

Sun Flash Accelerator F40 PCIe Card

User's Guide



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Using This Documentation

This users guide provides detailed procedures that describe installing, configuring, and servicing Oracle's Sun Flash Accelerator F40 PCIe Card.

This document is written for technicians, system administrators, authorized service providers (ASPs), and users who have advanced experience troubleshooting and replacing hardware.

Note – For specific installation instructions, see your server installation guide. For information about restrictions and use of the Sun Flash Accelerator F40 PCIe Card on your server, see the most recent version of the server product notes.

This preface contains the following sections:

- “Product Notes” on page vii
- “Related Documentation” on page viii
- “Feedback” on page viii
- “Access to Oracle Support” on page viii

Product Notes

For late-breaking information and known issues about this product, refer to the product notes at the Sun Flash Accelerator F40 PCIe Card Documentation Library:

<http://www.oracle.com/pls/topic/lookup?ctx=SunFlashF40>

Related Documentation

Documentation	Links
All Oracle products	http://www.oracle.com/documentation
Sun Flash Accelerator F40 PCIe card	http://www.oracle.com/pls/topic/lookup?ctx=SunFlashF40
Oracle Solaris OS and systems software library	www.oracle.com/technetwork/indexes/documentation/index.html#sys_sw

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Sun Flash Accelerator F40 PCIe Card Overview

Review the following product information sections before you install or service the Sun Flash Accelerator F40 PCIe Card:

- [“Card Overview” on page 1](#)
- [“Card Specifications” on page 6](#)

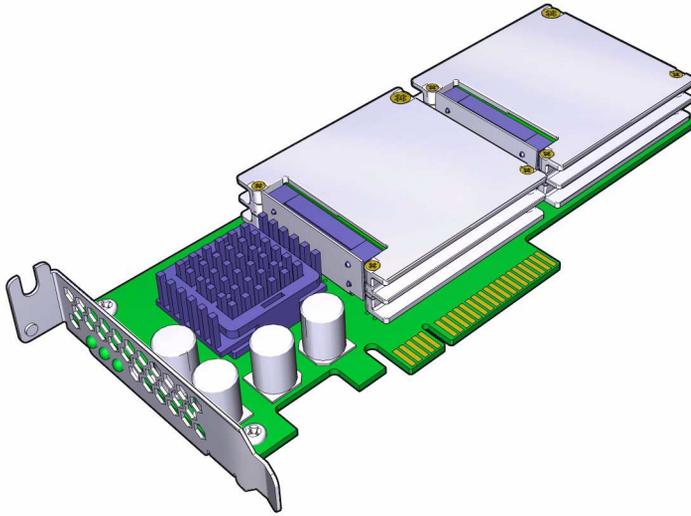
Card Overview

The following sections provide an overview of Sun Flash Accelerator F40 PCIe Card features:

- [“About the Sun Flash Accelerator F40 PCIe Card” on page 1](#)
- [“Key Features” on page 2](#)
- [“Card Software and Firmware Components” on page 5](#)
- [“Card Hardware Components” on page 3](#)
- [“Card LEDs” on page 5](#)

About the Sun Flash Accelerator F40 PCIe Card

The Sun Flash Accelerator F40 PCIe Card is a turnkey PCI-E 2.0, host bus adapter (HBA), low-profile, half-height, and half-length PCIe board form factor flash memory storage card.



Related Information

- [“Card Specifications” on page 6](#)

Key Features

Sun Flash Accelerator F40 PCIe Card key features include:

Feature	Description
Proven enterprise reliability	Block-level and page-level failure protection.
Best-in-class read and write performance	0.095 msec write latency (8k transfer size).
Capacity	400 GB, usable.
Life monitoring capability	Functional life expectancy based on read/writes such as write workloads, duty cycle writes, and retired blocks.
Low host burden	No static CPU and memory overhead.
Operating systems	Per server.
PCIe standard	PCI Express– 2.0, x8, PCIe low-profile bracket.
LED status indicators	Three board-mounted, right-angle LEDs shine through the PCI bracket to indicate activity, drive life, and status.

Characteristics

The Sun Flash Accelerator F40 PCIe Card has the following general characteristics:

Characteristic	Value
Device name	Sun Flash Accelerator F40 PCIe Card
Manufacturing name	Sun Flash Accelerator F40 PCIe Card
Capacity	400 GB, usable, 100 GB per flash drive module
Firmware	IT
NAND	eMLC (enterprise multi-level cell)
Card style	Low-profile, half-height, and half-length PCIe board

Related Information

- [“Card Specifications” on page 6](#)

Card Hardware Components

The Sun Flash Accelerator F40 PCIe Card contains these hardware components:

Component	Description
Four SSD flash memory modules	Total of 400 GB 32nm eMLC NAND flash is directly mounted on the card in two stacks. Each flash module hosts an integrated multi-channel NAND flash controller.
PCI-E to SAS protocol controller	The card host controller has a PCI-E 2.0 x8 host interface connecting to a SAS/SATA x4 6 Gbit/sec protocol controller.
Energy storage components	Energy storage component capacitance allows time to shut down tasks cleanly, assuring full data retention during loss of power.

The Sun Flash Accelerator F40 PCIe Card is a block storage device, with block sizing optimization capabilities. You can use the card for either nonpersistent or persistent data. The card offers high-performance with low latency and a low CPU burden. The Sun Flash Accelerator F40 PCIe Card is designed with advanced enterprise multi-level cell NAND (eMLC) technology for high-level performance and write durability, while providing higher capacity than SLC NAND cards.

The Sun Flash Accelerator F40 PCIe Card presents itself to the operating system through a Fusion-MPT™ interface as a flash card with four drives, that requires minimal user configuration. The card functions using a SAS controller with drive firmware running on its internal processor. The controller connects to up to four embedded flash memory modules.

For example, one Sun Flash Accelerator F40 PCIe Card displays as follows in an Oracle Solaris operating system:

```
5. c0t500051610010E810d0 <ATA-3E128-TS2-550B00-T3EM cyl 65533 alt
2 hd 16 sec 186>
/scsi_vhci/disk@g500051610010e810
6. c0t500051610010EA9Cd0 <ATA-3E128-TS2-550B00-T3EM cyl 65533 alt
2 hd 16 sec 186>
/scsi_vhci/disk@g500051610010ea9c
7. c0t500051610010EC0Cd0 <ATA-3E128-TS2-550B00-T3EM cyl 65533 alt
2 hd 16 sec 186>
/scsi_vhci/disk@g500051610010ec0c
8. c0t500051610010EC60d0 <ATA-3E128-TS2-550B00-T3EM cyl 65533 alt
2 hd 16 sec 186>
/scsi_vhci/disk@g500051610010ec60
```

The Sun Flash Accelerator F40 PCIe Card uses a low-profile, half-height, and half-length PCIe board, as shown in the following illustration.

FIGURE: Sun Flash Accelerator F40 PCIe Card Components

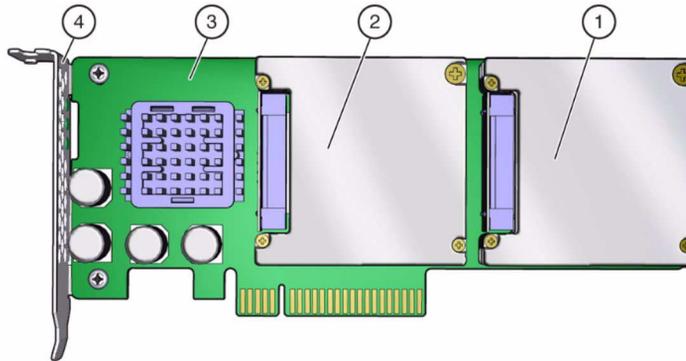


Figure Legend

- | | |
|---|------------------------|
| 1 | Flash stack 1 (Cage 1) |
| 2 | Flash stack 2 (Cage 2) |
| 3 | Board |
| 4 | Bracket |

The card meets the PCI low-profile MD2 specification. The card has a PCIe interface that complies with the PCI Express Specification 2.0.

