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Software Product Description

PRODUCT NAME: HS Family of Array Controllers Optional Operating Software (HSOF), Version 2.7 **SPD 54.38.01**

DESCRIPTION

HS Family of Array Controllers Optional Operating Software is a set of software products that execute within the controllers and provide additional capabilities beyond the controllers' basic operating software (HSOF). HS Family Optional Software currently includes the following separately licensed capabilities:

- Write-back cache capability that enhances I/O performance
- RAID capability that provides high data availability (tolerance of disk failures) at a lower cost than disk mirroring
- Disk mirroring capability that provides maximum data protection at improved performance over RAID

The write-back cache capability, the RAID capability, and the disk mirroring capability are controllable through the HS Family of Array Controllers command language interpreter (CLI) and can be restricted to operate only on certain disks.

These capabilities are available for HSJ40, HSJ30, HSD30, and HSZ40 array controllers, and all require that write-back cache hardware be available on the controller. The following sections describe these functions.

Write-Back Cache Capability

The write-back cache capability provides the following functions:

- Stores data to be written temporarily in the controller's write-back cache and informs the host that the write request is complete. This allows the host to continue working without waiting for data to be written to disk media
- Writes the data stored in cache to the disk media based on a least-recently-used cache flushing policy or when a device has been inactive for a defined time
- Consolidates contiguously located data blocks from multiple host write requests into a single device unit to reduce average latency
- On recovery from a controller failure (for example, a power outage), detects that unwritten data still exists in cache and writes it to disk media before enabling normal controller operations

The write-back cache capability is available only as part of a package that includes a license to use the write-back cache software and batteries that provide backup power to preserve the cache contents in the event of a system power failure.

RAID Capability

The RAID capability provides the following functions:

- Manages up to 14 sets of between 3 and 14 disks as RAIDsets (limited by controller configuration restrictions). A RAIDset is viewed by the host as a single disk. RAIDsets can tolerate the failure of a single member disk without loss of ability to deliver data to hosts.
- Dynamically adjusts between RAID Level 3 and RAID Level 5-like data protection algorithms depending on instantaneous workload.
- Maintains consistency of data and parity across all member disks in a RAIDset. This includes recovery from media errors.
- Detects failure of a single RAIDset member disk and invokes data regeneration algorithms to provide continued data availability to hosts.
- Captures a designated spare (if one exists) in the event of a member disk failure and reconstructs the data and parity of the failed member disk onto it.

- The algorithms for calculating the default and maximum chunksize for containers have changed with Version 2.7. For additional information regarding default checksize, refer to the respective controller release notes for Version 2.7, EK–HS*xx*0–RN. *x*01.

Disk Mirroring Capability

The disk mirroring capability provides the following functions:

- Real-time maintenance of up to six identical copies of data on mirrorsets of separate disks attached to a single HS array controller.
- Protects data against disk failure by replicating all data on each member of the mirrorset. Disk mirroring offers extremely high data reliability.
- Striping of mirrorsets, for high-performance access to large amounts of highly available data.
- Captures a designated spare (if one exists) in the event of a mirrorset member disk failure and reconstructs the data of the failed member disk onto it.
- Ability to increase or decrease the number of members in a mirrorset as requirements change.
- Flexible policy options for determining both how read requests are satisfied and the speed of copying when a new member is being added.
- HSOF disk mirroring can utilize the UNMIRROR command to change devices back to a single-disk unit.

Limits on the Total Number of Storagesets

The following limits apply to storagesets configured on a single controller or dual-redundant controller configurations:

- A mirrorset can have a maximum of 6 members.
- There can be a maximum of 20 mirrorsets and/or RAIDsets.
- There can be a maximum of 30 storagesets (RAIDsets, mirrorsets, and/or stripesets.)
- There can be no more than 32 physical device members total for a unit.

Restrictions on Moving Storagesets to Previous Software Versions

In software Version 2.5, striped mirrorsets reported a different disk geometry than the same nonmirrored stripeset. This has been resolved in Version 2.7, such that striped mirrorsets initialized under Version 2.7 report a disk geometry identical to the same nonmirrored stripeset.

Due to this improvement in Version 2.7, the following issues need to be considered when moving stripesets to previous versions of software:

- Striped mirrorsets created under software Version 2.7 cannot be used on previous versions; the metadata is incompatible.
- Any stripeset that is converted to a striped mirrorset using the MIRROR command under Version 2.7 cannot be used on previous versions. Each member must be UNMIRRORed to return the stripeset to an earlier version.
- Any stripeset clone that is created under Version 2.7 (using the CLONE utility) cannot be used with previous software versions.
- Any container initialized with the SAVE_CONFIGURATION option cannot be used with previous software versions.

