Sun StorEdge™ Instant Image™ 2.0 System Administrator's Guide

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Preface

The Sun StorEdge™ Instant Image™ 2.0 (Instant Image) System Administrator's Guide describes the Instant Image 2.0 management service software and its use. This guide is designed for use by an experienced system administrator of the Solaris™ operating environment and related disk storage systems.

How This Book Is Organized

Chapter 1 describes general information about the Instant Image 2.0 software and defines its terminology.

Chapter 2 describes the Instant Image 2.0 Configuration, Control, and Health management service graphical user interface.

Chapter 3 describes the Instant Image 2.0 command-line interface.

Chapter 4 describes examples of Instant Image 2.0 operations.

The *Glossary* contains definitions of terms used in this document.

Using UNIX Commands

This document may not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

Refer to the software documentation that you received with your system.

Documentation Conventions

TABLE P-1   Documentation Conventions

Typeface or Symbol	Meaning	Examples
`AaBbCc123`	The names of commands, files, and directories; on-screen computer output.	Edit your `.login` file. Use `ls -a` to list all files. `% You have mail.`
`AaBbCc123`	What you type, when contrasted with on-screen computer output.	`% `**`su`** `Password:`
AaBbCc123	Book titles, new words or terms, words to be emphasized. Command-line variable; replace with a real name or value.	Read Chapter 6 in the *User's Guide*. These are called *class* options. You *must* be `root` to do this. To delete a file, type `rm` *filename*.
[ ]	In syntax, brackets indicate that an argument is optional.	`sd_stats` [–d *sec*] [–r *n*[:*n*][,*n*]...] [–z]
{ }	In syntax, braces indicate that one of the enclosed arguments must be chosen. The arguments are separated by a vertical line.	`iiadm -e` {-I	-D} *master_vol shadow_vol bitmap*

\	At the end of a command line, the slash indicates that the command continues on the next line.	`iiadm -e -I /dev/rdsk/c1t3d0s1 \`
		`/dev/rdsk/c1t3d0s5 \`
		`/dev/rdsk/bitmap01`

Graphical User Interface Terms

TABLE P-2   Graphical User Interface Terms

Verb	Action	Example
Choose	To open a menu or initiate a command.	Choose New from the File menu.
Click	To press and release a mouse button without moving the pointer.	Click the left mouse button.
Double-click	To click a mouse button twice quickly without moving the pointer.	Double-click on the File Manager icon to re-open the program.
Drag	To move the pointer or an object by sliding the mouse with one or more buttons pressed.	Drag the Applications Menu Bar to the left corner of the screen.
Point	To move the mouse pointer to a specific location on the screen with no mouse buttons pressed.	Point to the Trash icon and click to select it.
Press	To push a mouse button down and continue to hold it.	Press the left mouse button on the OK button.
Release	To let up on a mouse button to initiate an action.	Release the left mouse button when the Print button is highlighted.
Select	To highlight an entire window or data in a window.	Select the Applications Menu bar. Choose the master volume and click to select it.

Shell Prompts

TABLE P-3   Shell Prompts

Shell	Prompt
C shell	*machine_name*%
C shell superuser	*machine_name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#
Instant Image 2.0 command line interface shell	sx >

Related Documentation

TABLE P-4   Related Documentation

Application	Title	Part Number
`man` Pages	`svadm`(1SV) `ii_control`(1M) `ii_config`(1M) `ii_health`(1M) `iiadm`(1M)	N/A
Release Notes	*Sun StorEdge Instant Image 2.0 Release Notes*	806-0231-10
Installation Guide	*Sun StorEdge Instant Image 2.0 Installation Guide*	806-4004-10

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Introducing the Sun StorEdge Instant Image 2.0 Software

This chapter describes Sun StorEdge™ Instant Image 2.0 capabilities, terminology, and concepts.

What Is the Instant Image 2.0 Software?

The Sun StorEdge Instant Image 2.0 (Instant Image 2.0) software is a volume copy application for the Solaris operating environment. The Management Services part of the Instant Image 2.0 software, based on Java™ technology, enables you to create a *volume set*: a point-in-time logical volume copy (*shadow*) from the original logical volume (*master*) that you specify. Once the shadow is created, you can read from and write to this shadow volume—and also the master volume. An Instant Image 2.0 volume group contains the master and shadow volume set, and *bitmap* volume file. The bitmap volume file tracks differences between the master and shadow volumes in the volume set.

The Instant Image 2.0 software's *fast resynchronization* feature enables you to create a new point-in-time volume copy quickly by updating the specified volume with only data that has changed since the last volume copy operation.

Using the Instant Image 2.0 software, you can update the shadow volume from the master volume, or restore the master volume from the shadow. The restore operations can be full or incremental.

Note – To use the Instant Image 2.0 management service software, you must first establish logical volumes using the Storage Volume driver svadm(1SV) utility. See Chapter 2.

Supported Sun Platforms

You can install and run the Instant Image 2.0 software on the following Sun hardware:

- Sun Enterprise™ Server models ES250 and ES450
- Sun Enterprise Server models ES3x00 through ES10000

Note – The Sun StorEdge Instant Image 2.0 software is not supported in a clustered environment.

The Instant Image 2.0 Software Components

You can use the Instant Image 2.0 features through either of its two independent software components:

- Management service—a graphical user interface (GUI)
- Command line interface (CLI)—a CLI, based on Java technology, to enable you to write scripts and issue commands when you choose not to use the GUI

Management Service

The Instant Image 2.0 management service component is a GUI using the Sun StorEdge™ Management Console (Management Console). The Management Console enables you to navigate the Instant Image 2.0 features and functions.

FIGURE 1-1 shows the Management Console window. Chapter 2 describes the Instant Image Control, Health, and Configuration features.

FIGURE 1-1   Sun StorEdge Management Console Window
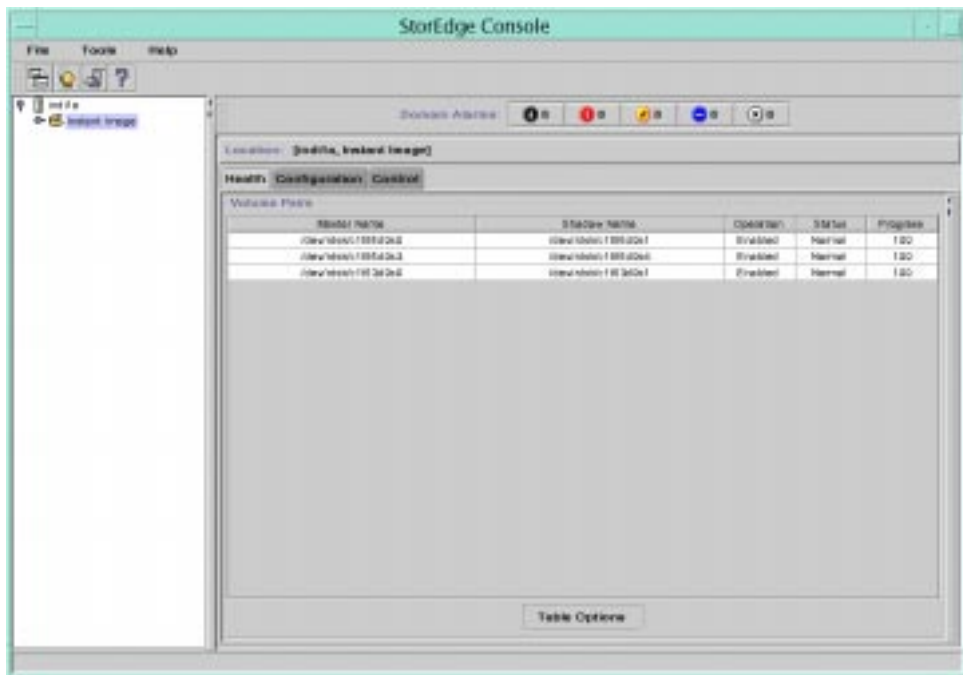
Command Line Interface

The Instant Image 2.0 CLI component enables you to write scripts to create, copy, or update volumes when it is convenient for you. It is a shell based on Java technology and is also compatible with the earlier CLI-only version of Instant Image, which included a CLI named iiadm(1M). You can use existing scripts from the older CLI-only version and write new ones using the new commands. You can also use the CLI interactively from a shell to issue commands as needed from a terminal window.

Note – The correct syntax for displaying volume status using the iiadm command is: iiadm -i {all | *shadow_vol*}
Choose the all keyword to show the status of all volumes or *shadow_vol* to show the status of the associated shadow volume's volume group.

-o *volume* is an invalid option for iiadm.

The Instant Image 2.0 Volumes

The Instant Image 2.0 software uses three volume types: the volume set containing a master volume and a shadow volume and the bitmap volume or file:

- Master volume—the volume containing the original data
- Shadow volume—the volume that is the copy of the master volume
- Bitmap—the volume or file that the Instant Image 2.0 software uses to track the differences between the master and shadow volumes in a volume set

The Shadow Volume

A shadow volume is a usable copy of the data stored on the master volume. You can read from and write to a shadow volume just like any other volume. There are two types of shadow volumes:

- **Independent**—an *independent* point-in-time copy of a master volume. When you enable the Instant Image 2.0 software for a volume set, you can specify the shadow volume as Independent. This selection causes a full volume copy operation between the master and shadow.

Note – Until the copy is complete, the volume acts as a *dependent*.

When the copy completes, the shadow volume data is identical to the master volume data stored on the master volume at the time the copy was started. If you were to disable the Instant Image 2.0 software for this volume set after the copy, the shadow volume, as an independent volume, would still contain valid point-in-time data. You can, however, keep the volume set association indefinitely.

Once the shadow volume is created, you can read from and write to it.

Note – After writing to the shadow volume, the shadow volume data is unique and does not necessarily match the master volume as it did initially.

- **Dependent**—a master volume-dependent point-in-time view. When you enable the Instant Image 2.0 software for a volume set, you can specify the shadow volume as Dependent. This selection does not cause the Instant Image 2.0 software to perform a full volume copy; data is not duplicated until it is required

or you request it from the shadow (for example, when the master volume is modified or a shadow data block is read after the dependent point-in-time volume is established).

The dependent shadow volume is a copy that relies on the master for all unmodified data blocks. A dependent copy takes only seconds to create, since no full volume copy occurs. Create a dependent shadow when you do not require two physical copies of the data.

Once the shadow volume is created, you can read from and write to it. After you write to it, the shadow volume data is unique and does not necessarily match the master volume. A bitmap volume file tracks the differences between the two.

If you disabled the Instant Image 2.0 software for this volume set, the shadow volume, as a dependent volume, would not contain valid point-in-time data. The Instant Image 2.0 software clears the first 64 Kbytes of data in the shadow volume, disabling the shadow volume to prevent users from accessing invalid or inconsistent data.

Note – TABLE 1-2 warning on disk label: The cleared 64 Kbytes of data will affect the label on cylinder 0 if you have the shadow configured to start writing at cylinder 0.

The Bitmap Volume

A bitmap volume is a volume or file that the Instant Image 2.0 software uses to track the differences between the master and shadow volumes in a volume set. Each Instant Image 2.0 volume requires an associated bitmap volume.

Each time you write to a volume, the Instant Image 2.0 software notes the location of the change. If you update the contents of one volume to the other so that the volumes match, the Instant Image 2.0 software copies only the changed data. This fast resynchronization update occurs much quicker than a full volume copy. It is particularly useful when you need to update large volumes.

The Instant Image 2.0 management service GUI (esm_gui) and CLI (esm_cli) automatically creates a correctly-sized bitmap volume when you enable a volume set; this bitmap volume file is located in either the default directory or the directory specified with the bitmap option.

If you use the Instant Image 2.0 CLI iiadm(1M), you must create a bitmap volume of the required size for each volume set before enabling the pair. The size depends on the sizes of the volumes being bitmapped.

Note – To make administration easier, create a single filesystem containing all bitmap entries. Keep the filesystem as small as practically possible, allocating 8Mbytes of bitmap per Gbyte of data plus 8Kbytes for overhead (minimum of 24 Kbytes).

