Performance

HP 128GB SATA 6Gb/s SSD:
(includes 2.5" and mSATA form factors)
Up to 560MB/s sustained reads and up to 400MB/s sustained writes.
Up to 90K IOPS (Random Read) and up to 88K IOPS (Random Writes).
Power Consumption (typical):
Active: 150mW
Idle: 70mW
Endurance (TBW): 100TB
Mean time to failure (MTTF): 1.5 million hours

HP 256GB SATA 6Gb/s SSD:(SED and non-SED version)
(includes 2.5" and mSATA form factors)
Up to 560MB/s sustained reads and up to 510MB/s sustained writes.
Up to 100K IOPS (Random Read) and up to 88K IOPS (Random Writes).Power Consumption (typical):
Active: 150mW
Idle: 70mW
Endurance (TBW): 200TB
Mean time to failure (MTTF): 1.5 million hours

The 256GB Self-Encrypting Drive (SED) version has similar performance to the standard 256GB SSD. It is also available in Opal 1.0 and Opal 2.0 versions.

Overview

HP 512GB & 1TB SATA 6Gb/s SSD:
Up to 560MB/s sustained reads and up to 510MB/s sustained writes.
Up to 100K IOPS (Random Read) and up to 88K IOPS (Random Writes).Power Consumption (typical):
Active: 150mW
Idle: 70mW
Endurance (TBW): 300TB (512GB capacity), 400TB (1TB capacity)
Mean time to failure (MTTF): 1.5 million hours

Note: 512GB SED SSD supports both Opal 1 and 2.

Samsung Enterprise 240GB & 480GB SATA SSD
High Performance & Extreme Write Endurance
Enterprise Class SSD
Sustained Sequential Read/Write data transfer rates (MB/s max): 500/370
Peak 4KB Random Read/Write command rates (KIOPs): 98/15
Average LBA access time (us typ) 170 us read / <3ms write.

Power Consumption (Active): 3.4W
Power Consumption (Idle): 300 mW

Endurance (TBW-Terabytes Written):
Random Writes: 1,730 TBW
Sequential Writes: 10,000 TBW
Flash Memory Type: NAND MLC
Power Loss Protection (including tantalum capacitors)
End-to-End Data Protection

HP Enterprise Class 240GB & 480GB SATA SSD
High Performance & Extreme Write Endurance
Enterprise Class SSD
Sustained Sequential Read/Write data transfer rates (MB/s max): 420/290(240GB); 420/380(480GB)
Peak 4KB Random Read/Write command rates (KIOPs): 63/18(240GB); 63/23(480GB)
READ latency (typical) 0.50 ms
WRITE latency (typical) 2.0 ms

Power Consumption (Seq Write Max): 5W (240GB); 6W (480GB)
Power Consumption (Idle Average): 1.2W

Endurance (TBW-Terabytes Written):
240GB: 920TB
480GB: 1850TB

Flash Memory Type: MLC NAND
Enhanced power-loss data protection with data protection capacitor monitoring
End-to-End Data Protection
MTTF: 2.0 million device hours
Static and dynamic wear leveling

Note: The numbers above represent raw system performance. Actual performance in applications will typically be lower. The recommended benchmark to assess SSD performance for specific market segment applications is SPECwpc, found at http://www.spec.org.

Overview

Form Factor

These SSDs are 7mm SFF (Small Form Factor, 2.5") drives, which are mounted in a removable 3.5" Frame. The SSD can be mounted in either a standard 3.5" bay or in a SFF, 2.5" bay by removing the 3.5" frame.

Intelligent System Maintenance

SSDs emulate HDDs such that the operating system thinks it is talking to a hard drive. However the physical data mapping is quite different. In fact the SSD intelligently manages the physical location of data on the drive in the background via wear leveling algorithms that maximize the life of the SSD. The extremely fast access times of SSDs permit the SSD to move the data around as needed for wear leveling without impacting the performance. The net result is that defragmenting is not needed and defragmenting will not improve the performance. In fact, defragmentation should be turned off.

SSDs use the TRIM function to improve endurance. The TRIM command is focused on maintaining MLC SSD write performance by erasing no longer used (released) logical blocks (aka files deleted from the Windows recycle bin) from the SSD automatically in the background. Most configurations with Win7 and Win8, including single SSD, RAID 0, and RAID 1, will provide support for TRIM. Optional controllers, including the SAS controllers supported on Workstations, do not provide support for TRIM when used in a RAID configuration, but do enable TRIM in non-RAID configurations. For additional information regarding TRIM support, please contact HP technical support. Use HP Performance Advisor software to check the actual usage / wear level of the device.

Models

HP 128GB SATA 6Gb/s SSD	A3D25AA
HP 128GB mSATA 6Gb/s SSD	E5Z78AA
HP 256GB SATA 6Gb/s SSD	A3D26AA
HP 256GB SATA 6Gb/s SED SSD	D8N28AA
HP 256GB SATA 6Gb/s SED Opal 2 SSD	G7U67AA
HP 256GB mSATA 6Gb/s SSD	F3C92AA
HP 512GB SATA 6Gb/s SSD	D8F30AA
HP 512GB SATA SED SSD	N8T26AA
HP 1TB SATA 6Gb/s SSD	F3C96AA
Samsung Enterprise 240GB SATA SSD	F0W94AA
Samsung Enterprise 480GB SATA SSD	F0W95AA
HP Enterprise Class 240GB SATA SSD	T3U07AA
HP Enterprise Class 480GB SATA SSD	T3U08AA

Benefits

- Higher overall performance than 15k HDDs based on random IOPs, sustained reads and sustained writes.
- Lower system level acoustic noise than systems with HDDs, especially 15k rpm HDDs
- More rugged than HDDs with respect to shock and vibration
- Typical wall power savings relative to a 15k drive is ~10W/drive (based on drive idle power and power supply at 85% efficiency. Active drive power deltas are slightly larger.)
- Lower system maintenance because there is no need to defragment the drive

NOTE: Some operating systems such as Microsoft Vista automatically schedule defragmenting sessions. Shutting off automatic defragmenting for the SDD will save both time and energy.