Related Information

- [“Card Software and Firmware Components” on page 5](#)

Card Software and Firmware Components

The following firmware and software modules are included with the Sun Flash Accelerator F40 PCIe Card:

Component	Description
SAS controller firmware	The SAS firmware controller runs on the PCIe host controller board of the Sun Flash Accelerator F40 PCIe Card.
Flash controller firmware	The NAND flash controller firmware provides firmware for the four SSD flash modules.
DDCLI	The DDCLI software is a user application. The <code>ddcli</code> utility is a standalone CLI that allows you to service and monitor any Sun Flash Accelerator F40 PCIe Card connected to the server.

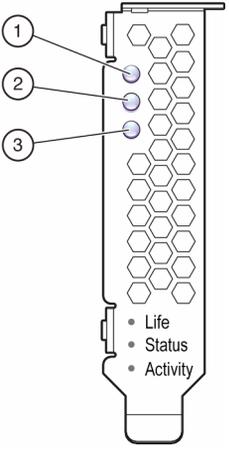
For hardware, firmware, and software compatibility information, refer to the *Sun Flash Accelerator F40 PCIe Card Product Notes*.

Related Information

- [“Card Hardware Components” on page 3](#)

Card LEDs

Use the Sun Flash Accelerator F40 PCIe Card LEDs to determine the status of the card. Three LEDs that are located on the PCI bracket indicate drive life, card status, and card activity.

Image	Normal LED state	Service required
	<p>(1) Life LED - Green steady</p> <p>(2) Status LED - Green steady</p> <p>(3) Activity LED - Green blinks when disk access, dark when idle</p>	<p>Yellow, Red</p> <p>Yellow, Red</p>

Related Information

- [“Troubleshooting Using Card LEDs” on page 45](#)

Card Specifications

The following sections describe information you need before installing or servicing the Sun Flash Accelerator F40 PCIe Card:

- [“Physical Dimensions” on page 7](#)
- [“Environmental Specifications” on page 7](#)
- [“Electrical Specifications” on page 8](#)

Note – For information about specifications on your server, see the most recent version of the server documentation. For compliance specifications, refer to the *Sun Flash Accelerator F40 PCIe Card Safety and Compliance Guide*.

Physical Dimensions

The Sun Flash Accelerator F40 PCIe Card has the following physical dimensions:

Specification	Dimension
Height	2.7 in. (70 mm)
Length	6.6 in. (167 mm)
Weight	0.5 lb / 10 oz maximum (283.5 g)

Related Information

- [“About the Sun Flash Accelerator F40 PCIe Card” on page 1](#)

Environmental Specifications

The Sun Flash Accelerator F40 PCIe Card operates and is stored in an environment defined by the following parameters:

Specification	Measurement
Temperature range	<ul style="list-style-type: none">• Operating temperature: 0 °C to 74°C (measured at card temperature sensor)• Operational environment: 5 °C to 55°C (dry bulb)• Storage and transit environment: -20 °C to 75 °C (dry bulb)• Thermal sensor temperature cannot exceed 75 °C• Maximum dry bulb temperature shall be derated by 3.3 °C per 1000 m above 500 m• Four thermal sensors on the cards monitor each flash drive module
Relative humidity range	<ul style="list-style-type: none">• Operational environment: 8% to 80% noncondensing• Storage and transit environment: 5% to 95% noncondensing• Non-operating: -20°C to 75°C noncondensing
Altitude	<ul style="list-style-type: none">• Operational environment: Up to 9840 ft (3,000 m)• Storage and transit environment: Up to 39,370 ft (12,000 m)
Airflow requirement	More than 200 LFPM (linear feet/minute)

The Sun Flash Accelerator F40 PCIe Card is designed to provide continuous full bandwidth performance with flash disk temperatures up to 73 °C. Qualified host platforms with required software updates operate with sufficient margin to the maximum temperature under worst case environments.

Should the system maximum operating temperature be exceeded, or a system fault occur which causes internal temperatures of the flash disks to rise above this limit, the card responds as follows:

- 74 °C - Disk write throttling is engaged to reduce card power.
 - Card status LED yellow.
 - Temperature warning displays in `ddcli -health` output.
- 76 °C - Additional disk write throttling is engaged.
 - Card status LED red.
 - Critical temperature status displays in `ddcli -health` output.



Caution – Sustained critical temperatures may cause data loss.

Note – For specific site planning guidelines and best practices, refer to the server site planning guide and product notes for your server.

Related Information

- [“About the Sun Flash Accelerator F40 PCIe Card” on page 1](#)

Electrical Specifications

The Sun Flash Accelerator F40 PCIe Card receives power from the PCI Express +12 VDC and +3.3 VDC power rails as shown in the following table:

Specification	Value	3.3 Vdc	12 Vdc
DC power requirements	PCI Express	DC voltage 3.3 V +/-5%	12 V +/- 8%
Power dissipation	Not to exceed 23.5 W		
DC voltage tolerance	3.3 V +/-5%	3.3 V aux +/-5%	12 V +/-8%
DC current		Idle:	Max (100% write):
	+12 V:	510 mA rms	1.62 A rms

Specification	Value	3.3 Vdc	12 Vdc
	+3.3 V:	1.6 A rms	1.65 A rms
	+3.3 V aux:	30 mA rms	30 mA rms
	Total power:	11.5 W	25 W max

Related Information

- [“About the Sun Flash Accelerator F40 PCIe Card” on page 1](#)

Preparing the Card for Installation

The following sections contain information about preparing a Sun Flash Accelerator F40 PCIe Card for installation:

- [“Required Tools” on page 11](#)
- [“Ship Kit Contents” on page 12](#)
- [“Observing Safety Precautions” on page 13](#)
- [“ESD Safety Measures” on page 14](#)
- [“Update the Host Operating System” on page 15](#)

Note – For specific installation instructions, see your system installation guide. For information about installation and use of the card on your server, see the most recent version of the server product notes.

Required Tools

You need the following tools to install or service the Sun Flash Accelerator F40 PCIe Card:

- Antistatic wrist strap
- Antistatic mat
- No. 1 Phillips screwdriver

Related Information

- [“Installing the Card Into a Server” on page 18](#)

Ship Kit Contents

The ship kit contains the components shown in the following diagram:

FIGURE: Sun Flash Accelerator F40 PCIe Card Ship Kit Contents

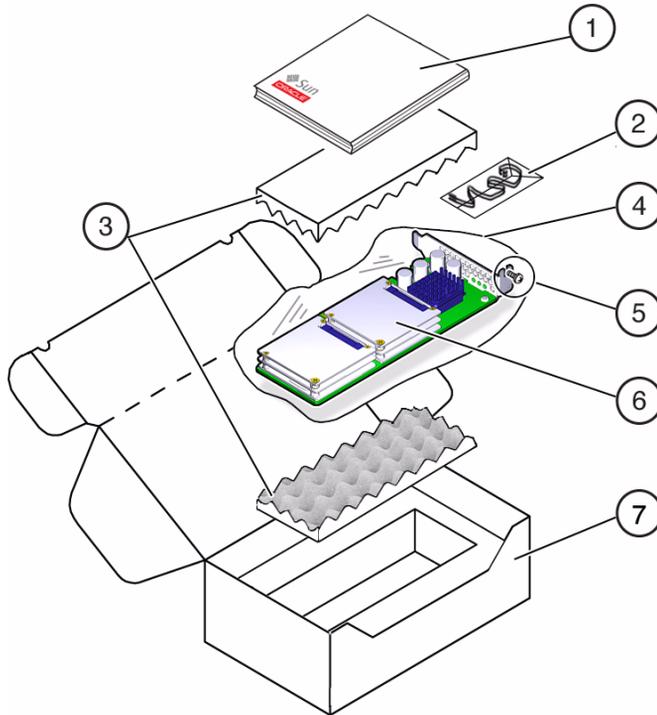


Figure Legend

-
- | | |
|---|--|
| 1 | Documentation |
| 2 | ESD wrist strap (Note: Not included in some ship kits) |
| 3 | Foam |
| 4 | Antistatic bag |
| 5 | Bracket screw |
| 6 | Sun Flash Accelerator F40 PCIe Card with low profile PCIe mounting bracket |
| 7 | Packaging |
-

Related Information

- “Installing the Card Into a Server” on page 18

Observing Safety Precautions

This section contains information about safeguarding the equipment and personnel from damage:

- “General Safety Information” on page 13
- “Safety Symbols” on page 13
- “ESD Safety Measures” on page 14
- “Perform ESD Prevention Measures” on page 14

General Safety Information

For your protection, observe the following safety precautions when setting up your equipment:

- Follow all cautions and instructions marked on the equipment.
- Follow all cautions and instructions described in the documentation shipped with your system, and described in the server’s safety information.
- Follow the electrostatic discharge safety practices as described in this section.
- Handle the card by the edges.