See "Instant Image 2.0 Bitmap Volume Size Requirements" on page 1-7. When you create a bitmap volume, make sure that it is:

- Located on a RAID-protected volume or file system
- Not located on the master or shadow volume
- Direct I/O

Instant Image 2.0 Bitmap Volume Size Requirements

The shadow volume must be the same size or larger than the master volume. For the bitmap volume, file, allocate 8Mbytes of bitmap per Gbyte of data plus 8Kbytes for overhead (minimum of 24 Kbytes). For example, to shadow a 3-Gbyte master volume, the bitmap volume size must be (3 * 8 Kbytes) + 8 Kbytes, or 32 Kbytes.

You can have multiple sets of master and shadow volumes; the number is limited only by the amount of storage you have physically available.

Mount Filesystem Containing Bitmap Files

The bitmaps must be available before Instant Image 2.0 is enabled. Do this by configuring the Storage Cache Manager (SCM) start-up script.

▼ Configure SCM Start-Up Script

1. **Add the filesystem mount point entry to** `/etc/opt/SUNWscm/bitmapfs.cf`. **For instance:** `/bitmapfs.`

2. **Add an entry for the filesystem to** `/etc/vfstab`; **for instance,** `/bitmapfs`, **specifying the mount option** `forcedirectio` **and no automount.**

Uses for the Instant Image 2.0 Software

The most important features of the Instant Image 2.0 software are updating volumes using *fast resynchronization* and creating independent full volume copies.

Fast resynchronization enables you to perform volume updates at faster speeds than most full volume copy or mirroring operations. The update command options copy all 32-Kbyte segments flagged as different between the master and shadow volumes, depending on which volume is being updated. They do not copy all volume data, only changed data.

You typically perform a full volume copy only when you initially enable an independent group, or if an independent volume has become corrupted or has failed. The full volume copy overwrites the shadow volume with the master contents, or you can overwrite the master volume with the shadow contents. Of course, you can choose to enable the Instant Image 2.0 software with the Independent option, which performs a full volume copy from master to shadow.

With Instant Image 2.0, you can:

- Create shadow copies of any RAID-level source volumes if your Solaris operating environment supports RAID.
- Copy production data to a shadow volume without interrupting production or locking out users. You can also copy production data to a shadow volume so you can safely test real data using beta or prerelease applications.
- Keep a point-in-time copy of your data on the shadow volume in case the master volume fails. After replacing the volume, you can resume read and write operations on your previously saved data.
- Balance read operation loads by making two volumes available instead of one to users who primarily require read access.
- Decide when to copy or update volumes, thus reducing the processor and I/O subsystem workload associated with automatic mirroring utilities. You can create scripts as part of `cron(1M)` jobs to update volume contents when it is convenient for you.
- Disable the Instant Image 2.0 software on a shadow volume at any time, and reassign that shadow volume to a different master.

Caution

When you quiesce the primary application, to ensure that consistent information is written to the volume prior to `-e`, `-u`, the target volume must not be open to a buffered application. For instance, volumes cannot be in use by databases and filesystems cannot be mounted.

Task Summary: Getting Started

TABLE 1-1 briefly lists the steps and tasks for getting started with the Instant Image 2.0 software.

TABLE 1-1 Getting Started Task Summary

Step	See This Section (Management Service GUI)	See This Section (Command Line Interface)
1. Choose volumes to use with Instant Image 2.0.	"Instant Image 2.0 Bitmap Volume Size Requirements" on page 1-7	"Instant Image 2.0 Bitmap Volume Size Requirements" on page 1-7
2. Configure start-up script to mount filesystems containing bitmaps.	"Mount Filesystem Containing Bitmap Files" on page 1-8	"Mount Filesystem Containing Bitmap Files" on page 1-8
3. Place these volumes under the control of the Storage Volume (SV) driver.	"Adding Instant Image 2.0 Volumes to the Storage Volume Driver Configuration File" on page 2-3	"Adding Instant Image 2.0 Volumes to the Storage Volume Driver Configuration File" on page 2-3
4. Enable the Instant Image 2.0 software for the volumes.	"Configuration Tab: Creating and Enabling Volume Sets" on page 2-10	"Enabling the Instant Image 2.0 Software" on page 3-9
5. Perform Instant Image 2.0 copy, update, and other operations on the volumes.	"Control Tab: Performing Instant Image 2.0 Operations" on page 2-15	Most of Chapter 3, including: "Updating the Shadow Volume" on page 3-13 "Copying the Master Volume to the Shadow Volume" on page 3-14 "Updating the Master Volume" on page 3-16 "Copying the Shadow Volume to the Master Volume" on page 3-18
6. Check volume status.	"Health Tab: Getting Volume Status" on page 2-21	"Displaying Volume Pair Status" on page 3-26

Product Considerations

TABLE 1-2   Product Considerations

Item	Consideration
Enable, copy, and update operations	Do not perform Instant Image 2.0 enable, copy, or update operations on mounted target volumes. Always unmount the target volume before issuing these commands. See Chapter 2.
Using the CLI for copy and update operations	Always specify the shadow volume name of the volume set when using the copy or update commands.
Length of the volume names	Master, shadow, and bitmap volume names (including the path name) are currently limited to a maximum of 64 characters.
Creating a shadow volume	It requires three devices: 1. A master volume to be shadowed. 2. A shadow volume where the copy will reside. This volume must be equal to or larger than the master volume. 3. An administration bitmap volume file for tracking differences between the shadow and master volumes. This volume must be at least 24 Kbytes; 8Kbytes for each Gbyte (or part thereof) of master volume size plus 8Kbytes for overhead. For example, to shadow a 3 Gbyte master volume, the bitmap volume must be 8 Kbytes + (3 * 8 Kbytes) = 32 Kbytes.
Location of the bitmap volume	Note: the Instant Image 2.0 management service GUI automatically creates the bitmap volume; see "The Bitmap Volume" on page 1-6. The bitmap volume cannot be located on the shadow volume. Place the bitmap volume in the root (/) or /usr file system. However, you may place it in any directory that you do not plan to unmount. Make sure the bitmap volume is on a mirrored volume or file system.
Shadowing the root device	You cannot make a shadow volume copy of the root device (/).
Shadowing encapsulated volumes	The Instant Image 2.0 software does not support encapsulated volumes; you cannot create a shadow volume of an encapsulated volume.
sd_stats(1M)	Note that the Instant Image 2.0 installation script also installs storage device software maintenance utilities such as sd_stats(1M). These utilities are for use by Sun Enterprise Services personnel only.

TABLE 1-2 Product Considerations

Item	Consideration
Dependent master and shadow volumes	In a dependent volume group, when a write operation to the mounted master occurs:
	1. The new data is written to the mounted master volume.
	2. The old data is written to the mounted shadow volume.
	The shadow volume does not contain the new data until you issue an update command.
Disk label and format information	If your shadow volume disk partition has its default cylinder starting at 0 and is the first cylinder of the disk, the Instant Image 2.0 software overwrites your disk formatting and labeling information during enable and full volume copy operations. To avoid losing your disk formatting and labeling information, exclude that cylinder when partitioning the disk.
Clustered environments	The Sun StorEdge Instant Image 2.0 software is not supported in a clustered environment.
reboot command	If you need to execute the reboot command after you have established a normal operation with valid data written to the shadow volumes, ensure that all Instant Image 2.0 volumes are suspended, then use shutdown instead.
MANPATH	Set/extend the MANPATH environment variable to include /usr/opt/SUNWesm/man by entering: `# setenv MANPATH /usr/opt/SUNWesm/man`

Using The Instant Image 2.0 Software Through The Sun StorEdge Management Console

This chapter describes how to start and navigate the Sun StorEdge Management Console (Management Console). The Instant Image 2.0 management service is available through the Management Console window. This chapter also describes all Instant Image 2.0 buttons and tabs. Chapter 4 provides examples of how to perform Instant Image 2.0 operations.

Note – This guide is designed for use by an experienced system administrator of the Solaris operating environment and related disk storage systems. To use the Instant Image 2.0 software, you must be the root user or superuser.

Before You Begin Using the Instant Image 2.0 Software

Before you enable and use the Instant Image 2.0 software:

1. See "Task Summary: Getting Started" on page 1-10.

2. Establish logical volumes using the Storage Volume (SV) driver `svadm(1SV)` utility. See "Adding Instant Image 2.0 Volumes to the Storage Volume Driver Configuration File" on page 2-3.

3. Unmount the target volume of Instant Image 2.0 copy and update operations to prevent file system panics.

   You may unmount the source volume also, to stop write operations to it and ensure a consistent shadow copy, but this source unmount is not required. Take the same precautions using Instant Image 2.0 Copy and Update that you would take using the `dd`(1M) command to copy between raw devices.

   After issuing the copy or update, remount the volumes; you do not have to wait for the operation to complete. You may access the target volume as soon as the CLI prompt returns or when you see the operation is in progress in the Management Console Instant Image 2.0 Control tab.

Caution – Before starting the enable, copy, and update operations, quiesce the workload to the master and shadow volumes and unmount the target volume.

This ensures that the point-in-time data is consistent. Remount the volume and resume the workload after starting the enable, copy, or update operation; you do not have to wait for the operation to complete.

Adding Instant Image 2.0 Volumes to the Storage Volume Driver Configuration File

Before you can enable and use the Instant Image 2.0 software, you must add the Instant Image 2.0 volumes to the Storage Volume (SV) driver configuration file and reconfigure the driver.

You cannot enable and use the Instant Image 2.0 software on volumes that are not in the SV driver configuration file and enabled by the SV driver. The SV driver provides a simple layer of volume management for the Instant Image 2.0 software.

▼ To Add Instant Image 2.0 Volumes

1. **Decide which volumes you are going to use with the Instant Image 2.0 software.**

2. **Using a text editor, add the volumes to the Storage Volume (SV) driver configuration file** `/etc/opt/SUNWspsv/sv.cf`

   This file includes two fields per line for each volume: the resource name field and access mode field. Separate the fields in the file with spaces or tabs.

   The resource name field contains the name of a raw device for which the SV driver is to be enabled. *It must be the full path to the raw device node and cannot be the block device node.*

   The access mode field can be `cache` or `raw`. This field specifies how the Instant Image 2.0 software accesses the volume: through the Storage Cache Management module cache or directly through the raw device.

   The following example shows four master and four shadow devices, two of each type to be accessed directly and two of each type to be cached.

Note – The example file shown shows volume names placed in order in the file: master followed by shadow. This is not required; you can place the volume names in any order.

```
# devices c1t3d0s0 to master02 are master volumes
/dev/rdsk/c1t3d0s0 cache
/dev/rdsk/c1t3d0s1 cache
/dev/vx/rdsk/master01 raw
/dev/vx/rdsk/diskgp/master01
/dev/vx/rdsk/master02 raw
/dev/vx/rdsk/diskgp/master02
#
# devices c1t3d0s4 to shadow02 are shadow volumes
/dev/rdsk/c1t3d0s4 cache
/dev/rdsk/c1t3d0s5 cache
/dev/vx/rdsk/shadow01 raw
/dev/vx/rdsk/diskgp/shadow01
/dev/vx/rdsk/shadow02 raw
/dev/vx/rdsk/diskgp/shadow02
```

3. **Save and exit** /etc/opt/SUNWspsv/sv.cf

4. **Use the** svadm**(1SV) utility to reconfigure the SV driver to add the new volumes in the configuration file to the SV layer.**

```
# /usr/opt/SUNWesm/SUNWspsv/sbin/svadm -r
```

Removing Volumes

To remove volumes from the SV layer, comment out the volumes in the file and repeat Step 4.

Adding Devices

If you want to add devices later, repeat the steps in "To Add Instant Image 2.0 Volumes".

▼ Changing the Storage Volume Size

If you change the size of a storage volume, use this procedure:

1. **If the volume is part of an Instant Image pair, disable that pair from the configuration using the Disable button in the Configuration screen or by issuing a CLI command:**

   ```
   iiadm -d shadow
   ```

2. **Disable the volume from the SV configuration: Comment that volume out of the sv.cf file and issue an:**

   ```
   svadm -r
   ```

   command or disable all SV devices by issuing an

   ```
   svadm -d
   ```

   command.

