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# Platform Notes: Using Standard SPARCstorage™ Array Software

## **Solaris 2.6**

*SPARCstorage Array*

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# Disk Management for the SPARCstorage Array

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The SPARCstorage Array™ takes advantage of several different levels of disk management, some available through the standard SPARCstorage Array software and some available through the Volume Manager software. This manual deals only with the disk management features available through the standard SPARCstorage Array software; if you would like more information on the disk management features available through the Volume Manager software, refer to the *Sun™ Enterprise Volume Manager™ User's Guide*.

Note that you can perform these procedures only from the CLI if you do not plan to use the Volume Manager software; the GUI is part of the Volume Manager software, so if you want to perform these or any other procedures using the GUI, you must use the Volume Manager software.

The SPARCstorage Array offers several disk management features, including fast write capability and reserve/release capability.

---

## Description of Fast Write

Usually when a system goes through a synchronous write for data without using the fast write capability, it goes through the following process:

1. The program issues the write command.
2. The command and data are sent to the SPARCstorage Array controller.
3. The SPARCstorage Array controller sends the command and data to the disk drive.
4. The drive executes the write command.

5. The drive tells the SPARCstorage Array controller that the write was completed successfully.
6. The SPARCstorage Array controller tells the host system that the write was completed successfully.
7. The program issues the next command.

This process can take anywhere from a few milliseconds to tens of milliseconds, because the host system must wait for confirmation from the drive that the write was executed successfully before the program can issue the next command.

If you use the fast write option, however, the data is stored on the NVRAM on the SPARCstorage Array controller for a short period of time. The SPARCstorage Array sends the status back to the system saying that the data was written to the disk (even though it really wasn't), which clears the way for the system to send more information over to the SPARCstorage Array. The SPARCstorage Array continues to store the data on the NVRAM and then flushes all the data from the NVRAM to the disk periodically.

So using the fast write option on a synchronous write for data results in a process similar to the following:

1. The program issues the write command.
2. The command and data are sent to the SPARCstorage Array controller.
3. The SPARCstorage Array controller tells the host system that the write was completed successfully.
4. The program issues the next command.
5. The SPARCstorage Array controller sends the command and data to the disk drive.
6. The drive executes the write command.
7. The drive tells the SPARCstorage Array controller that the write was completed successfully.

In the fast write scenario, if the SPARCstorage Array experiences a power failure after the SPARCstorage Array controller has told the host system that the write was completed (Step 3) and before the drive has told the SPARCstorage Array controller that the write was completed (Step 7), the SPARCstorage Array controller firmware will flush the write to the disk when the array is powered up again.

If the SPARCstorage Array is about to be powered off or if a disk drive is about to be made inaccessible while data is still sitting in the NVRAM, the SPARCstorage Array allows you to *flush* any outstanding writes from the NVRAM to the drives manually instead of waiting for the array to do it.



In some situations, though, flushing the writes to the drives won't work because the disk drive has failed. If flushing the data to the drive won't work, you will have to *purge* the data from the NVRAM. The instructions for flushing and purging writes are given later in this manual.

The fast write option is beneficial because it:

- Decreases latency for individual commands;
- Tends to provide a more consistent response time for write commands;
- Can significantly improve performance for applications that do a large amount of synchronous writes, as long as the amount of data being written doesn't overwhelm the capacity of the NVRAM cache.

There are several potential drawbacks to the fast write option, however:

- Management of the fast write NVRAM adds overhead to the SPARCstorage Array controller. So maximum total throughput with fast writes enabled will be lower than it is when fast writes are disabled. (This is true with any write-caching product.)
- If the write to the drive fails for some reason (say, if the drive fails), the application that issued the write will not know that the write failed, as it had been told already that the write succeeded, though an error message is displayed on the system console when this happens. For this reason, it is often recommended that you should use mirroring or RAID-5 so that individual drive failures can be survived without loss of data.

