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AX4-5 Series
Software Overview

September 4, 2008

This document presents an overview of all software you need to configure and monitor any AX4–5 series storage system running the Navisphere® Express management tool, the Navisphere Manager management tool, or the Navisphere Command Line Interface (CLI).The software includes the Navisphere Storage System Initialization Utility, the Navisphere Server Utility, the PowerPath® path management tool , and where supported, data replication software, the **admsnap** utility and the **admhost** utility.

There are several storage object terminology differences between Navisphere Express and Navisphere Manager. Navisphere Express uses the terms virtual disks and disk pools, whereas Navisphere Manager uses the terms LUNs and RAID groups respectively.

Topics include:

Prerequisites

Before using any of the software listed above, refer to the *Setup Guide* that ships with the storage system to complete the following tasks:

- Install the host bus adapters (HBAs) or network interface cards (NICs) and drivers in the servers attached to the storage system.
- Cable the server HBAs to the switch or directly to the storage system.

About the Navisphere Storage System Initialization Utility

For Fibre Channel storage systems, use the Navisphere® Initialization utility to discover storage systems and set network parameters (IP address, subnet mask, and default gateway). In addition, for iSCSI storage systems with iSCSI data ports attached to Windows servers, use the utility to set network parameters for these ports.

You can run the initialization utility from the server support CD or you can install it on a server or other host such as a Navisphere off-array management station. The only requirement is that the host be connected to the same network subnet as the storage-system management ports.

About the Navisphere Server Utility

The server utility allows you to perform the following functions:

- **Update server information to the storage system** — Lets you send the server name and IP address to the storage system and, if needed later on, allows you to update or view this data. For Windows servers running Navisphere Server Utility version 6.20 or later, if the **Registration Service** feature remains enabled after the installation of the server utility, the utility automatically registers the server's NICs or HBAs with the storage system and updates server information whenever the configuration changes (for example, when you mount new volumes or create new partitions).
- **Configure iSCSI connections or mutual CHAP** — For servers with Microsoft iSCSI initiators you can configure iSCSI connections, such as logging on, logging off, or removing an iSCSI target, and can configure mutual CHAP. In order to use this option, you must install the latest supported version of the Microsoft iSCSI Initiator software. This option is only available with Navisphere Server Utility version 6.20 or later.

  You do not need to install the Microsoft iSCSI initiator software on servers running the Windows Server 2008 operating system. The iSCSI initiator software is part of the operating system.

- **Verify server high availability (HA)** — Lets you determine if the server is configured for high availability (HA) by verifying that the server has at least one connection path to each storage-system SP, and that PowerPath® or some other failover software, such as VMware native, DMP, PV Links, or HP native failover for 11iV3 is running. The utility does not detect any other native failover software, such as Sun StorEdge Traffic Manager or Linux native multipath (MPIO).

  This feature is not available on iSCSI servers.

- **Use the snapshot feature** — On storage systems with Navisphere Express, you can start and stop a snapshot on the source server (server assigned to the source virtual disk or source LUN), or you

can allow or remove access to the snapshot by the secondary server (server assigned to the snapshot).

You can run the Navisphere Server Utility from the CD or you can install it on the servers that are connected to the storage system. We strongly recommend that you install the utility on each server that is connected to the storage system.

On AX4–5 series storage systems with Navisphere Manager, you cannot use the server utility to manage snapshots. Instead, you must install and use the **admsnap** utility.

About the management tools

After you upgrade to Navisphere Manager, you can also use the Navisphere Command Line Interface (CLI) to manage the storage system.

Navisphere Express and Navisphere Manager software are storage-system-based management tools that consist of the storage-system integrated management software and a web-based user interface (UI). The easy-to-use management software is displayed in a common browser and provides the following:

- Security
- Storage configuration and allocation
- Data redundancy
- Status and configuration information display
- Event notification
- Data migration

Security

Security consists of three basic functions — privacy, audit, and authentication.

Privacy

The privacy function encrypts all data that passes between the browser and the storage system. This encryption protects the transferred data whether it is on a local LAN or over the Internet.

Audit

The audit function maintains an event log of critical storage-system events. Each entry includes the date and time the event occurred, the code associated with the event, and a description of the event.

Authentication

The authentication function uses password-based authentication that is implemented by the storage-system integrated management software

installed on each storage system. You assign a username and password when you initialize the storage system.

Storage configuration and allocation

With Navisphere Express, you can manage storage for one storage system at a time by creating disk pools, virtual disks, and hot spares. With Navisphere Manager you can manage storage for more than one storage system at a time by creating domains, RAID groups, storage groups, LUNs and hot spares.

A disk pool or RAID group is a set of disks on which you create one or more virtual disks or LUNs. A virtual disk or LUN is a grouping of disk partitions (equal disk space from all disks) within a disk pool or RAID group. The capacity of each virtual disk or LUN you create is distributed equally across the disks in the disk pool or RAID group. A virtual disk or LUN looks like an individual disk to the server's operating system, and each virtual disk or LUN can be assigned to a different server. The shared storage control feature allows multiple servers to access the storage on the storage system. In order to perform data I/O to a virtual disk or LUN, you *must* assign it to a server.