HARDWARE REQUIREMENTS

HS Family Optional Software executes on any of the HS Family of Array Controllers (HSJ40, HSJ30, HSD30, or HSZ40). It is distributed on the same PCMCIA card that contains the basic software (HSOF). Valid configurations for HS Family Optional Software are the same as those of the underlying controller platform.

Note: Configuration guidelines for the HS Family of Array Controllers are provided in the latest version of the *StorageWorks Array Controllers HS Family of Array Controllers User's Guide*, EK–HSFAM–UG. D01.

OPTIONAL HARDWARE

The following kits contain the necessary options for write-back cache:

- HSJ40–YA Upgrades an HSJ40–AD with a Version 1 16 MB Read Cache option to a 16 MB Write-Back Cache option (includes a Version 2 16 MB Read Cache option and an HSJ40 Write-Back Cache kit)
- HSJ40–YB Upgrades an HSJ40–AD with a Version 1 32 MB Read Cache option to a 32 MB Write-Back Cache option (includes a Version 2 32 MB Read Cache option and an HSJ40–YC Write-Back Cache kit)
- HSJ40–YC HSJ40 Write-Back Cache kit, includes two batteries, a battery bracket, and a Write-Back Cache option license for HSJ40 controllers with Version 2 Read Cache modules
- HSJ30–YC HSJ30 Write-Back Cache kit, includes two batteries, a battery bracket, and a Write-Back Cache option license

- HSD30–YX HSD30 Write-Back Cache option kit, includes two batteries, a battery bracket, and a Write-Back Cache option license
- HSZ40–YX HSZ40 Write-Back Cache option kit, includes two batteries, a battery bracket, and a Write-Back Cache option license

SOFTWARE REQUIREMENTS

HS Family Optional Software requires HSOF V2.5 or later for write-back cache, RAID, and disk mirroring options.

OPTIONAL SOFTWARE

None.

DISTRIBUTION MEDIA

HS Family Optional Software is shipped on the PCMCIA program card that contains the HSOF for the applicable controller. No separate media or documentation is available.

ORDERING INFORMATION

HS Family Optional Software options are shipped preinstalled with HS Family of Array Controllers contained on the same order. The following are license order numbers for write-back cache, RAID, and disk mirroring options:

QL–3HVA9–AA CACHE FW HSD30 TRAD LIC
QL–3HVA9–RA CACHE FW HSD30 TRAD UPD LIC

QL–3HWA9–AA CACHE FW HSJ TRAD LIC
QL–3HWA9–RA CACHE FW HSJ TRAD UPD LIC

QL–3HXA9–AA CACHE FW HSZ40 TRAD LIC
QL–3HXA9–RA CACHE FW HSZ40 TRAD UPD LIC

The foregoing cannot be ordered separately; they are included in kits that contain the hardware required for write-back cache operation and the appropriate software license. See the OPTIONAL HARDWARE section of these release notes for the kit order numbers.

QL–3HYA9–AA RAID FW HSD30 TRAD LIC
QL–3HYA9–RA RAID FW HSD30 TRAD UPD LIC

QL–3HZA9–AA RAID FW HSJ TRAD LIC
QL–3HZA9–RA RAID FW HSJ TRAD UPD LIC

QL–3J0A9–AA RAID FW HSZ40 TRAD LIC
QL–3J0A9–RA RAID FW HSZ40 TRAD UPD LIC

QL–4DRA9–AA MIRRORING FW HSD30 TRAD LIC
QL–4DRA9–RA MIRRORING FW HSD30 TRAD UPD LIC
QL–4DSA9–AA MIRRORING FW HSJ TRAD LIC
QL–4DSA9–RA MIRRORING FW HSJ TRAD UPD LIC

QL–4DTA9–AA MIRRORING FW HSZ40 TRAD LIC
QL–4DTA9–RA MIRRORING FW HSZ40 TRAD UPD LIC

For self-maintenance customers or others who require separate ordering of software media and documentation, HSOF for the HS*x* array controllers may be ordered separately as follows:

- For HSJ30 and HSJ40 controllers:

Software Media and Docs: QA–0W9AB–HS

- For HSD30 controllers:

Software Media and Docs: QA–2YHAB–HS

- For HSZ40–B*x* controllers:

Software Media and Docs: QA–2YJAD–HS

For additional information on available licenses, services, and media, refer to the appropriate price book.

SOFTWARE LICENSING

An HS Family Optional Software License (key and letter) for the corresponding option is the license deliverable. The array controller utility called the Software Licensing System (FLS) must be used to install the license key for proper software option functionality.

SOFTWARE PRODUCT SERVICES

A variety of service options are available from Digital. For more information, contact your local Digital office.

Software service for the HSOF is covered under the terms and conditions of the Integrated Hardware and Software Customer Service contracts.

SOFTWARE WARRANTY

Warranty for this software product is provided by Digital as defined in the Software Warranty Addendum of this SPD.

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