Safety Symbols

Note the meanings of the following symbols that might appear in this document:



Caution – There is a risk of personal injury or equipment damage. To avoid personal injury and equipment damage, follow the instructions.



Caution – Hot surface. Avoid contact. Surfaces are hot and might cause personal injury if touched.



Caution – Hazardous voltages are present. To reduce the risk of electric shock and danger to personal health, follow the instructions.

ESD Safety Measures

Electrostatic discharge (ESD) sensitive devices, such as the motherboard, PCI cards, hard drives, and memory modules, require special handling.



Caution – Circuit boards and hard drives contain electronic components that are extremely sensitive to static electricity. Ordinary amounts of static electricity from clothing or the work environment can destroy the components located on these boards. Do not touch the components along their connector edges.



Caution – You must disconnect all server power supplies before servicing any of the components documented in this guide.

Antistatic Wrist Strap

Wear an antistatic wrist strap when handling ESD-sensitive components.

Antistatic Mat

Place ESD-sensitive components such as motherboards, memory, and other PCBs on an antistatic mat (not provided).

Related Information

- [“Perform ESD Prevention Measures” on page 14](#)

▼ Perform ESD Prevention Measures

1. **Prepare an antistatic surface to set parts on during the removal, installation, or replacement process.**

Place ESD-sensitive components such as the printed circuit boards on an antistatic mat. The following items can be used as an antistatic mat:

- Antistatic bag used to wrap a replacement part
- ESD mat
- A disposable ESD mat (shipped with some replacement parts or optional system components)

2. Attach an antistatic wrist strap.

When servicing or removing server components, attach an antistatic strap to your wrist and then to a metal area on the chassis.

Related Information

- [“ESD Safety Measures” on page 14](#)

▼ Update the Host Operating System

Check the *Sun Flash Accelerator F40 PCIe Card Product Notes* for the latest firmware requirements, available at the *Sun Flash Accelerator F40 PCIe Card Documentation Library*:

<http://oracle.com/pls/topic/lookup?ctx=SunFlashF40>.

- **Download and install any firmware updates required to support the card, host bus adapter (HBA), drive backplane, system BIOS, or OBP/system (Oracle Solaris) firmware for your system from this location:**

<https://support.oracle.com>

Note – The Sun Flash Accelerator F40 PCIe Card firmware update procedure is described in [“Update the Card Firmware” on page 26](#).

Installing the Card

This section contains information about installing the Sun Flash Accelerator F40 PCIe Card into a server.

- [“Installation Overview” on page 17](#)
- [“Installing the Card Into a Server” on page 18](#)

Related Information

- [“Preparing the Card for Installation” on page 11](#)
- [“Sun Flash Accelerator F40 PCIe Card Overview” on page 1](#)

Installation Overview

To quickly install your Sun Flash Accelerator F40 PCIe Card into a system, refer to the following table:

Step	Task	See
1.	Prepare the card for installation. Carefully unpack the card and inspect it for damage. Follow ESD precautions.	“Preparing the Card for Installation” on page 11
2.	Prepare the system for service. Turn off the system. Remove all server power cords. Remove the server cover.	Refer to the server service manual.
3.	Insert the card in an available PCIe slot.	“Installing the Card Into a Server” on page 18
4.	Secure the bracket to the system’s chassis.	“Install a New Card” on page 19 , and refer to the server service manual.
5.	Return the server to service. Replace the cover and the power cord, and then power up the system.	Refer to the server service manual.

Related Information

- “Remove an Existing Card From a Server” on page 22

Installing the Card Into a Server

Follow the instructions in the following sections to install or replace the Sun Flash Accelerator F40 PCIe Card.

Note – For specific PCIe card installation instructions, see your server service manual and product notes.

- “Card Optimization Guidelines” on page 18
- “Install a New Card” on page 19
- “Remove an Existing Card From a Server” on page 22

Card Optimization Guidelines

Block size can be configured through a server OS or file system, and is set to a default size with Oracle databases.

The Sun Flash Accelerator F40 PCIe Card is designed to provide best performance for data transfers that are multiples of 8k size, and using addresses that are 8k aligned. Partitions should be aligned to start on 8k boundaries.

Oracle Solaris OS automatically ensures 8k alignment when the default SMI label type is selected. If a label of type `EFI` is desired, care must be taken to specify and ensure 8k alignment: the default start sector of 34 for `EFI` labels is not an 8k aligned value. Use the `partition` subcommand of the Solaris `format` command to change the start sector to 48, or any other 8k aligned value. Note that there are 512B per sector.

The ZFS file system automatically aligns partitions to start on 8k boundaries when a full disk is allocated to ZFS (recommended). If you allocate individual `EFI` partitions to a ZFS pool, ensure the partition is 8k-aligned as discussed above.

For optimal performance of ZFS with the Sun Flash Accelerator F40 PCIe Card, refer to the *ZFS Tuning Guide*.

For highest performance, verify that the following hardware criteria are met:

- The PCI Express slot is PCIe 2.0.

- The PCI Express slot has an active width of 8 or 16.
- The system meets the physical, environmental, and electrical specifications listed in “Card Specifications” on page 6.

The Sun Flash Accelerator F40 PCIe Card functions in x4 and x2 active width slots, but with reduced performance.

Related Information

- “Card Hardware Components” on page 3
- ZFS Tuning Guide:
http://docs.oracle.com/cd/E26502_01/html/E29022/chapterzfs-flash.html
- Wiki:
<https://wikis.oracle.com/display/systemsperformance/Flash+and+SSD+Performance>

▼ Install a New Card

To install a new Sun Flash Accelerator F40 PCIe Card:

- 1. Back up your data, as required, before changing your server configuration.**
- 2. Prepare the card for installation.**
 - See “Preparing the Card for Installation” on page 11.
 - a. Gather the required tools.**
 - See “Required Tools” on page 11.
 - b. Unpack the shipping kit that includes the card.**
 - See “Ship Kit Contents” on page 12.
 - c. Remove the card from the antistatic bag using good good antistatic grounding procedures.**
 - See “ESD Safety Measures” on page 14.
 - d. Carefully inspect the card for damage.**
 - If you notice any damage, contact Oracle support , or your reseller support representative. Go to: <https://support.oracle.com>.
- 3. Prepare the server for service.**
 - Refer to your server’s service manual.
 - a. Remove the server from active operation.**

b. Turn off the server.

Power down the system.

c. Disconnect all power cords from the server power supplies.

Refer to the server service manual.

d. Remove the cover from the chassis.



Caution – Hazardous voltages are present. Disconnect the server from the main power and from any networks before installing the card to avoid electrical shock.

4. Identify a supported and available PCI Express slot in the server.

Refer to the *Sun Flash Accelerator F40 PCIe Card Product Notes*.

Note – Exceeding the maximum number of Sun Flash Accelerator F40 PCIe Cards or placing cards in unsupported slots results in host platform error report and shutdown.

5. Insert the card in the PCI Express slot.

a. Remove the blank bracket panel on the server chassis that aligns with the empty PCI Express slot.

Save the bracket screw, if applicable.

b. Align the card to the PCI Express slot.

c. Press down gently, but firmly, to properly seat the card in the slot.