3. **Change the volume size.**

4. **Re-enable the volume into the SV configuration: Un-comment the volume from the sv.cf file and issue an:**

   svadm -r

   command or reenable all SV devices by issuing an:

   svadm -e

   command.

5. **Reenable the pair either by using the Enable Independent or Enable Dependent button in the Configuration screen or entering this command:**

   ```
   iiadm -e ind|dep master shadow bitmap
   ```

Sun StorEdge Management Console

The Instant Image 2.0 management service is available through the Sun StorEdge Management Console (Management Console) window. The Management Console window provides a graphical user interface that enables you to navigate through the Instant Image 2.0 features and functions. FIGURE 2-1 shows the Management Console window and its components; the portion of the Management Console window to the right of the navigation pane is the Instant Image 2.0 management service area.

▼ To Start the Management Console and the Instant Image 2.0 Software

1. Become superuser (root).

2. Start the Management Console:

```
# /usr/opt/SUNWesm/bin/esm_gui &
```

The Management Console window is displayed. See FIGURE 2-1. TABLE 2-1 describes the parts of the window.

3. Double-click the server name.

Instant Image 2.0 is displayed. The tabs are not highlighted.

4. Click Instant Image 2.0.

The GUI tabs are highlighted. The Instant Image 2.0 software is ready for use.
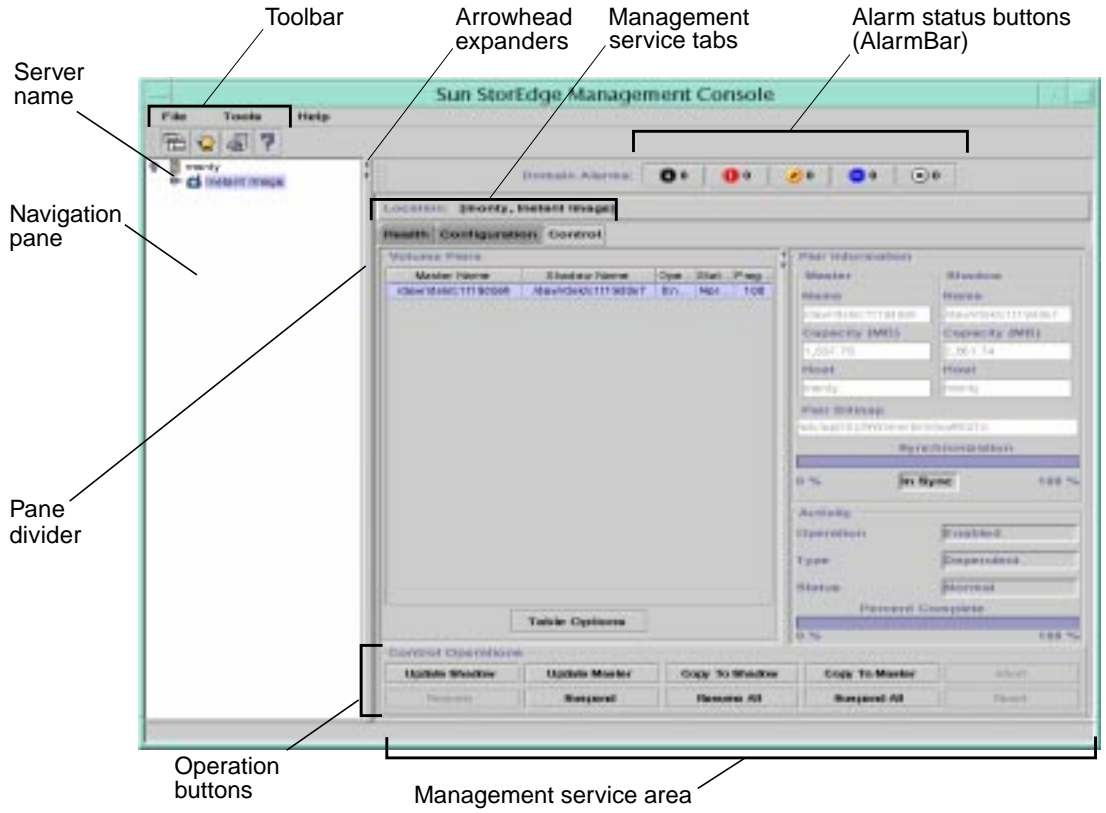
FIGURE 2-1 Management Console Window and Its Components

TABLE 2-1   Management Console and Instant Image 2.0 Window Components

Component	Description
Navigation pane	Shows the server where the Management Console is running and a top-level view of the management services available on the server.
Toolbar	Enables you to display Alarm Viewer, Log Viewer, and new Management Console windows. See "Toolbar" on page 2-9.
Management Service tabs	The three tabs (Health, Control, and Configuration) that enable you to control the Instant Image 2.0 software.
Alarm status buttons	Show the number of alarms active at the particular alarm level. Click a button to display the Alarm Viewer popup window for more information about the alarms. Instant Image 2.0 beta does not use the alarm features.
Instant Image 2.0 management service area	Shows the master and shadow volumes for the Instant Image 2.0 software
Operation buttons	Depending on the Sun StorEdge Management Service tab you select, these buttons let you perform Instant Image 2.0 control or configuration operations. For example, the Configuration tab and buttons are displayed to let you enable and disable Instant Image 2.0 volume sets.
Pane divider	Use to adjust the size of the pane
Arrowhead expanders	Use to expand or collapse the size of the pane with one mouse click.

Resizing Management Console Windows and Panes

You can resize the Management Console window and panes within the window according to your viewing preference.

▼ To Resize the Management Console Window

1. Position your cursor over the edge of the window and press the left mouse button.

2. Move the cursor to resize the window, and then release the left mouse button.

If you make the window too small to display all information, click the scroll bars at the right and bottom of the window.

3. **To make the window as large as possible, press the Maximize button in the upper right corner of the window.**

▼ To Resize a Pane

1. **Position your cursor over a pane divider and press the left mouse button.**

2. **Move the pane divider right or left to resize a pane.**

3. **Alternately, click the arrowhead expanders** ▮ **at the top of the dividers.**

Toolbar

The Toolbar are described in TABLE 2-2.

TABLE 2-2   Management Console Toolbar Icons

Icon	Name	Clicking This Icon:
	New Window	Launches another Management Console window.
	Alarm Viewer	Shows the Alarm Viewer window. See "To View Information About Alarms" on page 2-22.
	Log Viewer	Shows the Log Viewer window. See "To View Log Messages" on page 2-23.
	JavaHelp	Displays available JavaHelp^{TM} for the Instant Image 2.0 software.

Configuration Tab: Creating and Enabling Volume Sets

Use the Configuration tab to create volume sets and enable the Instant Image 2.0 software. This procedure is three steps:

1. Configuring the volumes to be used by the Instant Image 2.0 software into the Storage Volume driver. See "Adding Instant Image 2.0 Volumes to the Storage Volume Driver Configuration File" on page 2-3.

2. Choosing master and shadow volume sets. See below.

3. Enabling the Instant Image 2.0 software for each volume set. See "To Enable the Instant Image 2.0 Volume Sets" on page 2-11

▼ To Choose Master and Shadow Volume Sets

1. **In the Navigation pane, expand the management service view by clicking on the server name icon shown in** FIGURE 2-2 **or by double-clicking the folder.**

2. **Click Instant Image 2.0 to highlight it.**

3. **Click the Configuration tab.**

   The Master Candidate List appears. This pane lists all volumes defined in `sv.cf` that are not in use by Instant Image 2.0.

4. **Choose a master volume and click to select it.**

   The list of eligible shadow volumes appears in the Shadow Candidate List window pane. Note that the Shadow Candidate List shows only those shadow volumes that are equal to or greater than the selected master volume size, in Mbytes.

5. Choose a shadow volume to pair with the master volume and click to select it.

Click the icon or double-
click the folder to expand
and collapse the view.

FIGURE 2-2 Expanding the Management Service View

▼ To Enable the Instant Image 2.0 Volume Sets

⚠

Caution – Before starting the enable, copy, and update operations, quiesce the
workload to the master and shadow volumes and unmount the target volume.

This ensures that the point-in-time data is consistent. Remount the volume and
resume the workload after starting the enable, copy, or update operation.

Note – If your shadow volume disk partition has cylinder 0 as its default starting
cylinder, be aware that the Instant Image 2.0 software will overwrite your disk
formatting and labeling information during enable and full volume copy operations.
To avoid losing your disk formatting and labeling information, exclude that cylinder
when partitioning the disk.

1. Unmount the shadow volume.

**2. Click an Enable Mode button, depending on how you want the Instant Image 2.0
software to operate on this volume set. See** FIGURE 2-3.

You can enable the Instant Image 2.0 software for the volume sets in one of two
modes:

- The Enable Independent Pair button starts a full volume copy, copying all master
volume data to the shadow volume.

- The Enable Dependent Pair button creates a master volume-dependent point-in-
time view of the master volume, which is accessible through the shadow volume.

Chapter 1 describes the difference between independent and dependent volumes.
See "The Shadow Volume" on page 1-5.

3. Mount the shadow volume.

Note – The Instant Image 2.0 management service GUI automatically creates a correctly-sized bitmap volume when you enable a volume set; this bitmap volume is located in the `/etc/opt/SUNWiims/bm/` directory. See "Instant Image 2.0 Bitmap Volume Size Requirements" on page 1-7.
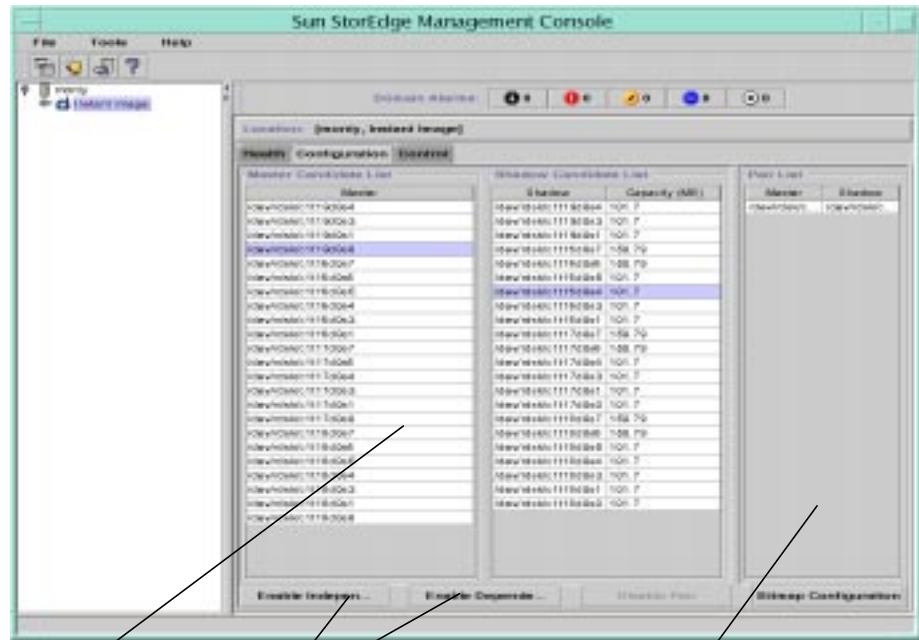
Master and shadow volume candidate lists

Enable Mode buttons

Pair list

FIGURE 2-3   Choosing Volume Sets and Enabling the Instant Image 2.0 Software

▼ To Disable The Instant Image 2.0 Software

The Disable Pair button disables the master and shadow volumes in the volume set. Disable the Instant Image 2.0 software to return the master and shadow volumes to the pool of available volumes.

Note – If you abort a volume set copy or update operation and then try to disable the volume set, the disable operation fails. When you abort a copy or update operation, the operation is incomplete and the target volume becomes a dependent copy of the source volume.

To successfully disable a volume set after aborting its copy or update operation, re-issue the copy or update command, then disable the pair.

Before you disable the Instant Image 2.0 software for a volume set that may have a copy or update operation in progress, wait for the operations to complete and then issue the disable command.