A hot spare is a single global spare disk, which serves as a temporary replacement for a failed disk. If you create a hot spare, and a disk fails, the storage system automatically rebuilds the failed disk's structure on the hot spare. When the storage system finishes rebuilding the failed disk, the disk pool or RAID group functions normally, using the hot spare instead of the failed disk. When you replace the failed disk, the storage system copies the data from the hot spare to the replacement disk. The storage system automatically frees the hot spare to serve as a temporary replacement again. You can create more than one hot spare for each storage system.

For storage configurations that support both SAS and SATAII disk drives, we strongly recommend that you create a unique hot spare for each disk type.

Data redundancy

Data redundancy is a method by which the data contained within a disk pool or RAID group is protected against the failure of any single disk pool or RAID group component. The storage-system integrated

management software uses RAID (redundant array of independent disks) technology to improve data reliability and/or performance, and to provide data redundancy. The Navisphere Express operating environment supports the following types of RAID technology - RAID 6 (supported for storage systems running FLARE 02.23.050.5.7xx or higher), RAID 5, RAID 3 or RAID 1/0. The Navisphere Manager environment supports the same RAID technology.

Status and configuration information display

You can monitor the status of all storage-system components and of any critical storage-system operations. If you experience performance or configuration problems, each management tool provides component fault isolation and lets you generate diagnostic files that you can send to an authorized service provider for help in resolving any problems that the files detect. In addition, Navisphere Express provides expanded alert capability, and links to hardware replacement libraries and troubleshooting trees.

Event notification

You can configure the storage system to send email notification of predefined critical storage-system events to one or more persons. To do this, enter the email addresses of the persons you want to receive notification and the IP address of the SMTP mail server that sends the email notifications. You can also configure the storage system to send SNMP traps by entering the IP address for an SNMP trap destination.

Data migration

The data migration feature helps you to move data from one disk pool or LUN to another, in order to improve performance on your storage system. For example, you might want to move your data to a disk pool or RAID group of a different RAID type, which may be better suited for your data and the way applications access it. To migrate your data, select a virtual disk or LUN and the disk pool or RAID group to which you want to migrate it, and then start the migration operation. The software creates a virtual disk or LUN in the destination disk pool or RAID group and migrates the source data to it.

About data replication

Data replication software consists of EMC SnapView™, EMC SAN Copy™, EMC MirrorView™/A and EMC MirrorViw/S. Not all storage systems support data replication software. Support depends on the storage system type and the version of FLARE OE software that the system is running. You can install data replication enabler software on supported AX4-5 dual SP storage systems that are configured with the expansion enabler and Navisphere Manager. Fibre Channel storage systems support all data replication software; iSCSI systems support only SnapView. For more information about supported data replication configurations, see the online help and the release notes specific to the software product.

EMC SnapView

EMC SnapView software consists of two main features – snapshots and clones. Snapshots are supported on some storage systems running Navisphere Express (without the SnapView enabler), or Navisphere Manager (with or without the SnapView enabler). Clones are supported only if the SnapView enabler is installed on the storage system.

The snapshot feature helps you create non-disruptive point-in-time copies (snapshots) of a virtual disk or LUN. To use the snapshot feature, you must have a source server (server assigned to the source virtual disk or LUN) and a secondary server (server assigned to the snapshot). Use the snapshot for backup purposes or as a base for temporary operations on the copy of the production data without damaging the source data. With Navisphere Express, you will use the Navisphere Server Utility to start and stop snapshots and with Navisphere Manager, you will use the **admsnap** utility. Stopping the snapshot ends the point-in-time copy and frees up the snapshot disk resources for other snapshots to use.

The clone feature helps you create full image copies of your production data that you can use to accelerate application development, and if necessary, restore your storage data quickly and easily.

EMC SAN Copy

EMC SAN Copy software lets you exchange data between the storage on supported CLARiiON®, Symmetrix® or non-EMC storage systems

and the storage on CLARiiON SAN Copy storage systems (storage systems running the SAN Copy software). SAN Copy transfers this data directly without using host resources.

SAN Copy supports two types of copy sessions— full and incremental. A full session copies all the data from the source storage device to the destination storage device. An incremental session copies only the data that has changed since the last copy session. The source storage for an incremental session must reside on a SAN Copy storage system. SAN Copy transfers data through a SAN (storage area network), and, with the appropriate hardware such as an FC-IP bridge, also supports protocols that use the IP WAN (Wide Area Network) to send data over extended distances. SAN Copy supports running multiple copies - each in its own copy session – simultaneously. On supported Windows hosts, use the **admhost** utility to activate and deactivate the source and destination storage devices being used in a SAN Copy session, and to flush data from operating system buffers to ensure that the information on the source storage device is current.

EMC MirrorView

EMC MirrorView software offers two complimentary but separately licensed storage-system based remote mirroring products: MirrorView/Synchronous (MirrorView/s) and MirrorView/Asynchronous (MirrorView/A). Both provide for disaster recovery, that is, to let one image continue if a serious accident or natural disaster disables the other. MirrorView/S is a synchronous product that mirrors data in real time between local and remote storage systems. MirrorView/A is an asynchronous product that offers extended-distance replication based on a periodic incremental-update model.

About path management

PowerPath® software, installed on the server, provides path management for the connection paths between a server and the virtual disks or LUNs in the storage system. It transfers I/O to a working path if one path fails and provides load balancing to distribute I/O load equally among paths.