The following figure shows how to insert the card in a PCI Express slot:

FIGURE: Sun Flash Accelerator F40 PCIe Card Installation

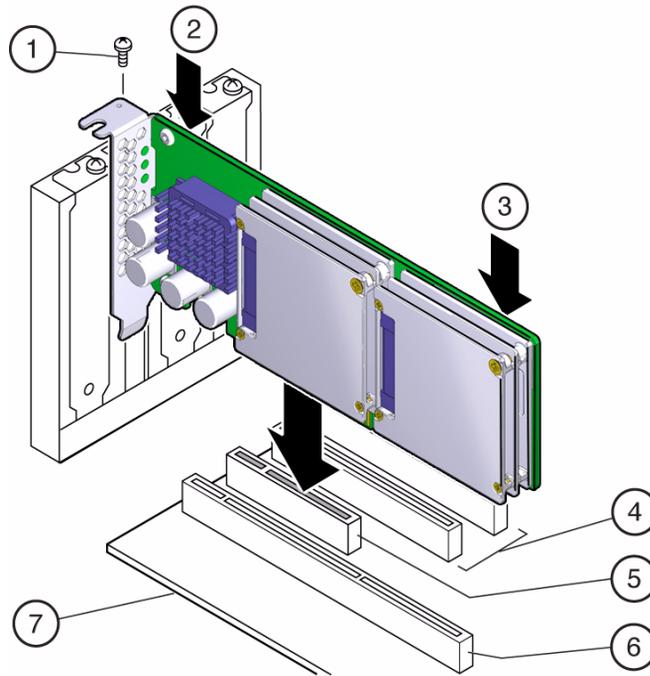


Figure Legend

-
- | | |
|---|--------------------------|
| 1 | Bracket screw |
| 2 | Press here |
| 3 | Press here |
| 4 | 32-bit slot (3.3 V only) |
| 5 | PCI express x8 slot |
| 6 | 64-bit slot (3.3 V only) |
| 7 | Motherboard |
-

Note – Your server chassis may contain a card riser or other configuration. Refer to the servers service manual for card installation instructions.

6. Secure the card bracket to the server chassis.

- Install the bracket screw, as required, to secure the card to the server chassis.
or
- Engage the server retention mechanism to secure the card to the server chassis.

7. Return the server to service.

Refer to your server's service manual.

a. Replace the cover.

b. Reconnect the power cord and any network cables.

c. Power on the system.

The card hardware installation is complete.

8. If applicable, perform any required commands for your system to recognize the new card.

For the Oracle Solaris OS, `reboot` with the reconfiguration option. Refer to your server's administration guide.

9. Verify successful installation of the card through your systems OS.

Upon completed installation, the Sun Flash Accelerator F40 PCIe Card appears on your server. Refer to your server's administration guide.

10. Configure the system to maximize flash technology.

Refer to your server's administration guide.

Related Information

- ["Installation Overview" on page 17](#)

▼ Remove an Existing Card From a Server

For specific PCIe card removal instructions, refer to the system service manual and product notes.

1. Prepare the server for service.

Refer to your server's service manual.

a. Remove the server from active operation.

b. Turn off the server.

Power down the system.

c. Disconnect all power cords from the server power supplies.

Refer to your server's service manual.

d. Remove the cover from the chassis.



Caution – Hazardous voltages are present. Disconnect the server from the main power and from any networks before installing the card to avoid electrical shock.

2. Remove the bracket from the server chassis [1].

Remove the bracket screw.

3. Remove the card from the server chassis [2].

Carefully lift the card out of the PCIe slot to remove the card.



Caution – Hot surface. Avoid contact. Surfaces are hot and might cause personal injury if touched. Hazardous voltages are present.

FIGURE: Sun Flash Accelerator F40 PCIe Card Removal

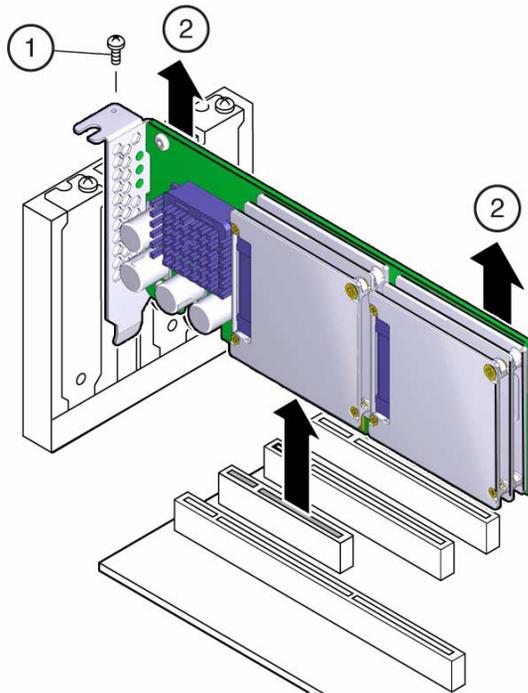


Figure Legend

-
- | | |
|---|---------------|
| 1 | Bracket screw |
| 2 | Lift here |
-

4. Install the new card, as required.

Refer to [“Install a New Card”](#) on page 19.

Related Information

- [“Installation Overview”](#) on page 17

Servicing the Card

The following sections contain service information for the Sun Flash Accelerator F40 PCIe Card.

This section includes the following sections:

- [“Service Overview” on page 25](#)
- [“Update the Card Software” on page 26](#)
- [“Update the Card Firmware” on page 26](#)
- [“Technical Support” on page 28](#)
- [“Servicing the Card Using the ddcli Utility” on page 28](#)
- [“Troubleshooting Using Card LEDs” on page 45](#)

Service Overview

For service, the Sun Flash Accelerator F40 PCIe Card contains updatable flash ROM for storing the BIOS and firmware, and also NVRAM for storing nonvolatile configuration data. Use DDCLI to monitor and service the card. You can also use the MegaRAID Storage Manager (MSM) software utility for troubleshooting.

In addition, you can monitor Sun Flash Accelerator F40 PCIe Card health and flash media life through card bracket LED status indicators. The card has three LEDs on the PCI bracket to indicate activity, drive life, and status. See [“Troubleshooting Using Card LEDs” on page 45](#).

The Sun Flash Accelerator F40 PCIe Card requires no periodic maintenance. For data protection, the Sun Flash Accelerator F40 PCIe Card is designed with energy storage components, such as on-board capacitors, to complete buffered writes to the persistent flash storage in case of a sudden power loss. These energy storage components are designed for the life of the Sun Flash Accelerator F40 PCIe Card and do not require periodic maintenance.

The Sun Flash Accelerator F40 PCIe Card is a complete field-replaceable unit (FRU), with no removeable components. Individual flash disks are not field serviceable, and should never be removed, even though the `ddcli` utility identifies each SSD flash module DFF using unique descriptors.

Related Information

- “Servicing the Card Using the `ddcli` Utility” on page 28
- “Troubleshooting Using Card LEDs” on page 45
- “Sun Flash Accelerator F40 PCIe Card Overview” on page 1

▼ Update the Card Software

Check the *Sun Flash Accelerator F40 PCIe Card Product Notes* for the latest software requirements, available at:

<http://www.oracle.com/pls/topic/lookup?ctx=SunFlashF40>

- Refer to the server documents.