Compatibility

SSDs are supported on all Z-Workstations. Check individual workstation platform Quickspecs for confirmation.

If an HP Solid State Drive is purchased as an After Market Option, the kit will include a mounting bracket for use in the standard 3.5" HDD Bays. If it is for use in an Optical Bay, one of the following mounting brackets will be needed.

- HP Optical Bay HDD Mounting Bracket-BLK-for WKS, HP Part Number NQ099AA

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- HP 2.5in HDD 2-in-1 Optical Bay Bracket, HP Part Number FX615AA or K4T74AA
- HP 4-in-1 SFF HDD Carrier with External access (Option kit only for Z620 and Z820, B8K60AA), fits into ODD bay.

Technical Specifications

Hard Drives	**HP 128GB SATA 6Gb/s SSD**	**Capacity**	128GB	
		Height	0.28 in; 0.7 cm	
		Width	**Physical Size**	2.5 in; 6.36 cm
		Interface	SATA 6Gb/s	
		Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)	
		Operating Temperature	32° to 158° F (0° to 70° C)	
	HP 128GB mSATA 6Gb/s SSD	**Capacity**	128GB	
		Interface	SATA 6Gb/s	
		Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)	
	HP 256GB SATA 6Gb/s SSD	**Capacity**	256GB	
		Height	0.28 in; 0.7 cm	
		Width	Physical Size	2.5 in; 6.36 cm
		Interface	SATA 6Gb/s	
		Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)	
		Operating Temperature	32° to 158° F (0° to 70° C)	
	HP 256GB SATA 6Gb/s SED Opal 1 SSD	**Capacity**	256GB	
		Height	0.28 in; 0.7 cm	
		Width	**Physical Size**	2.5 in; 6.36 cm
		Interface	6Gb/s SATA	
		Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)	
		Operating Temperature	32° to 158° F (0° to 70° C)	
	HP 256GB SATA 6Gb/s SED Opal 2 SSD	**Capacity**	256GB	
		Height	0.28 in; 0.7 cm	
		Width	Physical Size	2.5 in; 6.36 cm
		Interfase	6Gb/s SATA	
		Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)	
		Operating Temperature	32° to 158° F (0° to 70° C)	
	HP 256GB mSATA 6Gb/s SSD	**Capacity**	256GB	
		Interface	6Gb/s SATA	
		Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)	
		Operating Temperature	32° to 158° F (0° to 70° C)	

Technical Specifications

HP 512GB SATA 6Gb/s SSD	**Capacity**	512GB	
	Height	0.28 in; 0.7 cm	
	Width	**Physical Size**	2.5 in; 6.36 cm
	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)	
	Operating Temperature	32° to 158° F (0° to 70° C)	
HP 512GB SATA SED SSD	**Capacity**	512GB	
	Height	0.28 in; 0.7 cm	
	Width	**Physical Size**	2.5 in; 6.36 cm
	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Operating Temperature	32° to 158° F (0° to 70° C)	
HP 1TB SATA 6Gb/s SSD	**Capacity**	1TB	
	Height	0.28 in; 0.7 cm	
	Width	**Physical Size**	2.5 in; 6.36 cm
	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)	
	Operating Temperature	32° to 158° F (0° to 70° C)	
Samsung Enterprise 240GB SATA SSD	**Capacity**	240GB	
	Height	0.28 in; 0.7 cm	
	Width	**Physical Size**	2.5 in; 6.36 cm
	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	600 Mb/s	
Samsung Enterprise 480GB SATA SSD	**Capacity**	480GB	
	Width	**Physical Size**	2.5 in; 6.36 cm
	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	600 Mb/s	
HP Enterprise Class 240GB SATA SSD	**Capacity**	240GB	
	Height	0.28 in; 0.7 cm	
	Width	**Physical Size**	2.5 in; 6.36 cm
	Interface	6Gb/s SATA	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Operating Temperature	32° to 158° F (0° to 70° C)	
HP Enterprise Class 480GB SATA SSD	**Capacity**	480GB	
	Height	0.28 in; 0.7 cm	

Technical Specifications

Width	**Physical Size**	2.5 in; 6.36 cm
Interface	6Gb/s SATA	
Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
Operating Temperature	32° to 158° F (0° to 70° C)	

Summary of Changes

Date of change:	Version History:		Description of change:
	From v1 to v2		
July 10, 2014	From v16 to v17	**Removed**	Older model offerings
September 16, 2014	From v17 to v18	**Added**	Several specs for all drives
July 1, 2015	From v18 to v19	**Changed**	update SATA SSDs with Micron M600 specs
August 1, 2015	From v19 to v20	**Added**	512GB SED SSD and specs
November 1, 2015	From v20 to v21	**Added**	HP 512GB SATA SED SSD
		Removed	Duplicate instance of 512GB & 1TB
January 1, 2016	From v21 to v22	**Added**	Data specs for new Enterprise Class options, and general clean up

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