Frequently Asked Questions

Q: How do HGST SAS SSDs benefit enterprise customers?
A: HGST’s SAS SSD product family delivers ultra-high input/output operations per second (IOPS) for transaction-intensive server and storage applications. HGST SSDs also reduce total cost of ownership (TCO) through low power consumption, efficient cooling and minimal space requirements, since fewer SSDs are required to support the same high-IOPS applications compared to traditional enterprise HDDs. When combined in servers and tiered storage pools, HGST’s new throughput-enhancing SSDs and traditional HDDs provide a cost-effective, end-to-end enterprise-class storage solution.

Q: What is EnhanceIO™ SSD Cache Software?
A: EnhanceIO™ SSD Cache Software is a software product that enables solid-state storage devices to act as high performance caches for conventional hard-disk based storage. EnhanceIO SSD Cache Software is a non-disruptive cost proficient versatile plug and play caching solution that seamlessly integrates in the existing infrastructure. It sits between a host operating system and the storage to which it is connected, and makes copies of the data flowing between the host and its storage on an attached solid-state drive.

Q: What operating system platforms does EnhanceIO support?
A: EnhanceIO is currently available for Linux and Windows Server platforms. Specifically, the software supports:

- Red Hat Linux 6.0, 6.1, 6.2 and 6.3
- CentOS 6.0, 6.1, 6.2 and 6.3
- Windows Server 2008 sp2 64-bit (x86-64) and Windows 2012
- VMware 4.1 and 5.x: EnhanceIO for Linux and Windows 2008 R2 running as Guest
- HyperV 2012: EnhanceIO for Linux and Windows 2008 R2 running as Guest
- XenServer 6.1: EnhanceIO for Linux running as Guest
- KVM: EnhanceIO for Windows 2008 R2 running as Guest

Q: How do I get a copy of EnhanceIO?
A: Customers can visit http://www.HGST-inc.com/enhanceio and register to download a 30-day trial version of EnhanceIO SSD Cache Software.
Q: How much does EnhanceIO cost?
A: EnhanceIO SSD Cache Software is sold on an annual subscription basis, which includes product support and updates. The Linux version of the software retails for $295/year, and the Windows Server version for $495/year.

Q: How do international (non-U.S.) customers purchase EnhanceIO?
A: International customers purchase EnhanceIO software from the same Web portal as domestic customers (http://support.HGST-inc.com). Credit cards will be billed for the U.S. dollar price associated with the EnhanceIO SSD Cache Software software version being downloaded, and this amount will be converted to the appropriate international currency on the customer’s bill by the credit card company. European customers will be asked to provide a Value Added Tax (VAT) ID during the purchasing process, and will be charged VAT if they are unable to provide their VAT ID. European customers not providing a VAT ID will be charged VAT at their European country-specific VAT rate.

Q: What are the major features/enhancements offered by EnhanceIO SSD Cache Software?
A: EnhanceIO SSD Cache Software is available for the Windows Server 2008 and RedHat/CentOS Linux platforms. HGST EnhanceIO Cache Software accelerates application performance while leveraging existing server and storage environments.

With HGST’s EnhanceIO Cache Software, IT professionals can:
• Profile existing workloads to validate how SSD caching can improve application performance
• Leverage any SSD as cache for flexible cache configurations
• Experience little to no impact on existing server resources while improving application performance
• Optimize SSD usage for efficient datacenter operations

EnhanceIO allows you to easily create, configure and analyze the performance of your most critical applications.

Q: Does EnhanceIO implement block-level caching, or file-level caching?
A: EnhanceIO caching works at the block level within a server. It can be configured to cache block I/O traffic being performed to any underlying block device that is visible to the host on which it is running.

Q: Does EnhanceIO caching work on a system-wide or per-volume basis?
A: EnhanceIO caching is configured on a per-volume basis, and requires a dedicated SSD cache device, or device partition, for each source volume that it will be configured to cache. For example, if a Windows or Linux server contains two hard disk drives, and each drive is visible to the server as a unique volume containing a file system, in order to cache both devices EnhanceIO will need an SSD cache device that is divided into two partitions, one for each of the source volumes (hard drives) that is to be cached by the software.
**Q: Is EnhanceIO caching persistent?**  
A: Yes, EnhanceIO implements a persistent SSD cache for the volumes it has been configured to accelerate. The EnhanceIO cache will stay warm across server reboots and graceful power cycle events.

**Q: What type of HDD storage volume is EnhanceIO able to cache?**  
A: EnhanceIO is able to cache virtually any type of traditional storage volume that is attached to a Linux or Windows host. These volumes might include:

- Local hard disks that are directly attached to the server, such as locally connected IDE or SATA drives.
- Local hard disks that are directly attached to a server via some form of Host Bus Adapter (HBA). Drives connected in this manner are normally presented to a host either as individual drives, or as groups of drives configured in RAID groups, any of which can be cached by EnhanceIO.
- SAN connected storage volumes that are accessed via either a fibre channel or iSCSI storage area network.