Related Information

- “Servicing the Card Using the `ddcli` Utility” on page 28
- “Update the Card Firmware” on page 26

▼ Update the Card Firmware

Check the *Sun Flash Accelerator F40 PCIe Card Product Notes* for the latest firmware requirements, available at:

<http://www.oracle.com/pls/topic/lookup?ctx=SunFlashF40>

The Sun Flash Accelerator F40 PCIe Card has two sets of firmware. Both firmware sets are updated as a single F40 firmware package using the `ddcli` utility, or MSM:

- NAND flash controller firmware
- SAS controller firmware (host PCIe to SAS controller)

1. **Download and store any firmware updates required to support the Sun Flash Accelerator F40 PCIe Card.**

- a. Go to support.oracle.com.
<https://support.oracle.com>
 - b. Click the "Patches and Updates" tab.
 - c. Click the "Number/Name or Bug Number (Simple)" link under the Search tab.
 - d. Select "Bug Number" from the drop-down menu.
 - e. Enter "16005846".
 - f. Click the Search button.
 - g. The Patch 16005846 download page is displayed.
F40 (AURA 2) SW1.1 Release fw (08.05.01.00) and cli utility update (Patch)
2. Use the `-listall` command to identify the selected Sun Flash Accelerator F40 PCIe Card.
See "List All Command" on page 31
 3. Verify that the firmware package file that is installed in the Sun Flash Accelerator F40 PCIe Card requires updating.
See "Health Reporting Command" on page 36
 4. (Optional) If you are updating only specific cards in the server, use the `-locate` command to identify the logical mapping of the Sun Flash Accelerator F40 PCIe Card.
Skip this step if you are updating all cards in the server with the specified firmware package.
See "Locate Card Command" on page 38
 5. Use the `-updatepkg` command to update the selected Sun Flash Accelerator F40 PCIe Card with the specified firmware package.
See "Update Flash Package Command" on page 35
 6. Verify that the updated firmware package is installed in the Sun Flash Accelerator F40 PCIe Card.
See "Health Reporting Command" on page 36

Related Information

- "Servicing the Card Using the ddcli Utility" on page 28
- "Update the Card Software" on page 26

Technical Support

For assistance installing, configuring, or running the Sun Flash Accelerator F40 PCIe Card, contact My Oracle Support (MOS). Please have your CSI Customer Support ID ready.

Go to My Oracle Support:

<https://support.oracle.com>

Sign in to My Oracle Support to open a service request.

Call Oracle support, using the appropriate number from the Oracle Global Customer Support Contacts Directory:

<http://www.oracle.com/us/support/contact-068555.html>

Servicing the Card Using the `ddcli` Utility

This section includes the following sections:

- “Accessing the `ddcli` Utility” on page 29
- “`ddcli` Utility Command Summary” on page 30
- “List All Command” on page 31
- “List Command” on page 32
- “Update Flash Package Command” on page 35
- “Health Reporting Command” on page 36
- “Locate Card Command” on page 38
- “Format Card Command” on page 39
- “Show the Vital Product Data Command” on page 40
- “Extract SMART Logs Command” on page 42
- “Help Command” on page 44

Accessing the ddcli Utility

The ddcli utility supports both a text menu and a command line interface (CLI) interface to service the Sun Flash Accelerator F40 PCIe Card.

- “Access Text Menu Interface in ddcli Utility” on page 29
- “Access Command Line Interface (CLI) in ddcli Utility” on page 30

Note – The term WarpDrive refers to the Sun Flash Accelerator F40 PCIe Card in the menu and CLI text.

▼ Access Text Menu Interface in ddcli Utility

To access the ddcli utility in text menu mode:

1. **Start the ddcli utility in text menu mode by typing the ddcli command command without any options:** ddcli

The ddcli utility displays the following top-level menu, showing a list of cards in the system. Two Sun Flash Accelerator F40 PCIe Cards are shown in the following example:

ID	WarpDrive	Package Version	PCI Address
--	-----	-----	-----
1	ELP-4x100-4d-n	06.05.10.00	00:02:00:00
2	ELP-4x100-4d-n	06.05.10.00	00:03:00:00

Select the WarpDrive [1-2 or 0:Quit]

2. **Select a Sun Flash Accelerator F40 PCIe Card ID 1 or 2 (ELP).**
3. **After you select one of the cards in the top-level menu, the ddcli utility displays the following menu:**

1.	List WarpDrive Information
2.	Update Flash Package
3.	Display WarpDrive Health
4.	Locate WarpDrive
5.	Format WarpDrive
6.	Show Vital Product Data
7.	Extract SMART Logs

Select Operation [1-7 or 0:Quit]:

4. **Select the operation [1-7 or 0:Quit]:**

Related Information

- [“Access Command Line Interface \(CLI\) in ddcli Utility” on page 30](#)
- [“Update the Card Software” on page 26](#)

▼ Access Command Line Interface (CLI) in ddcli Utility

To access the ddcli utility in CLI mode, type one of the following commands:

- `ddcli -< -c DDID > -< -option arg >`
 - or `ddcli`

Related Information

- [“Access Text Menu Interface in ddcli Utility” on page 29](#)

▼ Verify Card Status

To assess if the Sun Flash Accelerator F40 PCIe Card is ready to be used:

1. Run the ddcli utility.

See [“Access Text Menu Interface in ddcli Utility” on page 29](#).

2. List card information.

- Select 1 in text interface. or:
- Type `ddcli -listall`

See [“List All Command” on page 31](#)

3. Display card health.

- Select 3 in text interface. or:
- Type `ddcli -health`

See [“Health Reporting Command” on page 36](#)

Related Information

- [“ddcli Utility Command Summary” on page 30](#)

ddcli Utility Command Summary

The following table lists all of the user commands supported by the ddcli utility. The sections following the table provide detailed descriptions of each command in the ddcli utility.

Command	Action
-listall	Display information about the cards in the system. You do not need to select card number (-c).
-list	List all information about the selected cards.
-updatepkg	Update card firmware with the flash package.
-health	Display the health of the selected card.
-locate	Locate the selected card in the system.
-format	Format the selected cards.
-showvpd	Show the Vital Product Data.
-getsmartlog	Extract the SMART Logs.
-help	Display help for command line usage. You do not need to select card number (-c).
-c	Card Number. Type the card ID option after the <code>ddcli</code> command to specify a card with an ID number range from 1 to 256.

Related Information

- [“Servicing the Card Using the ddcli Utility” on page 28](#)

List All Command

The `-listall` command identifies all Sun Flash Accelerator F40 PCIe Cards installed in a server.

The following information is displayed with the `-listall` command:

- Card ID number
- Card name
- Card flash package version
- PCI address

Text Menu Interface Usage: The `ddcli` utility lists seven commands. Type 1 to list all installed Sun Flash Accelerator F40 PCIe Cards installed in a server, as shown in the following example:

```
# ddcli

1. List WarpDrive Information
```

```

2.    Update Flash Package
3.    Display WarpDrive Health
4.    Locate WarpDrive
5.    Format WarpDrive
6.    Show Vital Product Data
7.    Extract SMART Logs
Select Operation [1-7 or 0:Quit]: 1

```

Command Line Interface Usage: Enter the following line of text in the CLI to run the `-listall` command: `ddcli -listall`

The `-listall` command runs without any command line parameter. You need not specify the `-c` option on the command line.

Sample Output: When the `-listall` command runs, the `ddcli` utility outputs the following text. Two Sun Flash Accelerator F40 PCIe Cards are shown in the following example:

ID	WarpDrive	Package Version	PCI Address
--	-----	-----	-----
1	ELP-4x100-4d-n	06.05.10.00	00:09:00:00
2	ELP-4x100-4d-n	06.05.10.00	00:05:00:00

Related Information

- [“Verify Card Status” on page 30](#)
- [“ddcli Utility Command Summary” on page 30](#)

List Command

The `-list` command lists the physical device information of a selected Sun Flash Accelerator F40 PCIe Card.

The following Sun Flash Accelerator F40 PCIe Card information is displayed with the `-list` command.