To disable the Instant Image 2.0 software on a volume set:

1. **Click the Configuration tab and select a volume set from the Pair List.**

2. If you originally used the Enable Dependent Pair button on the selected pair, creating a dependent shadow volume, unmount the shadow volume.

   If you originally used the Enable Independent Pair button on the selected pair, go to Step 3.

3. **Click the Disable Pair button.**

   If you originally used the Enable Dependent Pair button on the selected pair, creating a dependent shadow volume, the disable operation invalidates the shadow volume. A disabled dependent shadow volume is not guaranteed to contain valid data.

   If you originally used the Enable Independent Pair button on the selected pair, the shadow volume data contains the same data as it did before it was disabled (assuming no writes have occurred). Users can access the master and shadow volumes, as they are now standalone point-in-time copies.

▼ To Change the Default Bitmap Directory

One reason for choosing another directory is if that directory becomes filled.

● **Click the Bitmap Configuration button to change where the volume group bitmap is located.**

Note – Make sure the bitmap file is placed in the root (/) or /usr file system. Make sure the bitmap volume is on a mirrored volume or file system. However, you may place it in any directory that you do not plan to unmount.

Control Tab: Performing Instant Image 2.0 Operations

Use the Control tab to access the management service area where you perform operations on your enabled master and shadow volume sets. See FIGURE 2-4.

● **Click an arrowhead expander to see the information in the Pair Information and Activity areas.**

volume set information

Operation buttons
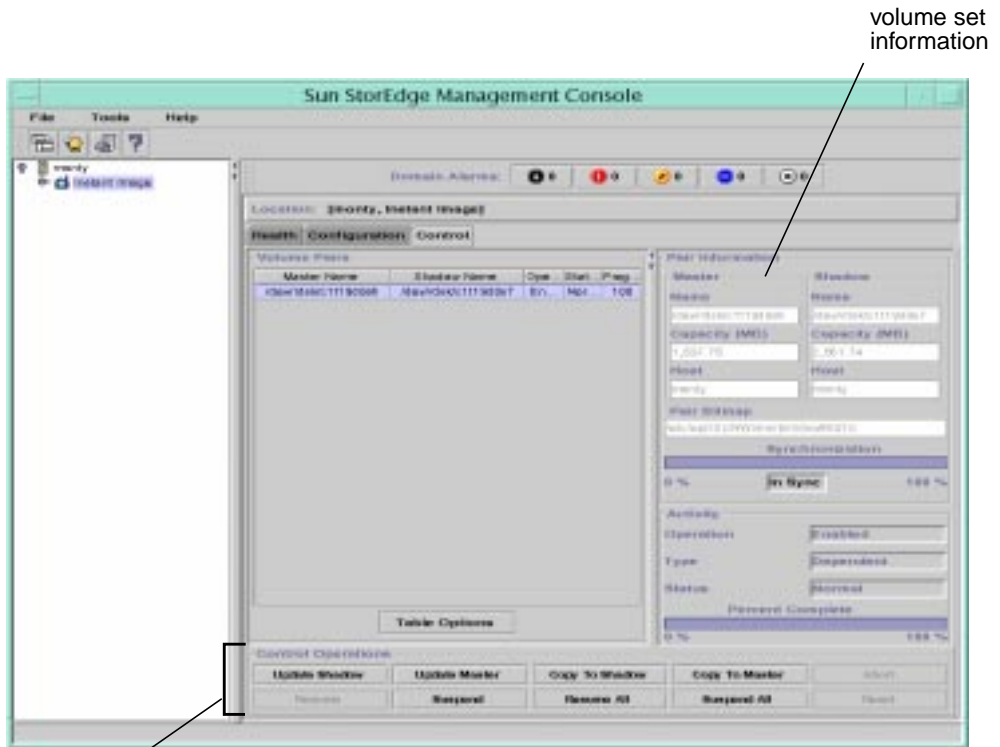
FIGURE 2-4   Instant Image 2.0 Control Tab

Volume Information Areas

The Control tab also shows volume information as described in TABLE 2-3. See "To Display More Volume Information: Table Options" on page 2-25 for information on how to display more detailed status for volume sets.

TABLE 2-3 Volume Set Information in the Control and Health Tabs

Area	Information Category	Description
Volume Sets	Master Name	Master volume path and name for volume set you have selected
	Shadow Name	Shadow volume path and name for volume set you have selected
	Additional information	See "To Display More Volume Information: Table Options" on page 2-25.
Pair Information	Master or Shadow	Master volume path and name for volume set you have selected
	Capacity (MB)	Size of the volume, in megabytes
	Host	Host server controlling that volume
	Pair Bitmap	Path and name of the bitmap associated with the volume set selected in the Volume Sets area.
	Synchronization	Percentage of data that has changed between the selected master and shadow volumes since the volume set was enabled or last updated. An Out of Sync message also indicates that the data between the volumes has changed. An In Sync message indicates that no data has changed.
Activity	Operation	The most recent operation performed on the volume set. This field can be Enabled, Update, Copy, or Disabled.
	Type	The Instant Image 2.0 volume set type as specified when you enabled the pair. This field can be Dependent or Independent.

TABLE 2-3   Volume Set Information in the Control and Health Tabs *(Continued)*

Area	Information Category	Description
Activity	Status	Status of the most recent operation performed on the selected volume set. This field can be Normal, Error, or Degraded. These are defined as: • Normal; no error occurred during the last operation • Error; an error occurred during the last operation and the pair is still operational • Degraded; a fatal error occurred and the pair is not operational. If the Status is Error or Degraded, try repeating the most recent operation. This may clear the error condition.
	Percent Complete	Percentage complete of the most recent operation performed.

▼ To Copy and Update a Volume

Caution – Before starting the enable, copy, and update operations, quiesce the workload to the master and shadow volumes and unmount the target volume.

This ensures that the point-in-time data is consistent. Remount the volume and resume the workload after starting the enable, copy, or update operation.

Note – If your shadow volume disk partition has cylinder 0 as its default starting cylinder, be aware that the Instant Image 2.0 software will overwrite your disk formatting and labeling information during enable and full volume copy operations. To avoid losing your disk formatting and labeling information, exclude that cylinder when partitioning the disk.

1. **Select a volume set in the Volume Sets area.**

2. **Click one of the operation buttons.**

   TABLE 2-4 describes these buttons.

TABLE 2-4 Copy and Update Operation Buttons

Button	Click This Button To...
Update Shadow	Write a point-in-time incremental copy of the master volume to the shadow volume. This command provides a fast resynchronization of the shadow volume, creating an incremental copy of the master. The update copies all 32-Kbyte segments flagged as different between the master and shadow volumes. It does not copy all master volume data, only changed data. While the data is being copied from the master to the shadow, the shadow volume is a dependent copy of the master volume.
Update Master	Write a point-in-time incremental copy of the shadow volume to the master volume. This button provides a fast resynchronization of the master volume, creating an incremental copy of the shadow. The update copies all 32-Kbyte segments flagged as different between the shadow and master volumes. While the data is being copied from the shadow to the master, the master volume is a dependent copy of the shadow volume.
Copy To Shadow	Create an independent point-in-time copy of the master volume to the shadow volume. It writes all data in the master volume to the shadow volume. Use this button to synchronize the master and shadow volumes; that is, to make the data on each volume match. While the data is being copied from the master to the shadow, the shadow volume is a dependent copy of the master volume. If you do not require a full volume copy operation, click the Update to Shadow button.
Copy To Master	Create an independent point-in-time copy of the shadow volume to the master volume. This button writes all data in the shadow volume to the master volume. Use this button to synchronize the master and shadow volumes; that is, to make the data on each volume match. While the data is being copied from the shadow to the master, the master volume is a dependent copy of the shadow volume. If you do not require a full volume copy operation, click the Update to Master button.

TABLE 2-4   Copy and Update Operation Buttons   *(Continued)*

Button	Click This Button To...
Abort	Abort any current Instant Image 2.0 copy or update operation on the Instant Image 2.0 volume set. After aborting, the update or copy to the target volume is incomplete. The target volume is now a dependent copy of the source volume. Re-issue the update or copy command option to resynchronize the volumes. To create a new point-in-time copy, click the Operation button you originally used.

▼ To Suspend and Resume a Volume

1. **Select a volume set in the Volume Sets area.**

2. **Click a Suspend or Resume button to perform the desired action.**

   TABLE 2-5 describes these buttons.

   ⚠ **Caution –** **Do not write to suspended master or shadow volumes.** Writing to suspended Instant Image 2.0 volumes guarantees that you will destroy their data integrity.

TABLE 2-5   Suspend and Resume Operation Buttons

Button	Click This Button To...
Suspend	Suspend the Instant Image 2.0 software for the selected volume set, saving the state to the associated bitmap. You cannot perform copy or update operations while the volumes are suspended. This prevents the bitmap volumes from tracking changes to both volumes
Resume	Continue Instant Image 2.0 operations for the selected volume set suspended by the Suspend button, using the state saved in the associated bitmap. After clicking Resume, you can perform Instant Image 2.0 operations on the volumes. Clicking the Resume button also resumes any copy or update operations that were in progress when you suspended the volume set. In the case of a system shutdown, the Instant Image 2.0 software suspends all enabled volume sets. After the system boots and the Instant Image 2.0 software starts, the Instant Image 2.0 software resumes all volume sets.
Suspend All	Suspend the Instant Image 2.0 software for all currently enabled volumes, saving the state to the associated bitmaps. Use this button when you want to temporarily suspend but not disable the Instant Image 2.0 software for all currently enabled volumes. You cannot perform copy or update operations while the volumes are suspended. In the case of a system shutdown, the Instant Image 2.0 software suspends all enabled volume sets. After the system boots and the Instant Image 2.0 software starts, the Instant Image 2.0 software resumes all volume sets.
Resume All	Continue Instant Image 2.0 operations for all suspended volume sets, using the state saved in the associated bitmap. After clicking Resume, you can perform Instant Image 2.0 operations on the volumes. Clicking the Resume All button also resumes any copy or update operations that were in progress when you suspended the volume sets.
Reset	If a volume goes offline, place it online using this button.

Health Tab: Getting Volume Status

The Health tab appears similar to the Control tab, but it does not have any Operation buttons (see FIGURE 2-5). It shows volume status information which is described in TABLE 2-3.

● **Click an arrowhead expander to see the information in the Pair Information and Activity areas.**

See "To Display More Volume Information: Table Options" on page 2-25 for information on how to display more detailed status for volume sets.

FIGURE 2-5   Instant Image 2.0 Health Tab

Viewing Alarms, Logs, and Volume Information

The Management Console provides two viewers to enable you to view alarm and log messages generated by the management services software:

- Alarm Viewer
- Log Viewer

The Instant Image 2.0 software includes a button named Table Options. This button enables you to customize how information is displayed in the Volume Sets area.

▼ To View Information About Alarms

Note – The beta release version of the Instant Image 2.0 software does not generate alarms; therefore, you will not see Instant Image 2.0 related alarm information in this window for this release.

The AlarmBar displays the alarm summary for any installed Sun StorEdge management services. Alarms are sorted into five levels:

- High—the number of critical alarms
- Medium—the number of warning alarms
- Low—the number of informational or low priority alarms
- Down—the number of alarms for systems or items that are not responding
- Unknown—the number of alarms for unknown items

To view more information about alarms:

1. **Click one of the Alarm Status buttons in the AlarmBar as shown in** FIGURE 2-1**, or the Alarm Viewer button on the Toolbar.**

   The Alarm Viewer window is displayed as shown in FIGURE 2-6. All alarm information associated with the selected severity level is displayed.

FIGURE 2-6   Alarm Viewer Window

2. Click More Filter Options to show information such as Alarm Severity, Begin Date, and End Date, depending on the filter option you select.

3. Click the Category box, type `Instant Image 2.0` **in the Category field, and click Apply Filter.**

The window displays any alarm messages about Instant Image 2.0 operations.

4. After you set filter options like Category and Begin Date, click the Apply Filter button to see the changes. To see any filter changes automatically, click the Apply Automatically box.