---

## Reserving and Releasing Disk Drives

The reserve command allows a host system to reserve individual drives or all the drives in a SPARCstorage Array so that no other host systems can use those drives. This is useful if you have more than one host system connected to a SPARCstorage Array but you want only one system to be able to access certain drives. The release command releases these drives from their reserved state.

---

## Installing the Software

Refer to the *SMCC SPARC Hardware Platform Guide* for instructions on installing the software for the SPARCstorage Array. When you have completed the procedures given in that manual, you will have the device drivers, libraries, and the command

line interface installed on your system. The device drivers, libraries, and command line interface are required components for the SPARCstorage Array subsystem; you will not be able to operate a SPARCstorage Array without them.

The Sun Enterprise Volume Manager is not a required component for the SPARCstorage Array subsystem. However, the Volume Manager gives you many useful disk management and user interface features, including:

- Logical volume management
- Support for disk concatenation, striping, and mirroring
- Online storage reorganization and load balancing
- Visual performance displays
- Graphical user interface (GUI)
- Command line interface (CLI) to the Volume Manager

Because of the disk management capabilities provided by Volume Manager, you may want to use the Volume Manager as a part of the overall SPARCstorage Array subsystem. However, if you do not want to use the Volume Manager, you can use different disk management software (such as Online: DiskSuite™), or use the SPARCstorage Array without any kind of disk management software and treat it as a collection of independent SCSI disks.

## Using the Standard SPARCstorage Array Software

---

This chapter gives the procedures for using the standard SPARCstorage Array software. The following tasks are covered in this chapter:

- *Reserving and Releasing Drives — page 5*
- *Setting Fast Writes — page 7*
- *Spinning Up and Spinning Down Disk Drives — page 9*
- *Displaying Properties of a SPARCstorage Array — page 11*
- *Displaying Properties of a SPARCstorage Array Disk — page 13*
- *Displaying Activity Levels on SPARCstorage Array Disks — page 14*

---

### Reserving and Releasing Drives

The `reserve` command allows a host system to reserve individual drives or all the drives in a SPARCstorage Array so that no other host systems can use those drives. This is useful if you have more than one host system connected to a SPARCstorage Array but you want only one system to be able to access certain drives. The `release` command releases these drives from their reserved state. These commands implement the reserve and release functions as defined by the industry standard SCSI-2 specification.

# Reserving and Releasing All Drives in a SPARCstorage Array

Following are the instructions for reserving and releasing all drives in a SPARCstorage Array.

## Reserving All Drives in a SPARCstorage Array

The `reserve` option reserves all drives in a SPARCstorage Array for exclusive use by the issuing host.

- Enter the following command at the prompt:

```
ssaadm reserve controller
```

where *controller* is the logical name of the controller, given in the form `c#`. If any of the drives had previously been reserved by another system, this command will fail.

---

**Note** – For more information on the `ssaadm` command, see the `ssaadm(1M)` man page.

---

## Releasing All Drives in a SPARCstorage Array

The `release` option releases all drives in a SPARCstorage Array from exclusive use by the issuing host. You would use this option if you had previously reserved all drives for exclusive use using the instructions given in the section entitled “Reserving All Drives in a SPARCstorage Array.”

- Enter the following command at the prompt:

```
ssaadm release controller
```

where *controller* is the logical name of the controller, given in the form `c#`. This command will have no affect on drives that were not reserved earlier.

## Reserving and Releasing Single Disks

Following are the instructions for reserving and releasing a single disk.

## Reserving a Physical Disk

The `reserve` option reserves a physical disk for exclusive use by the issuing host.

- Enter the following command at the prompt:

```
ssaadm reserve drive
```

where *drive* is the logical disk address for the drive, given in the form `/dev/rdisk/c#t#d#s#`. If the drive had previously been reserved by another system, this command will fail.

## Releasing a Physical Disk

The `release` command releases a physical disk from exclusive use by the issuing host. You would use this option if you had previously reserved the physical disk for exclusive use using the instructions given in the section entitled “Reserving a Physical Disk.”

- Enter the following command at the prompt:

```
ssaadm release drive
```

where *drive* is the logical disk address for the drive, given in the form `/dev/rdisk/c#t#d#s#`. This command will have no effect on a drive that was not reserved earlier.