**Q: What type of SSD cache devices does EnhanceIO support?**  
A: EnhanceIO can support any type of solid state device that can present itself to a host as a block storage volume. Any type of SATA, SAS, or PCIe-based SSD can be used as a cache device by EnhanceIO, as can SAN connected solid-state devices, if they are available. EnhanceIO uses SSD cache devices as raw block volumes, and does not require any type of file system to be present on the device being used as a cache resource.

**Q: Does EnhanceIO only work with HGST solid-state drives?**  
A: No, EnhanceIO SSD Cache Software has been engineered to work with any vendor’s solid-state storage disks. It does not require the presence of HGST SSDs to operate.

**Q: Can I use my SSD as a regular disk as well as a cache device for EnhanceIO?**  
A: Yes, by partitioning the SSD using standard operating system partitioning tools, it is possible to use an SSD as both an EnhanceIO SSD cache as well as a regular solid-state drive. Under Windows, SSD partitioning can be accomplished using the standard Disk Management GUI. Under Linux, either the fdisk or sfdisk utilities can be used.
Q: What caching modes does EnhanceIO support?
A: Currently, EnhanceIO supports write-back, write-through, and read-only caching modes.

In write-through caching mode, EnhanceIO caches all reads that are made from the source volume by the host, and will also make a copy of all writes to the source volume into the SSD cache. In this manner, if an application subsequently requires a block of data that it recently wrote to the source volume, the read of the block will be made from the SSD cache and become accelerated.

In read-only caching mode, EnhanceIO caches only the reads that are made from the source volume by the host. Data that is written to the source volume is not copied into the cache, but if the block that is overwritten on the source volume by the new write is also resident in the cache, that block will be invalidated by the software. This prevents stale data being sent to the host if/when this block is subsequently read.

In write-back caching mode, writes to the HDD source volume are cached within the SSD cache and acknowledged as complete to the overlying application before they are flushed to the underlying HDD source volume. With write-back caching, newly written blocks are sent immediately to the SSD cache, and flushed to the underlying source volume at some later time.

Q: What cache replacement/eviction policies does EnhanceIO support?
A: EnhanceIO supports three cache eviction methodologies that can be configured by the system administrator when a cache is enabled on a volume. These policies define how previously cached data will be replaced by new data after the SSD cache device has filled to capacity. The supported policies are Least Recently Used (LRU), First-In First-Out (FIFO), and Random.

Q: What performance monitoring capabilities does EnhanceIO have?
A: EnhanceIO provides a graphical interface that allows system administrators to view both current and historical performance data. The metrics presented include IOPS and throughput data for the disk volumes attached to the system, as well as the average I/O response times and cache hit rates for cached volumes on the system. Data is presented separately for read and write operations. Capacity utilization data is also presented for the SSD cache device.

Q: How can I tell if EnhanceIO will be effective in accelerating my application environment?
A: EnhanceIO includes a performance profiler tool that can be used to gauge the effectiveness of the EnhanceIO caching software in a given application environment. This tool can be used without configuring or enabling an SSD cache for a volume, and can be used to assess if using EnhanceIO on the volume will be worthwhile. The EnhanceIO profiler provides estimates of the performance improvement that could be achieved by using SSD caching in the context of any observed workload, and is expressed as the expected percentage improvement in average I/O response time that the use of an SSD cache would deliver.
Q: Does EnhanceIO work with Hypervisor Environments?
A: Yes, both EnhanceIO for Windows and EnhanceIO for Linux will work on a Windows/Linux operating system that is hosted as a guest within VMware, HyperV, XenServer, and KVM environments. When operating under VMware, the SSD cache device can be provisioned to EnhanceIO either as a VMware Raw Device Mapping (RDM), or as a VMDK that is hosted within a VMware datastore that is underpinned with a solid-state storage device.

Q: Does EnhanceIO work with VMware vMotion?
A: Yes, EnhanceIO can work with VMware vMotion if the SSD cache device is located on a shared, back-end SAN, and provisioned to EnhanceIO via a solid-state VMDK (i.e., a VMDK within a datastore that is underpinned with a SAN-based solid-state device). In such a configuration, the performance acceleration benefits provided by EnhanceIO will be retained even after a VM has been relocated to another server via vMotion.

EnhanceIO will not work with vMotion if the SSD cache device is configured as a local device attached to the VMware server on which the EnhanceIO VM is located.

Q: Will there be a native version of EnhanceIO for VMware or other Hypervisor platforms?
A: HGST is currently investigating the feasibility of a native EnhanceIO for VMware product; however, no announcement regarding such a product is being made at this time.

Q: Which applications will benefit the most with EnhanceIO deployed in the infrastructure?
A: EnhanceIO SSD Cache Software enables today’s data center infrastructure to deploy SSDs without major increase in cost. The following will benefit the most from EnhanceIO:

- Transactional Databases
- Server Virtualization
- Business Intelligence/Data Analytics
- Streaming Media
- High Performance Computing