▼ To View Log Messages

The Instant Image 2.0 software logs an event for each operation performed, including failed operations. The Log Viewer window displays these log messages. See FIGURE 2-7.

1. Click the Log Viewer button on the Toolbar.

The Log Viewer window appears.

2. Click the Next button to update the viewer and see messages that have occurred since the last time you opened the Log Viewer.

You can search for messages by message text or Category field in this window.

3. **Click on More Filter Options.**

4. **Click the Category box, type** `Instant Image 2.0` **in the Category field, and click Apply Filter.**

   The window displays any log messages about Instant Image 2.0 operations.

5. **Click in the Message text box, type the message text, and then click Apply Filter.**

   The window displays log messages containing the message text you entered.

6. **After you set filter options like Category or Begin Date, click the Apply Filter button to see the changes. To see any filter changes automatically, click the Apply Automatically box.**
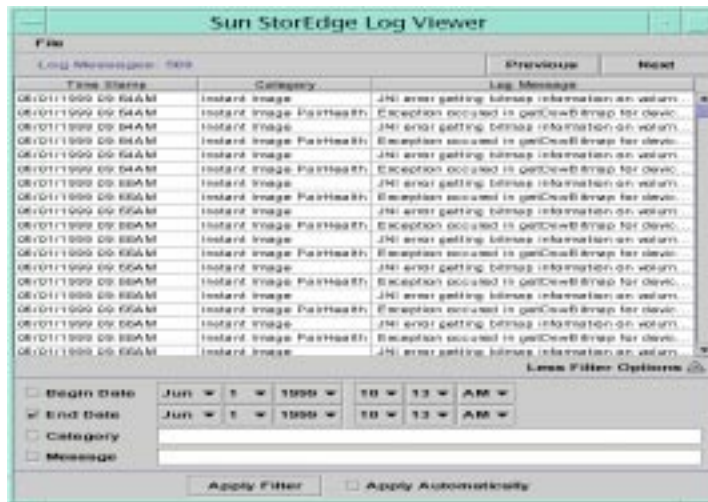
FIGURE 2-7   Log Viewer Window

▼ To Display More Volume Information: Table Options

The Health and Control tabs include the Table Options button. This button enables you to choose and view Pair Information, Synchronization, and Activity information in a brief table format. The information is displayed in the Volume Sets area.

1. **Click the Table Options button.**

The Table Options window is displayed. The Master Name and Shadow Name options are always displayed. The Operation, Status, and Progress options also are displayed by default.

TABLE 2-6 describes each option.
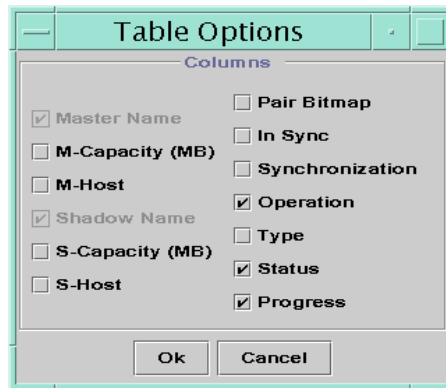
FIGURE 2-8   Table Options Window

2. **Click the options you want, then click OK.**

The Volume Sets area now displays the information you selected.

To expand or collapse the table, click the arrowhead expanders in the bar between the Volume Sets and Pairs Information areas. You can also resize the table by grabbing the bar with your mouse pointer and moving the bar. FIGURE 2-9 shows an example window.
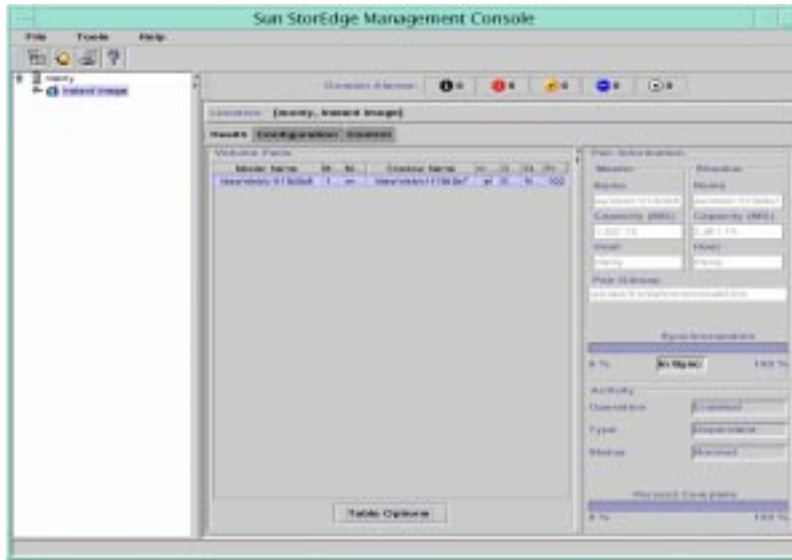
FIGURE 2-9 Example Window With Table Options Checked

TABLE 2-6 Table Options Window Checkboxes

Option	Information Displayed
M-Capacity S-Capacity	The capacity of the master or shadow volume, in Mbytes.
M-Host S-Host	The machine or host name of the server where the Instant Image 2.0 volumes reside. Instant Image 2.0 beta is a single node product
Pair Bitmap	The directory path and name of the volume set bitmap file.
In Sync	The synchronization status of the selected volume set; that is, if both volumes match (in sync) or changes have been made to one of the volumes (out-of-sync).
Synchronization	The percentage of data changed between the master and shadow volume set since the last update.
Operation	Any current operation after you click an Operation mode button (like Suspend, Copy to Master, and so on); if no operations are in progress, this table entry displays Enabled.
Type	The volume set type (Independent or Dependent) depending on how you enabled the volume set.
Status	The current volume set status.
Progress	The percentage complete of any Copy or Update operation.

The Command Line Interface

This chapter describes how to start the Instant Image 2.0 command line interface (CLI) shell and provides the syntax of the CLI commands.

Through the Instant Image 2.0 CLI, you can perform the same operations that are available in the Instant Image 2.0 management service shown in the Sun StorEdge Management Console described in Chapter 2. The Instant Image 2.0 CLI is useful when you want to script Instant Image 2.0 operations or when you want to perform Instant Image 2.0 operations from a terminal.

Note – This guide is designed for use by an experienced system administrator of the Solaris operating environment and related disk storage systems. To use the Instant Image 2.0 software, you must be the root user or superuser.

Before You Begin Using the Instant Image 2.0 Software

Before you use the Instant Image 2.0 software:

1. See "Task Summary: Getting Started" on page 1-10.

2. Establish logical volumes using the Storage Volume (SV) driver svadm(1SV) utility. See "Adding Instant Image 2.0 Volumes to the Storage Volume Driver Configuration File" on page 2-3.

3. Unmount the target volume of Instant Image 2.0 copy and update operations to prevent file system panics.

   You may unmount the source volume also, to stop write operations to it and ensure a consistent shadow copy, but this source unmount is not required. Take the same precautions using Instant Image 2.0 Copy and Update that you would take using the dd(1M) command to copy between raw devices.

   After issuing the copy or update, remount the volumes; you do not have to wait for the operation to complete. You may access the target volume as soon as the CLI prompt returns or when you see the operation is in progress in the Management Console Instant Image 2.0 Control tab.

Caution – Before starting the enable, copy, and update operations, quiesce the workload to the master and shadow volumes and unmount the target volume.

This ensures that the point-in-time data is consistent. Remount the volume and resume the workload after starting the enable, copy, or update operation; you do not have to wait for the operation to complete.

Reading Instant Image 2.0 Man Pages

● **To read the legacy CLI Instant Image** iiadm**(1M) man page, type:**

```
# man -M /usr/opt/SUNWesm/SUNWii/man iiadm
```

● **To read the Instant Image 2.0 management service man pages, type:**

```
# man -M /usr/opt/SUNWesm/SUNWiimsu/man manpagename
```

where *manpagename* is iiadm, ii_control, ii_config, or ii_health.

CLI Compatibility

The Instant Image 2.0 CLI is compatible with the SUNWii package-installed legacy CLI. See the iiadm(1M) man page for more information about the SUNWii command line. See also "Reading Instant Image 2.0 Man Pages" on page 3-4.

Note – Script files you have created using SUNWii iiadm(1M) command options are compatible with the Instant Image 2.0 CLI. However, make sure you specify the shadow volume name of the volume pair when using the copy or update commands.

Note – The correct syntax for displaying volume status using the iiadm command is: iiadm -i {all | *shadow_vol*}
Choose the all keyword to show the status of all volumes or *shadow_vol* to show the status of the associated shadow volume's volume pair.

Also, using iiadm -o *volume* is an invalid option.

Using the CLI

There are three ways to use the CLI to execute commands:

- As part of an existing or new script file which uses the iiadm command (see the iiadm(1M) man page).

- As a single command executed from the Solaris root user prompt or group of commands executed from a script file, such as:

```
# /usr/opt/SUNWesm/bin/esm_cli -e "InstantImage/health -s -a"
```

or

```
/usr/opt/SUNWesm/bin/esm_cli -e "InstantImage/control -u -S /dev/rdsk/c1t3d0s4"
/usr/opt/SUNWesm/bin/esm_cli -e "InstantImage/control -w /dev/rdsk/c1t3d0s4"
/usr/opt/SUNWesm/bin/esm_cli -e "InstantImage/health -s /dev/rdsk/c1t3d0s4"
```

- As a single command executed from the Instant Image 2.0 shell, such as:

```
[1] sx> health -status -a
```

Note – If you enter a command incorrectly or an error is generated in the Instant Image 2.0 shell, the shell returns you to the Solaris system software prompt.

▼ To Start the Command Line Interface Shell

1. **Become superuser (root).**

2. **Enter the CLI shell by typing:**

```
# /usr/opt/SUNWesm/bin/esm_cli
[1] sx> cd InstantImage
[2] sx>
```

Command Summary

You use three commands in the Instant Image 2.0 CLI shell. These three commands correspond to the Instant Image 2.0 management service GUI tabs described in Chapter 2:

- `config`—use to enable and disable volume pairs
- `control`—use to perform most Instant Image 2.0 operations such as copy and update volumes
- `health`—use to see volume pair information and status

TABLE 3-1 summarizes the command options. Each command includes the –h option, which shows a brief command syntax description. Also refer to the `ii_config(1M)`, `ii_control(1M)`, and `ii_health(1M)` man pages.

Note – Always specify the volume pair's shadow volume when performing `control` or `health` command operations.