- Sun Flash Accelerator F40 PCIe Card ID
- PCI address
- SAS address
- Card flash package version
- RAID support

Text Menu Interface Usage: The following top-level menu lists the cards in the system and prompts you to select a card on which to perform an operation. Two Sun Flash Accelerator F40 PCIe Cards are shown in the following example:

```
# ddcli

ID      WarpDrive      Package Version      PCI Address
--      -
1       ELP-4x100-4d-n   06.05.10.00         00:02:00:00
2       ELP-4x100-4d-n   06.05.10.00         00:03:00:00
Select the WarpDrive [1-2 or 0:Quit]: 1
1.      List WarpDrive Information
2.      Update Flash Package
3.      Display WarpDrive Health
4.      Locate WarpDrive
5.      Format WarpDrive
6.      Show Vital Product Data
7.      Extract SMART Logs
Select Operation [1-7 or 0:Quit]: 1
```

Command Line Interface Usage: In CLI mode, select a Sun Flash Accelerator F40 PCIe Card by including its card number (adapter index). Enter the following line of text in the CLI to run the -list command: `ddcli -c 1 -list`

Sample Output: When the -list command runs, the ddcli utility outputs the following text:

```
# ddcli -c 1 -list

*****
LSI Corporation WarpDrive Management Utility
Version 107.00.00.04 (2012.06.05)
Copyright (c) 2011 LSI Corporation. All Rights Reserved.
*****

WarpDrive Selected is ELP-4x100-4d-n
-----
WarpDrive Information
-----
WarpDrive ID           : 1
PCI Address            : 00:05:00:00
SAS Address            : 500605B 0047A4990
Package Version        : 06.05.10.00
RAID Support           : NO
-----

Physical Device Information
-----
```

```
Device is a Solid State Drive
SSD Slot #           : 4
Cage                 : 1
Location             : Upper
Capacity (in bytes) : 100030242304
Manufacturer ID      : 516
Model Number         : 3E128-TS2-550B00
Serial Number        : 5L0010RY
Firmware Revision    : PRO6TI35
Link Rate            : 6.0
```

```
Device is a Solid State Drive
SSD Slot #           : 5
Cage                 : 1
Location             : Lower
Capacity (in bytes) : 100030242304
Manufacturer ID      : 516
Model Number         : 3E128-TS2-550B00
Serial Number        : 5L0010RY
Firmware Revision    : PRO6TI35
Link Rate            : 6.0
```

```
Device is a Solid State Drive
SSD Slot #           : 6
Cage                 : 2
Location             : Upper
Capacity (in bytes) : 100030242304
Manufacturer ID      : 516
Model Number         : 3E128-TS2-550B00
Serial Number        : 5L0010RY
Firmware Revision    : PRO6TI35
Link Rate            : 6.0
```

```
Device is a Solid State Drive
SSD Slot #           : 7
Cage                 : 2
Location             : Lower
Capacity (in bytes) : 100030242304
Manufacturer ID      : 516
Model Number         : 3E128-TS2-550B00
Serial Number        : 5L0010RY
Firmware Revision    : PRO6TI35
Link Rate            : 6.0
```

Related Information

- “ddcli Utility Command Summary” on page 30

Update Flash Package Command

The `-updatepkg` command updates Sun Flash Accelerator F40 PCIe Cards with the specified firmware package file. You select a card by typing the card ID, or all cards in the server are updated if you do not select any card ID using the command line interface or text interface.

This command supports the upgrade of only the firmware package. If the current firmware package version on the selected card is higher than the specified firmware package version, the command returns an error.

Text Menu Interface Usage: The following top-level menu lists the cards in the system and prompts you to select a card on which to perform an operation. Two Sun Flash Accelerator F40 PCIe Cards are shown in the following example:

```
# ddcli

ID      WarpDrive      Package Version  PCI Address
--      -
1       ELP-4x100-4d-n  06.05.10.00     00:02:00:00
2       ELP-4x100-4d-n  06.05.10.00     00:03:00:00
Select the WarpDrive [1-2 or 0:Quit]: 1
1.     List WarpDrive Information
2.     Update Flash Package
3.     Display WarpDrive Health
4.     Locate WarpDrive
5.     Format WarpDrive
6.     Show Vital Product Data
7.     Extract SMART Logs
Select Operation [1-7 or 0:Quit]: 2
Enter Flash Package File:
/home/user/ELP-4x100-4d-n_06.05.10.00.bin
```

Command Line Interface Usage: Enter the following line of text in the CLI to run the `-updatepkg` command: `ddcli -c 1 -updatepkg SLP-300_01.02.00.00.bin`

`ddcli -c <card number> -updatepkg <flash package file>`

Error Handling: The following statements are true with regard to error handling:

- If a controller firmware update fails, the `-updatepkg` command terminates.
- If a firmware download fails on any of the card components, the process terminates.

Related Information

- “Update the Card Firmware” on page 26
- “Exception Handling” on page 47
- “ddcli Utility Command Summary” on page 30

Health Reporting Command

The `-health` command shows the overall health status of a selected card and its components. If any alert exists, this command shows the component that is causing the alert, along with further information. Use the `-health` command to verify firmware versions before and after firmware updates.

Text Menu Interface Usage: The following top-level menu lists the cards in the system and prompts you to select a card on which to perform an operation. Two Sun Flash Accelerator F40 PCIe Cards are shown in the following example:

```
# ddcli

ID      WarpDrive      Package Version      PCI Address
--      -
1       ELP-4x100-4d-n  06.05.10.00          00:02:00:00
2       ELP-4x100-4d-n  06.05.10.00          00:03:00:00
Select the WarpDrive [1-2 or 0:Quit]: 1
1.      List WarpDrive Information
2.      Update Flash Package
3.      Display WarpDrive Health
4.      Locate WarpDrive
5.      Format WarpDrive
6.      Show Vital Product Data
7.      Extract SMART Logs
Select Operation [1-7 or 0:Quit]: 3
```

Command Line Interface Usage: Enter the following line of text in the CLI to run the `-health` command: `ddcli -c 1 -health`

Sample Output: When the `-health` command runs, the `ddcli` utility outputs the following text.

```
# ddcli -health
*****
LSI Corporation WarpDrive Management Utility
Version 107.00.00.04 (2012.06.05)
Copyright (c) 2011 LSI Corporation. All Rights Reserved.
```

```

*****
-----
WarpDrive ELP-4x100-4d-n Health
-----

-----
SSD Drive SMART Data SSD Slot #: 4 Cage : 1 Location : Upper
-----
Warranty Remaining                               : 100 %
Temperature                                       : 38 degree C
-----

-----
SSD Drive SMART Data SSD Slot #: 5 Cage : 1 Location : Lower
-----
Warranty Remaining                               : 100 %
Temperature                                       : 39 degree C
-----

-----
SSD Drive SMART Data SSD Slot #: 6 Cage : 2 Location : Upper
-----
Warranty Remaining                               : 100 %
Temperature                                       : 41 degree C
-----

-----
SSD Drive SMART Data SSD Slot #: 7 Cage : 2 Location : Lower
-----
Warranty Remaining                               : 100 %
Temperature                                       : 41 degree C

Overall Health                                   : GOOD

```

The definitions are:

Item	Definition
SSD Slot	PCIe slot number in server. Logical disk number assigned as cards are discovered. For example: 0-3 for card ID 1, 4-7 for card ID 2. Refer to the <i>Sun Flash Accelerator F40 PCIe Card Product Notes</i> for supported slots.
Cage	Flash stack 1 or 2 on the card.
Location	Upper or lower position in the flash stack.

Related Information

- [“Verify Card Status” on page 30](#)
- [“ddcli Utility Command Summary” on page 30](#)

Locate Card Command

The `-locate` command initiates blinking on the Status LED of the selected Sun Flash Accelerator F40 PCIe Card. Use this command to locate a selected card in a rack of servers. The Status LED turns off after 60 seconds.

Text Menu Interface Usage: The following top-level menu lists the cards in the system and prompts you to select a card on which to perform an operation. Two Sun Flash Accelerator F40 PCIe Cards are shown in the following example:

```
# ddcli

ID      WarpDrive      Package Version      PCI Address
--      -
1       ELP-4x100-4d-n  06.05.10.00         00:09:00:00
2       ELP-4x100-4d-n  06.05.10.00         00:05:00:00
Select the WarpDrive [1-2 or 0:Quit]: 1
1.      List WarpDrive Information
2.      Update Flash Package
3.      Display WarpDrive Health
4.      Locate WarpDrive
5.      Format WarpDrive
6.      Show Vital Product Data
7.      Extract SMART Logs
Select Operation [1-7 or 0:Quit]: 4
Enter Operation [1:on]:
```

Command Line Interface Usage: Enter the following line of text in the CLI to run the `-locate` command: `ddcli -c 1 -locate on`

Related Information

- [“ddcli Utility Command Summary” on page 30](#)
- [“Troubleshooting Using Card LEDs” on page 45](#)

Format Card Command

The `-format` command erases all of the data on the selected Sun Flash Accelerator F40 PCIe Card.