---

## Setting Fast Writes

You can set fast writes from either the controller level, which would set fast writes for all the drives in the SPARCstorage Array, or from the drive level, which would set fast writes only for one specific drive.

- If you want to set fast writes from the controller level, refer to “Setting Fast Writes at the Controller Level”.
- If you want to set fast writes from the drive level, refer to “Setting Fast Writes at the Drive Level”.

## Setting Fast Writes at the Controller Level

To set fast writes at the controller level:

- **Enter the following command at the prompt:**

```
ssaadm fast_write [-s] -e controller
```

The `-s` option causes the SPARCstorage Array to save the fast write option across power cycles. Your SPARCstorage Array is now set up so that all the drives within the array take advantage of the fast write option.

If at any point you want to stop fast writes for all the drives in the SPARCstorage Array, follow these instructions:

- **Enter the following command at the prompt:**

```
ssaadm fast_write [-s] -d controller
```

## Setting Fast Writes at the Drive Level

To set fast writes at the drive level:

- **Enter the following command at the prompt:**

```
ssaadm fast_write [-s] -e drive
```

The `-s` option causes the SPARCstorage Array to save the fast write option across power cycles. The disk drive you selected is now set up so that it takes advantage of the fast write option. You can repeat this procedure for other drives, if you want set more than one drive for fast writes.

If at any point you want to stop fast writes for a single drive, follow these instructions:

- **Enter the following command at the prompt:**

```
ssaadm fast_write [-s] -d drive
```

---

# Spinning Up and Spinning Down Disk Drives

You can spin up or spin down the physical disk drives in your SPARCstorage Array at three levels:

- “Spinning Up and Spinning Down All Drives in an Array — *page 9*”
- “Spinning Up and Spinning Down All Drives in a Disk Tray — *page 9*”
- “Spinning Up and Spinning Down Individual Disk Drives — *page 10*”

## Spinning Up and Spinning Down All Drives in an Array

To spin up all drives in a SPARCstorage Array:

- **Enter the following command at the prompt:**

```
ssaadm start controller
```

where *controller* is the logical name of the controller, given in the form *c#*.

---

**Note** – For more information on the `ssaadm` command, see the `ssaadm(1M)` man page.

---

To spin down all drives in a SPARCstorage Array:

- **Enter the following command at the prompt:**

```
ssaadm stop controller
```

## Spinning Up and Spinning Down All Drives in a Disk Tray

To spin up all drives in a disk tray:

- Enter the following command at the prompt:

```
ssaadm start -t tray_number controller
```

where *tray\_number* is the number of the disk tray containing the drives and *controller* is the logical name of the controller, given in the form *c#*. For example, to start all drives in tray 3 on controller *c2*, you would enter:

```
ssaadm start -t 3 c2
```

To spin down all drives in a disk tray:

- Enter the following command at the prompt:

```
ssaadm stop -t tray_number controller
```

## Spinning Up and Spinning Down Individual Disk Drives

To spin up individual disk drives:

- Enter the following command at the prompt:

```
ssaadm start drive
```

where *drive* is the logical disk address for the drive, given in the form */dev/rdisk/c#t#d#s#*.

To spin down individual disk drives:

- Enter the following command at the prompt:

```
ssaadm stop drive
```



---

# Displaying Properties of a SPARCstorage Array

- Enter the following command at the prompt:

```
ssaadm display controller
```

where *controller* is the logical name of the controller, given in the form c#.