TABLE 3-1   Instant Image 2.0 CLI Command Options

Instant Image 2.0 Operation	Command and Option	Description	Detailed Information
Enable the Instant Image 2.0 software	`config -e -t {ind|dep}` `-m` *master_vol* `-s` *shadow_vol* `[-b` *bitmap_vol* `]`	Enable the Instant Image 2.0 software for the specified volumes.	page 3-9
Disable the Instant Image 2.0 software	`config -d` *shadow_vol*	Disable the Instant Image 2.0 software for the specified volume; *shadow_vol* is the shadow volume in the Instant Image 2.0 volume pair.	page 3-11
Update the shadow volume	`control -u -S` *shadow_vol*	Write a new point-in-time incremental copy of the master volume to the shadow; *shadow_vol* is the shadow volume in the Instant Image 2.0 volume pair.	page 3-13
Copy the master volume to the shadow volume	`control -c -S` *shadow_vol*	Create a point-in-time copy of the master volume to the shadow volume; *shadow_vol* is the shadow volume in the Instant Image 2.0 volume pair.	page 3-14

TABLE 3-1   Instant Image 2.0 CLI Command Options

Instant Image 2.0 Operation	Command and Option	Description	Detailed Information
Update the master volume	control -u -M *shadow_vol*	Write a new point-in-time incremental copy of the shadow volume to the master volume; *shadow_vol* is the shadow volume in the Instant Image 2.0 volume pair.	page 3-16
Copy the shadow volume to the master volume	control -c -M *shadow_vol*	Create a point-in-time copy of the shadow volume to the master volume; *shadow_vol* is the shadow volume in the Instant Image 2.0 volume pair.	page 3-18
Abort	control -A *shadow_vol*	Abort any current Instant Image 2.0 copy or update operation on the Instant Image 2.0 volume pair containing the specified shadow volume.	page 3-20
Wait for the update or copy operation to complete	control -w *shadow_vol*	Wait until any in-progress copy or update operation for the Instant Image 2.0 volume pair containing the specified shadow volume completes or aborts.	page 3-21
Suspend a volume	control -s *shadow_vol*	Suspend the Instant Image 2.0 software for the Instant Image 2.0 volume pair containing the specified shadow volume, saving the state to the associated bitmap.	page 3-22
Suspend all volumes	control -s -a	Suspend all currently enabled Instant Image 2.0 volume pairs.	page 3-23
Resume operations for a volume	control -r *shadow_vol*	Resume Instant Image 2.0 operations for the Instant Image 2.0 volume pair containing the specified shadow volume, using the state saved in the associated bitmap.	page 3-24
Resume operations for all volumes	control -r -a	Resume the Instant Image 2.0 software for all Instant Image 2.0 volume pairs.	page 3-25

TABLE 3-1 Instant Image 2.0 CLI Command Options

Instant Image 2.0 Operation	Command and Option	Description	Detailed Information
Display status	`health -s` {*shadow_vol* | `-a`}	Display status for the Instant Image volume pair containing the specified currently enabled or suspended shadow volume. If you specify `-a`, status is displayed for all Instant Image volume pairs.	page 3-26
Display the bitmap volume contents	`health -b` *shadow_vol*	Display the full bitmap scoreboards for the specified shadow volume.	page 3-27
Place a volume pair online	`control -R` *shadow_vol*	Place a volume online after it has been placed offline.	page 3-28

Enabling the Instant Image 2.0 Software

⚠ **Caution –** Before starting the enable, copy, and update operations, quiesce the workload to the master and shadow volumes and unmount the target volume.

This ensures that the point-in-time data is consistent. Remount the volume and resume the workload after starting the enable, copy, or update operation.

Note – If your shadow volume disk partition has its default cylinder starting at 0 and is the first cylinder of the disk, the Instant Image 2.0 software overwrites your disk formatting and labeling information during enable and full volume copy operations. To avoid losing your disk formatting and labeling information, exclude that cylinder when partitioning the disk.

The enable option starts the Instant Image 2.0 software for the specified master and shadow volumes and creates a copy or view of the master volume.

The -b *bitmap_vol* argument is optional. If you do not specify the bitmap scoreboard volume used to track differences between the shadow and master volumes, the Instant Image 2.0 software creates a default one for the volume pair in the /etc/opt/SUNWiims/bm/ directory. Use the argument to specify a location other than the default one.

Syntax

config [-e|-enable] -t {ind|dep} -m *master_vol* -s *shadow_vol* [-b *bitmap_vol*]

Options

-t ind   Independent mode; this copies all master volume data to the shadow volume.

-t dep   Dependent mode; this creates a master volume-dependent point-in-time view of the master volume, which is accessible through the shadow volume.

When to Use This Command Option

Use this command option to start the Instant Image 2.0 software for volume pairs you want to shadow.

This Command Option Can Fail If...

- The *shadow_vol* is already part of a currently enabled or suspended volume pair or is not accessible.
- The bitmap or shadow volumes are too small; see "Instant Image 2.0 Bitmap Volume Size Requirements" on page 1-7.

Disabling the Instant Image 2.0 Software

Note – If you abort a volume pair copy or update operation and then try to disable the volume pair, the disable operation fails. When you abort a copy or update operation, the operation is incomplete and the target volume becomes a dependent copy of the source volume.

To successfully disable a volume pair after aborting its copy or update operation, re-issue the copy or update command, then disable the pair.

Before you disable the Instant Image 2.0 software for a volume pair that may have a copy or update operation in progress, use the wait command option (`control -w`), then issue the disable command.

The disable option disables the Instant Image 2.0 volume pair associated with the specified shadow volume.

- Disabling a dependent volume—the Instant Image 2.0 software invalidates the shadow volume data by clearing the first 64 Kbytes of data in the shadow volume. Clearing the first two data segments prevents a user from trying to access the volume after a disable operation. A disabled dependent shadow volume is not guaranteed to contain valid data.

Note – Before disabling a dependent pair, unmount the shadow volume.

- Disabling an independent volume—the shadow volume contains the same data as it did before it was disabled (assuming no writes have occurred). Users can access the master and shadow volumes, as they are now standalone point-in-time copies.

Syntax

```
config {-d|-disable} shadow_vol
```

When to Use This Command Option

Use this command option to disable the Instant Image 2.0 software for volume pairs you had previously shadowed.

This Command Option Can Fail If...

- The *shadow_vol* does not belong to an Instant Image 2.0 volume pair that is currently enabled or suspended.
- A volume dependency exists; for example, a copy or update operation has not completed. See "Aborting a Copy or Update Operation" on page 3-20.
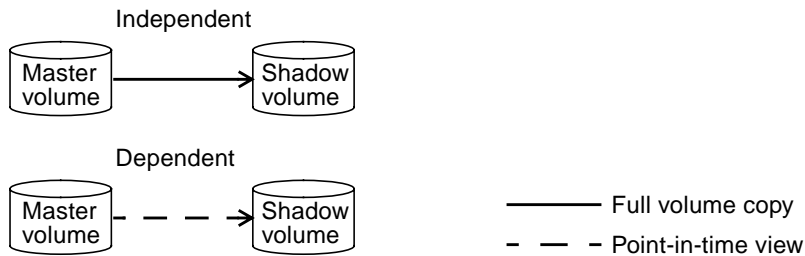
Updating the Shadow Volume

Caution – Before starting the enable, copy, and update operations, quiesce the workload to the master and shadow volumes and unmount the target volume.

This ensures that the point-in-time data is consistent. Remount the volume and resume the workload after starting the enable, copy, or update operation.

This option writes a point-in-time incremental copy of the master volume to the shadow volume; *shadow_vol* is the shadow volume in the Instant Image 2.0 volume pair. This command provides a fast resynchronization of the shadow volume, creating an incremental copy of the master. The update copies all 32-Kbyte segments flagged as different between the master and shadow volumes. It does not copy all master volume data, only changed data. While the data is being copied, the shadow volume is a dependent copy of the master volume.

Syntax

```
control {-u|-update} -S shadow_vol
```

When to Use This Command Option

Use this command option to create a new point-in-time copy of the master volume. This incrementally updates the shadow volume with only changed data from the master volume.

This Command Option Can Fail If...

- The *shadow_vol* does not belong to an Instant Image 2.0 volume pair that is currently enabled.
- A copy or update operation is in progress.
- You abort this copy operation; see "Aborting a Copy or Update Operation" on page 3-20.
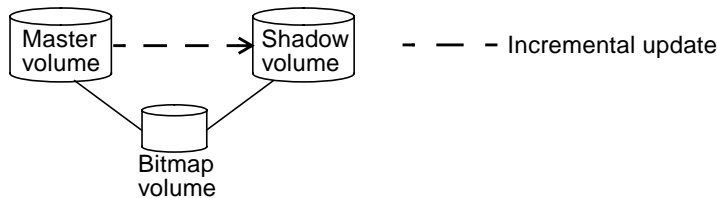
Copying the Master Volume to the Shadow Volume

Caution – Before starting the enable, copy, and update operations, quiesce the workload to the master and shadow volumes and unmount the target volume.

This ensures that the point-in-time data is consistent. Remount the volume and resume the workload after starting the enable, copy, or update operation.

Note – If your shadow volume disk partition has its default cylinder starting at 0 and is the first cylinder of the disk, the Instant Image 2.0 software overwrites your disk formatting and labeling information during enable and full volume copy operations. To avoid losing your disk formatting and labeling information, exclude that cylinder when partitioning the disk.

This option creates a point-in-time copy of the master volume to the shadow volume; *shadow_vol* is the shadow volume in the Instant Image 2.0 volume pair. It writes all data in the point-in-time copy of the master volume to the shadow volume. While the data is being copied from master to shadow, the shadow volume is a dependent copy of the master volume.

Syntax

```
control {-c|-copy} -S shadow_vol
```

When to Use This Command Option

Note – This command option performs a full volume copy and overwrites the shadow volume. Use it only if the integrity of the data on the independent shadow volume is in doubt.

Use this command option to synchronize the master and shadow volumes; that is, to make the data on each volume match. If you do not require a full volume copy operation, use the `control -u -S` command option to update the shadow volume.

This Command Option Can Fail If...

- The *shadow_vol* does not belong to an Instant Image 2.0 volume pair that is currently enabled.
- An independent copy operation is in progress; see "Enabling the Instant Image 2.0 Software" on page 3-9.
- You abort this copy operation; see "Aborting a Copy or Update Operation" on page 3-20.

Updating the Master Volume

Caution – This command option overwrites the data in your master volume.

Caution – Before starting the enable, copy, and update operations, quiesce the workload to the master and shadow volumes and unmount the target volume.

This ensures that the point-in-time data is consistent. Remount the volume and resume the workload after starting the enable, copy, or update operation.

This option writes a point-in-time incremental copy of the shadow volume to the master volume; *shadow_vol* is the shadow volume in the Instant Image 2.0 volume pair. This command provides a fast resynchronization of the master volume, creating an incremental copy of the shadow. This update copies all 32-Kbyte segments flagged as different between the shadow and master volumes. While the data is being copied from the shadow to the master, the master is a dependent copy of the shadow volume.
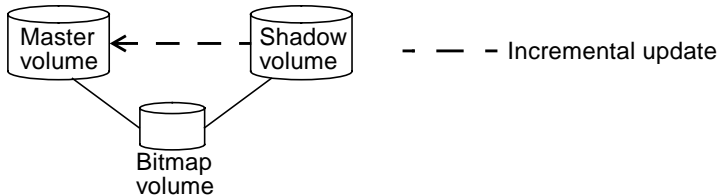
Syntax

```
control {-u|-update} -M shadow_vol
```

Note – The specified volume is the shadow volume, even though you are overwriting the master volume. This is correct; always specify the volume pair's shadow volume when performing `control` or `health` command operations.

When to Use This Command Option

Use this command option to create a new point-in-time copy of the shadow volume, incrementally updating the master volume with only changed data from the shadow volume.

This Command Option Can Fail If...

- The *shadow_vol* does not belong to an Instant Image 2.0 volume pair that is currently enabled.
- A copy or update operation is in progress.
- You abort this update operation; see "Aborting a Copy or Update Operation" on page 3-20.

Copying the Shadow Volume to the Master Volume

Caution – This command option performs a full volume copy and overwrites the data in your master volume. Use it only if the integrity of the data on the master volume is in doubt.

Caution – Before starting the enable, copy, and update operations, quiesce the workload to the master and shadow volumes and unmount the target volume.

This ensures that the point-in-time data is consistent. Remount the volume and resume the workload after starting the enable, copy, or update operation.

Note – If your shadow volume disk partition has its default cylinder starting at 0 and is the first cylinder of the disk, the Instant Image 2.0 software overwrites your disk formatting and labeling information during enable and full volume copy operations. To avoid losing your disk formatting and labeling information, exclude that cylinder when partitioning the disk.

This option creates a point-in-time copy of the shadow volume to the master volume; *shadow_vol* is the shadow volume in the Instant Image 2.0 volume pair. It writes all data in the point-in-time copy of the shadow volume to the master volume. While the data is being copied from the shadow to the master, the master is a dependent copy of the shadow volume.

Syntax

```
control {-c|-copy} -M shadow_vol
```

When to Use This Command Option

Use this command option to synchronize the master and shadow volumes; that is, to make the data on each volume match. If you do not require a full volume copy operation, use the `control -u -M` command option to update the master volume with only changed data.

This Command Option Can Fail If...

- The *shadow_vol* does not belong to an Instant Image 2.0 volume pair that is currently enabled.
- A copy or update operation is in progress.
- You abort this copy operation; see "Aborting a Copy or Update Operation" on page 3-20.