Caution – Data Loss. Use the `-format` command with caution, because it erases all of the data on the card. Create a backup of all data before running this command.

Note – Do not use this command unless directed by service personnel.

Text Menu Interface Usage: The following top-level menu lists the cards in the system and prompts you to select a card on which to perform an operation. Two Sun Flash Accelerator F40 PCIe Cards are shown in the following example:

```
# ddcli
*****
LSI Corporation WarpDrive Management Utility
Version 107.00.00.04 (2012.06.05)
Copyright (c) 2011 LSI Corporation. All Rights Reserved.
*****

ID      WarpDrive      Package Version      PCI Address
--      -
1      ELP-4x100-4d-n  06.05.10.00          00:09:00:00
2      ELP-4x100-4d-n  06.05.10.00          00:05:00:00
Select the WarpDrive [1-2 or 0:Quit]: 1
1.      List WarpDrive Information
2.      Update Flash Package
3.      Display WarpDrive Health
4.      Locate WarpDrive
5.      Format WarpDrive
6.      Show Vital Product Data
7.      Extract SMART Logs
Select Operation [1-7 or 0:Quit]: 5

Enter whether to format single or all SSDs[1:Single 2:All or
0:Quit] 2

Perform Over-provisioning? (Yes/No): No

WARNING: Formatting will result in loss of all data on the selected
WarpDrive device.
Type YES if you would like to continue, or any other key to abort
the request: yes
```

```
LSI WarpDrive Management Utility: Please wait. Format of WarpDrive
is in progress.....
LSI WarpDrive Management Utility: WarpDrive format successfully
completed.
```

```
Select the WarpDrive [1-2 or 0:Quit]: 1
1. List WarpDrive Information
2. Update Flash Package
3. Display WarpDrive Health
4. Locate WarpDrive
5. Format WarpDrive
6. Show Vital Product Data
7. Extract SMART Logs
Select Operation [1-7 or 0:Quit]: 1
```

Command Line Interface Usage: Enter either of the following lines of text in the CLI to run the `-format` command: `ddcli -c 1 -format` or `dccli -c 1 -format -s`

The `-s` option for the `-format` command activates silent mode. In silent mode, the `ddcli` utility does not require confirmation before running the `-format` command.

If the `-s` option is not specified, the `ddcli` utility prompts you for confirmation before running the command.

Related Information

- [“ddcli Utility Command Summary” on page 30](#)

Show the Vital Product Data Command

The `-showvpd` command displays the VPD information on the selected Sun Flash Accelerator F40 PCIe Card.

The VPD (Vital Product Data) definitions are:

Item	Definition
Product Name	Full description of the card
PN	Part Number
EC	ECO or Revision level
SN	Serial Number

Item	Definition
VA	FRU shortname

Text Menu Interface Usage: The following top-level menu lists the cards in the system and prompts you to select a card on which to perform an operation. Two Sun Flash Accelerator F40 PCIe Cards are shown in the following example:

```
# ddcli
ID      WarpDrive      Package Version      PCI Address
--      -
1       ELP-4x100-4d-n     06.05.10.00         00:09:00:00
2       ELP-4x100-4d-n     06.05.10.00         00:05:00:00
Select the WarpDrive [1-2 or 0:Quit]: 1
1.      List WarpDrive Information
2.      Update Flash Package
3.      Display WarpDrive Health
4.      Locate WarpDrive
5.      Format WarpDrive
6.      Show Vital Product Data
7.      Extract SMART Logs
Select Operation [1-7 or 0:Quit]: 6
```

Command Line Interface Usage:

Enter the following line of text in the CLI to run the `-showvdp` command: `ddcli -c 1 -showvdp`.

Sample Output: When the `-showvdp` command runs, the `ddcli` utility outputs the following text.

```
# ddcli -showvdp
-----
VPD Information
-----
Product Name      : Sun Flash Accelerator F40 PCIe 2.0 Low Profile
Adapter
PN                : 7026993
EC                : L3-25487-02B
SN                : 464168P+1224002406
VA                : Flash HBA
VB                : 0000
V1                : LSI Corporation
V2                : 1000
V3                : 007E
V4                : 108E
V5                : 0581
```

```

V6          : 17.6W
V7          : 5.8W
V8          : 0.1W
MN          : 10080
RV          : 0x87
V1          : SP22429978
V3          : 00
V4          : A3
V6          : V6
V7          : P
-----

```

Related Information

- [“ddcli Utility Command Summary” on page 30](#)

Extract SMART Logs Command

Note – Do not use this command unless directed by service personnel.

The `-getsmartlog` command extracts SMART logs for the selected Sun Flash Accelerator F40 PCIe Card. Use the `-getsmartlog` command when requested to assist Oracle support in debugging and resolution. This command extracts two specific files for each single card or all cards in the server if the `-slot` option is not used. The following files are extracted:

- `SSDEventLog<_slot_cage_location_configid_serialnumber_timestamp>.bin`
- `SystemEventLog<_slot_cage_location_configid_serialnumber_timestamp>.bin`

Text Menu Interface Usage: The following top-level menu lists the cards in the system and prompts you to select a card on which to perform an operation. Two Sun Flash Accelerator F40 PCIe Cards are shown in the following example:

```

# ddcli
*****
LSI Corporation WarpDrive Management Utility
Version 107.00.00.04 (2012.06.05)
Copyright (c) 2011 LSI Corporation. All Rights Reserved.
*****

ID      WarpDrive      Package Version      PCI Address
--      -
1       ELP-4x100-4d-n    06.05.10.00          00:09:00:00
2       ELP-4x100-4d-n    06.05.10.00          00:05:00:00

```

```
Select the WarpDrive [1-2 or 0:Quit]: 1

1.    List WarpDrive Information
2.    Update Flash Package
3.    Display WarpDrive Health
4.    Locate WarpDrive
5.    Format WarpDrive
6.    Show Vital Product Data
7.    Extract SMART Logs

Select Operation [1-7 or 0:Quit]: 7

Get Log for single or all SSDs[ Enter 1:All or 0:Single]: 1
Enter Log File Path: /root
Successfully collected SSD Event Logs for Cage = 01 Location =
Upper
Successfully collected System Event Logs for Cage = 01 Location =
Upper
Successfully collected SSD Event Logs for Cage = 01 Location =
Lower
Successfully collected System Event Logs for Cage = 01 Location =
Lower
Successfully collected SSD Event Logs for Cage = 02 Location =
Upper
Successfully collected System Event Logs for Cage = 02 Location =
Upper
Successfully collected SSD Event Logs for Cage = 02 Location =
Lower
Successfully collected System Event Logs for Cage = 02 Location =
Lower

1.    List WarpDrive Information
2.    Update Flash Package
3.    Display WarpDrive Health
4.    Locate WarpDrive
5.    Format WarpDrive
6.    Show Vital Product Data
7.    Extract SMART Logs

Select Operation [1-7 or 0:Quit]: 7
```

Command Line Interface Usage: Enter the following line of text in the CLI to run the -getsmartlog command: `ddcli -c 1 -getsmartlog -slot 2 -path /root`

Related Information

- [“ddcli Utility Command Summary” on page 30](#)

Help Command

The `-help` command displays help for command line usage.