A screen like the following is displayed::

```
SPARCstorage Array Configuration
Controller path:
devicesiommu@f,e0000000sbus@f,e0001000SUNW,soc@0,0
SUNW,
pln@a0005012,55200065:ctlr

                                DEVICE STATUS
      TRAY 1                      TRAY 2                      TRAY 3
slot
1   Drive: 0,0                    Drive: 2,0                    Drive:
4,0
2   Drive: 0,1                    Drive: 2,1                    Drive:
4,1
3   Drive: 0,2                    Drive: 2,2                    Drive:
4,2
4   Drive: 0,3                    Drive: 2,3                    Drive:
4,3
5   Drive: 0,4                    Drive: 2,4                    Drive:
4,4
6   Drive: 1,0                    Drive: 3,0                    Drive:
5,0
7   Drive: 1,1                    Drive: 3,1                    Drive:
5,1
8   Drive: 1,2                    Drive: 3,2                    Drive:
5,2
9   Drive: 1,3                    Drive: 3,3                    Drive:
5,3
10  Drive: 1,4                    Drive: 3,4                    Drive:
5,4

                                CONTROLLER STATUS
Vendor:      SUN
Product ID:  SSA100
Product Rev:  1.0
Firmware Rev: 1.9
Serial Num:   501255200065
Accumulate Performance Statistics: Enabled
```

---

**Note** – For more information on the `ssaadm` command, see the `ssaadm(1M)` man page.

---

---

## Displaying Properties of a SPARCstorage Array Disk

- To display the properties of a SPARCstorage Array disk, enter:

```
ssaadm display drive
```

where *drive* is the logical disk address for the drive, given in the form `/dev/rdisk/c#t#d#s#`.

A screen like the following is displayed:

```
DEVICE PROPERTIES for device /dev/rdisk/c1t5d0s0
SCSI Port 5 Target 0
Status:          O.K.
Vendor:          CONNER
Product ID:      CP30548 SUN0535
Product Rev:     AEBX
Firmware Rev:   9308
Serial Num:      28QB
Unformatted Capacity: 532956 KByte
Fast Writes:     Disabled
```

Following are the different messages you could see on the status line:

- No drive found
- Drive did not respond to Select
- Drive not ready
- Could not read from drive
- Drive spun down
- No UNIX label
- Okay

---

**Note** – For more information on the `ssaadm` command, see the `ssaadm(1M)` man page.

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# Displaying Activity Levels on SPARCstorage Array Disks

- To display the activity level on SPARCstorage Array disks, enter:

```
ssaadm -p display controller
```

where *controller* is the logical name of the controller, given in the form *c#*.  
A screen like the following is displayed:

```
PERFORMANCE Log
BUSY: 84% IOPS: 1102
      DEVICE IOPS
slotTRAY 1TRAY 2TRAY 3
1   254 20  103
2   120 348 348
3    41  20  123
4    34  20  10
5    26  20  13
6   254 20  43
7    72 348  0
8    50  20  0
9    31  0  0
10   7  11  46
```

---

**Note** – For more information on the `ssaadm` command, see the `ssaadm(1M)` man page.

---

## Performing Service-Related Software Tasks

---

This chapter gives instructions on performing software tasks necessary for certain service procedures:

- *When Powering Down the SPARCstorage Array — page 17*
- *When Replacing a Physical Disk Drive in the SPARCstorage Array — page 18*
- *When Replacing a Drive Tray in the SPARCstorage Array — page 19*
- *When Replacing an Array Controller — page 20*
- *When Replacing All Other FRUs in the SPARCstorage Array — page 22*

---

## Flushing or Purging Outstanding Writes from NVRAM

Before you replace a FRU, you must first determine if your system is set up for fast writes.

- If your system is set up for fast writes, go to “Flushing or Purging Outstanding Writes from NVRAM”.
- If your system is *not* set up for fast writes, go to “Preliminary Software Tasks”.

---

**Note** – If you are not sure if your system is set up for fast writes or not, you should go through the procedures given in “Flushing or Purging Outstanding Writes from NVRAM” anyway, since it won’t affect drives that aren’t set up for fast writes.

---

You must first determine if you want to flush or purge the outstanding writes from the NVRAM:

- The *flush* option flushes any outstanding writes from the NVRAM to the disk drive. Follow the instructions given in “Flushing Outstanding Writes from NVRAM to a Disk Drive” to do this.
- If you get an error message when you tried to flush the writes from the NVRAM, then you must *purge* the writes from the NVRAM. The *purge* option gives the controller permission to completely throw away any outstanding writes currently residing in the NVRAM for a disk drive. You should only use this option if you are replacing a failed disk drive, since you cannot flush the outstanding writes to the failed disk drive. Follow the instructions given in “Purging Writes from NVRAM” to do this.