Aborting a Copy or Update Operation

> **Caution –** If you interrupt copy or update operations using this command, you cannot undo the partial copy or update to the targeted volume. You must resynchronize the targeted volume by re-issuing the copy or update command.

This option aborts any current Instant Image 2.0 copy or update operation on the Instant Image 2.0 volume pair containing the specified *shadow_vol*.

After executing `control -A`, the update or copy to the target volume is incomplete. The target volume is now a dependent copy of the source volume. Re-issue the update or copy command option to resynchronize the volumes.

Syntax

`control {-A|-abort}` *shadow_vol*

When to Use This Command Option

Use this command option when you need to stop any of the copy and update command options from executing to completion.

This Command Option Can Fail If...

■ The *shadow_vol* does not belong to an Instant Image 2.0 volume pair that is currently enabled.

■ The command was interrupted before the copy could be aborted.

Waiting for a Copy or Update to Complete

This option makes the Instant Image 2.0 software wait until any in-progress copy or update operation for the volume pair containing the specified *shadow_vol* completes. It prevents another Instant Image 2.0 command from executing on the specified volume.

Syntax

control {-w|-wait} *shadow_vol*

When to Use This Command Option

Use this command when you need to be sure the copy or update operation has completed before invoking another Instant Image 2.0 command that affects that volume. Use it after enabling the Instant Image 2.0 software with the independent option or you have issued a copy or update command. Also use this command before you disable the Instant Image 2.0 software for a volume that may have a copy or update operation in progress. This command is useful when used as part of a script.

This Command Option Can Fail If...

- The *shadow_vol* does not belong to an Instant Image 2.0 volume pair that is currently enabled.

Suspending a Volume

Caution – *Do not write to suspended master or shadow volumes.* Writing to suspended Instant Image 2.0 volumes will destroy their data integrity.

This option suspends the Instant Image 2.0 software for the currently enabled Instant Image 2.0 volume pair containing the specified *shadow_vol*, saving the state to the associated bitmap.

Syntax

```
control {-s|-suspend} shadow_vol
```

When to Use This Command Option

Use this command when you want to temporarily suspend (but not disable) the Instant Image 2.0 software for the specified volume. You cannot perform copy or update operations while the volume is suspended. See also "Resuming a Suspended Volume" on page 3-24.

This Command Option Can Fail If...

■ The specified volume does not belong to an Instant Image 2.0 volume pair.

Suspending All Volumes

⚠ **Caution –** *Do not write to suspended master or shadow volumes.* Writing to suspended Instant Image 2.0 volumes guarantees that you will destroy their data integrity.

This option suspends the Instant Image 2.0 software for all currently enabled volumes, saving the state to the associated bitmaps.

Syntax

```
control {-s|-suspend) -a
```

When to Use This Command Option

Note – The Instant Image 2.0 software uses this command as part of system shutdown. After system reboot, it also resumes any copy or update operations that were in progress when the system shut down.

Use this command when you want to temporarily suspend (but not disable) the Instant Image 2.0 software for all currently enabled volumes. You cannot perform copy or update operations while the volumes are suspended. See also "Resuming All Suspended Volumes" on page 3-25.

This Command Option Can Fail If...

- There are no currently enabled Instant Image 2.0 volume pairs.

Resuming a Suspended Volume

This option continues Instant Image 2.0 operations for the specified *shadow_vol* suspended by the `control -s` command option, using the state saved in the associated bitmap. After typing this command, you can perform Instant Image 2.0 operations on the volume using the commands in this chapter. Any copy or update operation that was in progress when the volume was suspended also resumes.

> **Caution –** Changes made to either the master or shadow volume while suspended will corrupt the data.

Syntax

`control {-r|-resume}` *shadow_vol*

When to Use This Command Option

Use this command when you want to resume Instant Image 2.0 operations for the currently suspended specified volume. You cannot perform copy or update operations while the volume is suspended. See also "Suspending a Volume" on page 3-22.

This Command Option Can Fail If...

■ The specified volume does not belong to an Instant Image 2.0 volume pair that is currently suspended.

Resuming All Suspended Volumes

This option resumes Instant Image 2.0 operations for all volumes suspended by the `control -s` command option. After typing this command, you can perform Instant Image 2.0 operations on the volumes using the commands in this chapter. Any copy or update operations that were in progress when the volumes were suspended also resume.

Syntax

```
control {-r|-resume} -a
```

When to Use This Command Option

Note – The Instant Image 2.0 software uses this command as part of system startup. It also resumes any copy or update operations that were in progress when the system shut down.

Use this command when you want to resume Instant Image 2.0 operations for all currently suspended volumes. You cannot perform copy or update operations while the volume is suspended. See also "Suspending All Volumes" on page 3-23.

This Command Option Can Fail If...

- No Instant Image 2.0 enabled volume is currently suspended.

Displaying Volume Pair Status

This option displays status for the Instant Image 2.0 volume pair containing the specified currently enabled or suspended *shadow_vol*. If you specify -a, status is displayed for all Instant Image 2.0 volume pairs.

Syntax

`health {-s|-status} {`*shadow_vol*`|-a}`

Sample output:

```
/dev/vx/rdsk/master01: (master volume)
/dev/vx/rdsk/shadow01: (shadow volume)
/dev/vx/rdsk/scoreboard01: (bitmap volume)
Dependent copy                indicates that the shadow volume type is dependent
Percent of bitmap set: 0
```

When to Use This Command Option

Use this command when you want to check the status of the Instant Image 2.0 volume pairs; use the *shadow_vol* option to check the status of a volume pair. A typical use of this command option is to check the status of a copy or update operation before using the target volume for any other operations. See also "Waiting for a Copy or Update to Complete" on page 3-21.

This Command Option Can Fail If...

■ The specified volume does not belong to an Instant Image 2.0 volume pair.

Displaying the Volume Pair Bitmap

This option displays the full bitmap scoreboard for volume pair associated with the currently enabled or suspended shadow volume *shadow_vol*.

Syntax

```
health -b shadow_vol
```

Sample output:

```
0x03, 0x01, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
```

A value of **0x00** indicates an unchanged track. Any other value indicates a change to a track.

When to Use This Command Option

Use this command when you want to check the status of a particular Instant Image 2.0 bitmap.

This Command Option Can Fail If...

■ The specified volume does not belong to an Instant Image 2.0 volume pair.
■ An I/O error occurs when reading the bitmap.

Resetting a Volume

This option lets you place an Instant Image 2.0 volume pair online after a volume has gone offline.

If a volume fails during a normal Instant Image 2.0 operation, it is considered offline by the Instant Image 2.0 software. TABLE 3-2 explains what operation the Instant Image 2.0 software performs after you replace the failed volume.

TABLE 3-2   Reset Command Results for Various Volume Types

Offline Volume Type	After Issuing A Reset, The Instant Image 2.0 Software:
Dependent shadow volume	Automatically updates the shadow volume from the master volume, using volume differences stored by the bitmap volume
Independent shadow volume	Automatically copies the master volume to the shadow volume
Bitmap	Resynchronizes the volume pair by copying the master volume to the shadow volume

Syntax

```
control {-R|-reset} shadow_vol
```

When to Use This Command Option

Use this command option when you want to place previously offlined Instant Image 2.0 volume pairs online, making them available for use. You can also use it if you have replaced failed disk drives that had volumes previously included in the Instant Image 2.0 volume pair.

This Command Option Can Fail If...

■ A volume does not belong to an Instant Image 2.0 volume pair.

Examples of Instant Image 2.0 Operations

This chapter contains examples showing how to configure, enable, and use the Instant Image 2.0 software. The examples in this chapter show how to perform operations using either the Instant Image 2.0 management service GUI or command line interface (CLI). Before performing any procedures in this chapter, read about the Instant Image 2.0 features in Chapter 2 and Chapter 3.

Note – This guide is designed for use by an experienced system administrator of the Solaris operating environment and related disk storage systems. To use the Instant Image 2.0 software, you must be the root user or superuser.

Note – Take the same precautions using Instant Image 2.0 Copy and Update options as you would using the dd(1M) command to copy between raw devices. That is, unmount the target of the copy and update operation first to prevent file system panics. You may unmount the source device also, to stop write operations to it and ensure a consistent shadow copy, but this source unmount is not required. After issuing the copy or update, remount the device(s) and resume the workload; you do not have to wait for the operation to complete.

Example Volume Names

This section contains examples of Instant Image 2.0 operations. The example volume names used in this section are:

Master volume	`/dev/rdsk/c1t3d0s0`
Shadow volume	`/dev/rdsk/c1t3d0s4`
Bitmap volume	`/dev/vx/rdsk/bitmap0`

Basic Instant Image 2.0 Operations

Caution – Before starting the enable, copy, and update operations, quiesce the workload to the master and shadow volumes and unmount the target volume.

This ensures that the point-in-time data is consistent. Remount the volume and resume the workload after starting the enable, copy, or update operation.

The basic Instant Image 2.0 operations are:

1. Enabling the Instant Image 2.0 software for the volumes you have selected.

2. Using the Instant Image 2.0 fast resynchronization commands to quickly update volumes when necessary.

   An important feature of the Instant Image 2.0 software is fast resynchronization. Fast resynchronization enables you to perform volume updates at faster speeds than most full volume copy or mirroring operations.

   To perform fast resynchronization, use the Update feature. This copies all 32-Kbyte segments flagged as different between the master and shadow volumes, depending on which volume is being updated. They do not copy all volume data, only changed data.

3. Using the Instant Image 2.0 Copy feature to perform full volume copies.

   You typically perform a full volume copy only when you need two physically-separate volumes, or if a volume has become corrupted or has failed. The Copy to Shadow feature overwrites the shadow volume with the master contents; the Copy to Master feature overwrites the master volume with the changed shadow contents. Of course, you can choose to enable the Instant Image 2.0 software using the Enable Independent Pair feature, which performs a full volume copy from master to shadow.

4. Disabling the Instant Image 2.0 software, if you choose to do so. You can keep the Instant Image 2.0 software enabled indefinitely, depending on your storage use and strategy.

▼ To Check the Status of the Copy or Update Operation

To check the progress of the copy or update operation:

Using the Management Service GUI

1. **Click the Health tab.**

2. **Click the arrowhead expanders to see the Pair Information area.**

3. **Select the volume pair you just enabled.**

   The Percent Complete bar shows the progress of the copy or update operation. The Percent Complete bar shows the progress of the copy operation as 100 percent complete in the case of a dependent shadow volume, as the shadow volume is a dependent image of the master volume.

Using the CLI

Use the `health` **command to check the status of a volume pair or all volumes pairs:**

```
# /usr/opt/SUNWesm/bin/esm_cli
[1} sx> cd InstantImage
[2] sx> health -s /dev/rdsk/c1t3d0s4
[3] sx> health -s -a
```

▼ To Enable an Independent Volume Pair

In this example, enable the Instant Image 2.0 software so that it performs a full volume shadow copy of the master volume. See also "To Enable a Dependent Volume Pair" on page 4-6.

Using the Management Service GUI

1. **Unmount the shadow volume** /dev/rdsk/c1t3d0s4.

2. **Click the Configuration tab.**

   The Master Candidate List appears. This window pane lists the pool of all volumes eligible to be master volumes.

3. **Select the master volume.**

   The list of eligible shadow volumes appears in the Shadow Candidate List window pane.

4. **Select a shadow volume.**

5. **Click the Enable Independent Pair button.**

   The volumes appear in the Pair List area.

6. **Mount the shadow volume.**

   You now have two point-in-time copies of data.

Using the CLI

1. **Unmount the shadow volume** /dev/rdsk/c1t3d0s4.

2. **Enable an independent volume pair by typing:**

```
# /usr/opt/SUNWesm/bin/esm_cli
[1} sx> cd InstantImage
[2] sx> config -enable -t ind -m /dev/rdsk/c1t3d0s0 -s /dev/rdsk/c1t3d0s4 \
-b /dev/vx/rdsk/bitmap0
```

3. **Mount the shadow volume.**

   You now have two point-in-time copies of data.

▼ To Enable a Dependent Volume Pair

You can also enable a dependent volume pair (see Chapter 1 for a description of *dependent*).