Sample Output: When the `-help` command runs, the `ddcli` utility outputs the following text.

```
# ddcli -help
*****
LSI Corporation WarpDrive Management Utility
Version 107.00.00.04 (2012.06.05)
Copyright (c) 2011 LSI Corporation. All Rights Reserved.
*****

ddcli <-c controller#> [command] [parameters]

<controller #> : Number between 1 and 256

<command> is:
-listall          - Display information about WarpDrive(s) in the
system (does not need controller number)
-list             - Lists information about the selected WarpDrive
-updatepkg       - Updates WarpDrive flash package
-health          - Display the health of selected WarpDrive
-locate          - Locate selected WarpDrive in the system
-format          - Format selected WarpDrive
-showvpd         - Show Vital Product Data
-getsmartlog     - Extract SMART Logs
-help            - Display help(does not need controller number)

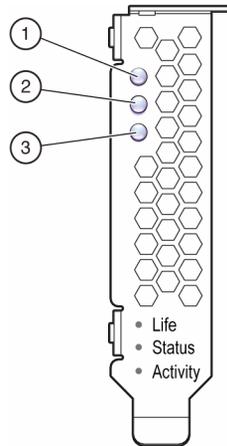
<parameters> are:
Command specific values
```

Related Information

- [“ddcli Utility Command Summary” on page 30](#)

Troubleshooting Using Card LEDs

Use the Sun Flash Accelerator F40 PCIe Card LED indicators to determine the status of the card. The Life, Status, and Activity LEDs, shown in the following image, provide key status indicators to diagnose card issues.



The following table describes troubleshooting using the LED status indicators:

LED	Color	Description
Life (1)	Green	On, steady: Card has sufficient life remaining for programming and erasing the flash memory. No action required.
	Yellow	On, steady: Card has approximately 10%, or less, of life remaining for programming and erasing the flash memory. Plan for replacements.
	Red	On, steady: Card has 0% programming and erasing cycles remaining. Backup data and copy data to a new card immediately.
Status (2)	Green	On, steady: Normal.
		On, blinking: Locate A user can locate a specific card in a rack of servers. Using the <code>-locate</code> command causes this LED to blink.

LED	Color	Description
	Yellow	<p>On, steady: Warning. A warning is caused by the following:</p> <ul style="list-style-type: none"> At least one flash drive reporting a high temperature warning.. Other component issues: Run the <code>-list</code> and <code>-health</code> commands in the <code>ddcli</code> utility to determine which component has an issue.
	Red	<p>On, blinking: Firmware fault code:</p> <ul style="list-style-type: none"> Run the <code>ddcli</code> utility to determine which component has an issue. If no information appears, reboot the system and retry. If no information appears, contact your Oracle support engineer. <p>On, steady: One of the following conditions applies:</p> <ul style="list-style-type: none"> One or more of the SSDs has failed. At least one of the SSDs has reported critical temperature. Backup power rail monitor failure detected. Other component issues: Run the <code>-list</code> and <code>-health</code> commands in the <code>ddcli</code> utility to determine which component has an issue. <p>Caution - If the critical temperature warning persists, you can damage your card. Increase cooling or shut down your system to prevent damage.</p>
Activity (3)	Green	<p>On, blinking: Indicates data activity on the card. No action required.</p>

Related Information

- [“Verify Card Status” on page 30](#)
- [“Card LEDs” on page 5](#)

Error Messages

The following sections contain service information for the Sun Flash Accelerator F40 PCIe Card.

This section includes:

- [“Exception Handling” on page 47](#)
- [“Firmware Exception Error Messages” on page 48](#)
- [“Reason Codes” on page 49](#)

Exception Handling

The following table lists all of the input validation errors for the Sun Flash Accelerator F40 PCIe Card `ddcli` utility.

Message

LSI WarpDrive Management Utility: Invalid command format specified on the command line.

LSI WarpDrive Management Utility: Invalid argument: %s.

LSI WarpDrive Management Utility: Incorrect number of command line parameters.

LSI WarpDrive Management Utility: File doesn't exists or not a regular file. Name

LSI WarpDrive Management Utility: No controllers found.

LSI WarpDrive Management Utility: Failed getting controller information.

LSI WarpDrive Management Utility: Insufficient memory.

LSI WarpDrive Management Utility: Feature not supported in this release.

LSI WarpDrive Management Utility: Execution completed successfully.

LSI WarpDrive Management Utility: Error executing command %s.

LSI WarpDrive Management Utility: Command terminated %s.

LSI WarpDrive Management Utility: Format failed for Cage=%d Location=%s component.

LSI WarpDrive Management Utility: Only %d out of %d components found.

LSI WarpDrive Management Utility: WarpDrive is not in a proper state.

LSI WarpDrive Management Utility: Preparing WarpDrive for format.

LSI WarpDrive Management Utility: Couldn't prepare WarpDrive for format.

LSI WarpDrive Management Utility: Please wait. Format of WarpDrive is in progress.

LSI WarpDrive Management Utility: Format failed for component at "Cage=%d Location=%s".

LSI WarpDrive Management Utility: WarpDrive could not be brought in usable state.

LSI WarpDrive Management Utility: WarpDrive format successfully completed.

LSI WarpDrive Management Utility: Invalid package signature.

LSI WarpDrive Management Utility: Checksum error.

LSI WarpDrive Management Utility: Package type not supported. Type: 0x%x

LSI WarpDrive Management Utility: Invalid file size.

LSI WarpDrive Management Utility: Package does not contain required image.

LSI WarpDrive Management Utility: Package type does not match controller.

Message

LSI WarpDrive Management Utility: Failed to get current package version from Aura2.

LSI WarpDrive Management Utility: Cannot downgrade package version xx.xx.xx.xx to xx.xx.xx.xx.

LSI WarpDrive Management Utility: Failed to Flash image. Type: 0x%x

LSI WarpDrive Management Utility: Flash upgrade not allowed for component at "Cage: %d, Location: %s".

LSI WarpDrive Management Utility: Failed to update component at "Cage: %d, Location: %s".

Related Information

- [“ddcli Utility Command Summary” on page 30](#)

Firmware Exception Error Messages

The following table lists the firmware error messages for the Sun Flash Accelerator F40 PCIe Card ddcli utility.

Message

SSD is being throttled Slot Number <slot#> (Cage <cake#> Location <upper or lower>) Throttle <level>

SSD throttling is now removed Slot Number <slot#> (Cage <cake#> Location <upper or lower>) Throttle <level>"

SSD Life is at warning level Slot Number <slot#> (Cage <cake#> Location <upper or lower>) Drive Life <current life> Warning Level <warning threshold> Error Level <critical threshold>

SSD Life is exhausted Slot Number <slot#> (Cage <cake#> Location <upper or lower>) Drive Life <current life> Warning Level <warning threshold> Error Level <critical threshold>

Critical Error: Backup Rail Monitor has failed on warpdrive. Check warpdrive documentation for additional details (Note: Contact Oracle Support.)

Temperature <current temp> on sensor <sensor#> has exceeded warning temperature threshold <warning threshold>

Temperature <current temp> on sensor <sensor#> has exceeded critical temperature threshold <critical threshold>

Percent Power Throttled <throttle%> PCI Slot Available Power <max slot power>

```

Power throttling is now removed Percent Power Throttled 100%
PCI Slot Available Power <max slot power>
Temperature <current temp> on slot <slot#> has exceeded
warning temperature threshold <warning threshold>
Temperature <current temp> on slot <slot#> has exceeded
critical temperature threshold <critical threshold>
Temperature <current temp> on slot <slot#> has exceeded
critical temperature threshold <critical threshold>
LSI WarpDrive Management Utility: Format failed for Cage=%d
Location=%s component.
Diagnostic trigger fired

```

Related Information

- “ddcli Utility Command Summary” on page 30

Reason Codes

The following table lists the Reason Codes for the Sun Flash Accelerator F40 PCIe Card ddcli utility.

Health Reason Code	Description
0	Backup rail monitor failure
1	Could not determine backup rail monitor status
2	Reserved for RAID solutions
3	Reserved for RAID solutions
4	Reserved for RAID solutions
5	Volume missing
6	Volume status not available
7	Device(s) missing
8	Too many devices present
9	Device locked
10	LifeLeft critical threshold exceeded
11	Critical temperature threshold exceeded

Related Information

- [“ddcli Utility Command Summary” on page 30](#)

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