## Flushing Outstanding Writes from NVRAM to a Disk Drive

To flush writes from NVRAM to a physical disk:

- **Enter the following command at the prompt:**

```
ssaadm sync_cache drive
```

- If you did not get an error message after entering the command, then all outstanding writes were flushed to the disk drive.
- If you got an error message after entering the command, you will have to purge the writes from the NVRAM. Refer to “Purging Writes from NVRAM” for those instructions.

## Purging Writes from NVRAM

The *purge* option gives the controller permission to throw away any outstanding writes that are currently pending in NVRAM for the physical disk you select.



---

**Caution** – This option will destroy all data currently on the NVRAM for the selected disk drive. Use this option *only* if you can no longer access the disk drive; if you can still access the disk drive, you should flush the data to the drives using the instructions given in “Flushing Outstanding Writes from NVRAM to a Disk Drive”.

---

- Enter the following command at the prompt:

```
ssaadm purge drive
```

All outstanding writes for the disk drive are now purged.

---

## When Powering Down the SPARCstorage Array

If you are powering down the SPARCstorage Array, you must first stop all drives in the SPARCstorage Array. The procedures for this software task is given in the following section.

### Preliminary Software Tasks

Before powering down the SPARCstorage Array, you must first perform the preliminary software tasks.

1. **Unmount the file system(s) on all disks in the array.**
2. **Stop all *database* processes that are accessing any disks in the array.**
3. **Stop all *other* processes that may be accessing any disks in the array.**
4. **Flush or purge the outstanding writes from the NVRAM, if necessary.**  
Refer to “Flushing or Purging Outstanding Writes from NVRAM” for more information.

### Stopping All Drives in the SPARCstorage Array

- At the prompt, enter:

```
ssaadm stop controller
```

where *controller* is the logical name of the controller, given in the form *c#*.

---

**Note** – For more information on the `ssaadm` command, refer to the `ssaadm(1M)` man page.

---

## When Replacing a Physical Disk Drive in the SPARCstorage Array

There are two sets of tasks to be performed when replacing a physical disk drive in the SPARCstorage Array:

- *Before* replacing a drive — page 18
- *After* replacing a drive — page 19

### Before Replacing a Drive

Before replacing the drive, you must first perform the preliminary software tasks.

#### Preliminary Software Tasks

Before replacing the drive, you must first perform the following software tasks:

- 1. Unmount the file system(s) on the disks in the tray with the faulty drive.**
- 2. Stop all *database* processes that are accessing the disks in the tray with the faulty drive.**
- 3. Stop all *other* processes that may be accessing the disks in the tray with the faulty drive.**
- 4. Flush or purge the outstanding writes from the NVRAM, if necessary.**

Refer to “Flushing or Purging Outstanding Writes from NVRAM” for more information.



## Stopping All Drives in a Drive Tray

- At the prompt, enter:

```
ssaadm stop -t tray_number controller
```

where *tray\_number* is the tray that contains the drives and *controller* is the logical name of the controller, given in the form *c#*.

---

**Note** – For more information on the `ssaadm` command, refer to the `ssaadm(1M)` man page.

---

## After Replacing a Drive

- At the prompt, enter:

```
ssaadm start -t tray_number controller
```

where *controller* is the logical name of the controller, given in the form *c#*.

---

## When Replacing a Drive Tray in the SPARCstorage Array

There are two sets of tasks to be performed when replacing a drive tray in the SPARCstorage Array:

- *Before* replacing a drive tray — page 19
- *After* replacing a drive tray — page 20

## Before Replacing a Drive Tray

If you are replacing a drive tray in the SPARCstorage Array, you must first perform the preliminary software tasks.