Using the Management Service GUI

1. **Unmount the shadow volume** /dev/rdsk/c1t3d0s4.

2. **Click the Configuration tab.**

   The Master Candidate List appears. This window pane lists the pool of all volumes eligible to be master volumes.

3. **Select the master volume.**

   The list of eligible shadow volumes appears in the Shadow Candidate List window pane.

4. **Select the shadow volume.**

5. **Click the Enable Dependent Pair button.**

   The volumes appear in the Pair List area.

6. **Mount the shadow volume.**

   You now have a master volume-dependent point-in-time view of the data.

Using the CLI

1. **Unmount the shadow volume** /dev/rdsk/c1t3d0s4.

2. **Enable a dependent volume pair by typing:**

```
# /usr/opt/SUNWesm/bin/esm_cli
[1] sx> cd InstantImage
[2] sx> config -enable -t dep -m /dev/rdsk/c1t3d0s0 -s /dev/rdsk/c1t3d0s4 \
-b /dev/vx/rdsk/bitmap0
```

3. **Mount the shadow volume.**

   You now have a master volume-dependent point-in-time view of the data.

▼ To Perform Fast Resynchronization Updates

Fast resynchronization enables you to perform volume updates at much faster speeds than most full volume copy or mirroring operations.

Using the Management Service GUI

Update the Shadow Volume From the Master

1. **Unmount the shadow volume** `/dev/rdsk/c1t3d0s4`.

2. **Click the Control tab.**

3. **Select the volume pair in the Volume Pairs area that includes the shadow volume** `/dev/rdsk/c1t3d0s4`.

4. **Click the Update Shadow button.**

5. **Mount the shadow volume.**

Update the Master From the Shadow

1. **Unmount the master volume** `/dev/rdsk/c1t3d0s0`.

2. **Click the Control tab.**

3. **Select the volume pair in the Volume Pairs area that includes the master volume** `/dev/rdsk/c1t3d0s0`.

4. **Click the Update Master button.**

5. **Mount the master volume.**

Using the CLI

Update the Shadow Volume From the Master

1. Unmount the shadow volume /dev/rdsk/c1t3d0s4.

2. Update the shadow volume by typing:

```
# /usr/opt/SUNWesm/bin/esm_cli
[1] sx> cd InstantImage
[2] sx> control -update -S /dev/rdsk/c1t3d0s4
```

3. Mount the shadow volume.

Update the Master From the Shadow

1. Unmount the master volume /dev/rdsk/c1t3d0s0.

2. Update the master volume by typing:

> **Note –** The specified volume in this example is the shadow volume, even though you are updating the master volume. This is correct; always specify the volume pair's shadow volume when performing control or health command operations.

```
# /usr/opt/SUNWesm/bin/esm_cli
[1] sx> cd InstantImage
[2] sx> control -update -M /dev/rdsk/c1t3d0s4
```

3. Mount the master volume.

▼ To Perform Full Volume Copies

You typically perform a full volume copy only when you need two physically-separate volumes, or if a volume has become corrupted or has failed.

Using the Management Service GUI

Copy All Data From the Master Volume to the Shadow

1. **Unmount the shadow volume** `/dev/rdsk/c1t3d0s4`.

2. **Click the Control tab.**

3. **Select the volume pair in the Volume Pairs area that includes the shadow volume** `/dev/rdsk/c1t3d0s4`.

4. **Click the Copy to Shadow button.**

5. **Mount the shadow volume.**

Copy All Changed Data From the Shadow Volume to the Master

1. **Unmount the master volume** `/dev/rdsk/c1t3d0s0`.

2. **Click the Control tab.**

3. **Select the volume pair in the Volume Pairs area that includes the master volume** `/dev/rdsk/c1t3d0s0`.

4. **Click the Copy to Master button.**

5. **Mount the master volume.**

Using the CLI

Copy All Data From the Master Volume to the Shadow

1. **Unmount the shadow volume** `/dev/rdsk/c1t3d0s4`.

2. **Copy all data from the master volume to the shadow by typing:**

```
# /usr/opt/SUNWesm/bin/esm_cli
[1] sx> cd InstantImage
[2] sx> control -copy -S /dev/rdsk/c1t3d0s4
```

3. **Mount the shadow volume.**

Copy All Changed Data From the Shadow Volume to the Master

1. **Unmount the master volume** `/dev/rdsk/c1t3d0s0`.

2. **Copy all changed data from the shadow volume to the master by typing:**

Note – The specified volume in this example is the shadow volume, even though you are overwriting the master volume. This is correct; always specify the volume pair's shadow volume when performing `control` or `health` command operations.

```
# /usr/opt/SUNWesm/bin/esm_cli
[1] sx> cd InstantImage
[2] sx> control -copy -M /dev/rdsk/c1t3d0s4
```

3. **Mount the master volume.**

▼ To Disable the Instant Image 2.0 Software

Note – If you abort a volume pair copy or update operation and then try to disable the volume pair, the disable operation fails. When you abort a copy or update operation, the operation is incomplete and the target volume becomes a dependent volume of the source volume. To successfully disable a volume pair after an abort, re-issue the copy or update operation, let it complete, then disable the volume pair.

Using the Management Service GUI

1. **Click the Configuration tab.**

2. If you originally used the Enable Dependent Pair button on the selected pair, creating a dependent shadow volume, unmount the shadow volume.

   If you originally used the Enable Independent Pair button on the selected pair, go to Step 3.

3. **Select a volume pair in the Pair List area.**

4. **Click the Disable Pair button.**

Using the CLI

Note – Before disabling a dependent pair, unmount the shadow volume.

● **Disable the Instant Image 2.0 software for a volume pair by typing:**

```
# /usr/opt/SUNWesm/bin/esm_cli
[1] sx> cd InstantImage
[2] sx> config -disable /dev/rdsk/c1t3d0s4
```

Other Instant Image 2.0 Operations

Other Instant Image 2.0 operations include:

- Suspending one or all volume pairs.
- Resuming one or all volume pairs.
- Displaying status and information about volume pairs.
- Resetting volume pairs.

▼ To Suspend Volume Pairs

Caution – *Do not write to suspended master or shadow volumes.* Writing to suspended Instant Image 2.0 volumes guarantees that you will destroy their data integrity.

When you suspend volume pairs, the Instant Image 2.0 software saves their state in the associated bitmap. You cannot perform copy or update operations while the volume is suspended. If a copy or update operation was in progress when you suspended a volume, the operation continues when you resume the suspended pair.

Using the Management Service GUI

1. **Click the Control tab.**

2. **Select the volume pair in the Volume Pairs area that includes the shadow volume** `/dev/rdsk/c1t3d0s4`**.**

3. **Click the Suspend button to suspend only this volume pair.**

4. **Click the Suspend All button to suspend all volume pairs.**

Using the CLI

- **Suspend one volume pair by typing:**

```
# /usr/opt/SUNWesm/bin/esm_cli
[1] sx> cd InstantImage
[2] sx> control -suspend  /dev/rdsk/c1t3d0s4
```

- **To suspend all volume pairs by typing:**

```
# /usr/opt/SUNWesm/bin/esm_cli
[1] sx> cd InstantImage
[2] sx> control -suspend -a
```

▼ To Resume Suspended Volume Pairs

This feature continues Instant Image 2.0 operations for suspended volume pairs, using the state saved in the associated bitmap. After enabling this feature, you can perform Instant Image 2.0 operations. Any copy or update operation that was in progress when the volume was suspended also resumes.

Using the Management Service GUI

1. **Click the Control tab.**

2. **Select the suspended volume pair in the Volume Pairs area that includes the shadow volume** /dev/rdsk/c1t3d0s4**.**

3. **Click the Resume button to resume only this volume pair.**

4. **Click the Suspend All button to resume all suspended volume pairs:**

Using the CLI

- **Resume one volume pair by typing:**

```
# /usr/opt/SUNWesm/bin/esm_cli
[1] sx> cd InstantImage
[1] sx> control -resume /dev/rdsk/c1t3d0s4
```

- **Resume all volume pairs by typing:**

```
# /usr/opt/SUNWesm/bin/esm_cli
sx> cd InstantImage
sx> control -resume -a
```

▼ To Display Volume Pair Status and Information

Using the Management Service GUI

1. **Click the Health Tab.**

2. **Select a volume pair to display its status and information.**

Note – See "Health Tab: Getting Volume Status" on page 2-21 and "To Display More Volume Information: Table Options" on page 2-25 for information on how to display more detailed status for volume pairs.

Using the CLI

● **Display status and information for the volume pair including the shadow volume** /dev/rdsk/c1t3d0s4 **by typing:**

```
# /usr/opt/SUNWesm/bin/esm_cli
[1] sx> cd InstantImage
[2] sx> health -status /dev/rdsk/c1t3d0s4
```

For example, the following information is displayed:

```
/dev/rdsk/c1t3d0s0: (master volume)
/dev/rdsk/c1t3d0s4: (shadow volume)
/dev/vx/rdsk/bitmap0: (bitmap volume)
Independent Copy
Percent of bitmap set: 0
```

● **Display status and information for all volume pairs by typing:**

```
# /usr/opt/SUNWesm/bin/esm_cli
[1] sx> cd InstantImage
[2] sx> health -status -a
```

For example, status and information for two sets of volume pairs are displayed:

```
/dev/rdsk/c1t3d0s0: (master volume)
/dev/rdsk/c1t3d0s4: (shadow volume)
/dev/vx/rdsk/bitmap0: (bitmap volume)
Independent Copy
Percent of bitmap set: 0
--------------------------------------------------------------
/dev/rdsk/c1t86d0s3: (master volume)
/dev/rdsk/c1t86d0s4: (shadow volume)
/etc/opt/SUNWiims/bm/dsw49531b: (bitmap volume)
Dependent Copy
Percent of bitmap set: 0
```

● **Display the bitmap information for the volume pair including the shadow volume**
/dev/rdsk/c1t3d0s4 **by typing:**

```
# /usr/opt/SUNWesm/bin/esm_cli
[1] sx> cd InstantImage
[2] sx> health -bitmap /dev/rdsk/c1t3d0s4
```

For example, the following information is displayed:

```
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
```

▼ To Reset Volume Pairs

This feature enables you to place an Instant Image 2.0 volume pair online after a volume has failed. This feature also starts any necessary point-in-time volume updates. If a volume fails during a normal Instant Image 2.0 operation, the volume pair is considered offline by the Instant Image 2.0 software.

Using the Management Service GUI

1. **Click the Control tab.**

2. **Select the offline volume pair in the Volume Pairs area.**

3. **Click the Reset button.**

Using the CLI

● **To reset a volume pair and place it online by typing:**

```
# /usr/opt/SUNWesm/bin/esm_cli
[1] sx> cd InstantImage
[2] sx> control -reset /dev/rdsk/c1t3d0s4
```

Glossary

bitmap The file that tracks the location of data changes on the shadow or master volume.

dependent Implies a volume-*dependent* point-in-time view. When you enable Instant Image 2.0 for a volume pair, you can specify the shadow volume as `dependent`. This does not cause Instant Image 2.0 to perform a full volume copy; data is not duplicated until you request it from the shadow. The dependent shadow volume is a copy that relies on the master for all unmodified data blocks.

fast resynchronization When Instant Image 2.0 copies all 32-Kbyte segments flagged as different between the master and shadow volumes, depending on which volume is being updated. It does not copy all volume data, only changed data. It is quicker than a full volume copy.

independent A physically-separate full volume copy. It remains so after Instant Image 2.0 is disabled.

invalidate After disabling a dependent volume, Instant Image 2.0 clears the first 64 Kbytes of data in the volume to prevent users from accessing invalid or inconsistent data.

master The volume that contained the original data, copied to the *shadow volume*.

point-in-time view A copy or image of volume data captured or copied at a particular moment.

resynchronization See *fast resynchronization*.

segment A 32-Kbyte track of data.

shadow The volume containing a copy of data from the *master* volume.

volume group The master volume and its associated shadow and bitmap volumes.

volume pair The master and shadow volumes in a volume group.

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