## Preliminary Software Tasks

1. **Unmount the file system(s) on the disks in the tray.**
2. **Stop all *database* processes that are accessing the disks in the tray.**
3. **Stop all *other* processes that may be accessing the disks in the tray.**
4. **Flush or purge the outstanding writes from the NVRAM, if necessary.**  
Refer to “Flushing or Purging Outstanding Writes from NVRAM” for more information.

## Stopping All Drives in a Drive Tray

- **At the prompt, enter:**

```
ssaadm stop -t tray_number controller
```

where *controller* is the logical name of the controller, given in the form *c#*.

---

**Note** – For more information on the `ssaadm` command, refer to the `ssaadm(1M)` man page.

---

## After Replacing a Drive Tray

- **At the prompt, enter:**

```
ssaadm start -t tray_number controller
```

where *controller* is the logical name of the controller, given in the form *c#*.

---

## When Replacing an Array Controller

There are two sets of tasks you should perform when you replace an array controller in the SPARCstorage Array:

- *Before* replacing an array controller — *page 21*

## Before Replacing an Array Controller

1. **Unmount the file system(s) on all disks in the array.**
2. **Stop all *database* processes that are accessing any disks in the array.**
3. **Stop all *other* processes that may be accessing any disks in the array.**
4. **Flush or purge the outstanding writes from the NVRAM, if necessary.**  
Refer to “Flushing or Purging Outstanding Writes from NVRAM” for more information.

## Stopping All Drives in the SPARCstorage Array

- **At the prompt, enter:**

```
ssaadm stop controller
```

where *controller* is the logical name of the controller, given in the form *c#*.

---

**Note** – For more information on the `ssaadm` command, refer to the `ssaadm(1M)` man page.

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## After Replacing an Array Controller

The worldwide name for a SPARCstorage Array is stored on a PROM in the array controller. When you replace an array controller, the worldwide name for the SPARCstorage Array will change to the worldwide name stored on the PROM on the new controller.

Because paths to volumes contain the worldwide name from the *old* array controller, you must go through the following procedure so that the paths to the volumes will be updated with the *new* array controller’s worldwide name:

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**Caution** – Do *not* change the worldwide name for the new controller back to the worldwide name used by the old controller.

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1. **Become superuser.**
2. **Shut down your system:**

```
# shutdown -g0 -y -i0
```

---

**Note** – This is the correct shutdown command for most systems. However, if this does not work for your system, shut down your system as you normally would.

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3. **Verify that the system goes to the `ok` prompt after the shutdown is complete.**  
If the system goes to the `>` prompt after the shutdown, enter `n` to get to the `ok` prompt.
4. **Reboot your system using the following command:**

```
ok boot -rs
```

Once the boot cycle is completed, you should see a screen similar to the following:

```
Type Ctrl-d to proceed with normal startup,  
(or give root password for system maintenance):
```

5. **Enter your root password to become superuser, then enter the following command to boot the system a second time:**

```
# reboot
```

Once the system completes the second boot-up cycle, all the paths to the volumes should be updated to contain the new controller's worldwide name.

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## When Replacing All Other FRUs in the SPARCstorage Array

The software tasks contained in this section apply if you are replacing any of the following SPARCstorage Array FRUs:

- Fan tray
- Power supply
- FC/OM
- Battery module
- SPARCstorage Array backplane

You only need to perform certain software tasks *before* replacing the FRU in the SPARCstorage Array; no software tasks are necessary after you replace the FRU.

## Preliminary Software Tasks

1. **Unmount the file system(s) on any disk in the array.**
2. **Stop all *database* processes that are accessing all disks in the array.**
3. **Stop all *other* processes that may be accessing all disks in the array.**
4. **Flush or purge the outstanding writes from the NVRAM, if necessary.**

Refer to “Flushing or Purging Outstanding Writes from NVRAM” for more information.

## Stopping All Drives in the SPARCstorage Array

- **At the prompt, enter:**

```
ssaadm stop controller
```

where *controller* is the logical name of the controller, given in the form *c#*.

---

**Note** – For more information on the `ssaadm` command, refer to the `ssaadm(1M)` man page.

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