Oracle® Flash Accelerator F320 PCIe Card and Oracle 3.2 TB NVMe SSD Product Notes Release 1.3

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Using This Documentation

- **Overview** – Provides late-breaking information about the Oracle Flash Accelerator F320 PCIe Card and Oracle 3.2 TB NVMe SSD.
- **Audience** – Technicians, system administrators, authorized service providers, and users.
- **Required knowledge** – Experience with servers and advanced understanding of server storage systems.

Product Documentation Library

Documentation and resources for this product and related products are available at `http://www.oracle.com/goto/oracleflashf320/docs`.

Feedback

Provide feedback about this documentation at `http://www.oracle.com/goto/docfeedback`.

Oracle 3.2 TB NVMe SSD Product Notes

This document contains late-breaking information about the Oracle 3.2 TB NVMe SSD. Read this document before reading other Oracle 3.2 TB NVMe SSD documentation.

For specific installation instructions, see your server documentation. For late-breaking information about the installation and use of the Oracle 3.2 TB NVMe SSD with your server, see the most recent version of the server product notes.
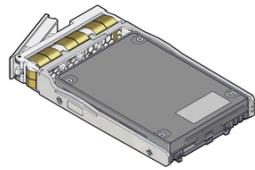
These topics are included in this section.

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Review the software and firmware supported for the Oracle 3.2 TB NVMe SSD.	"Supported Hardware and Software" on page 9
Review important information for configuring the Oracle 3.2 TB NVMe SSD.	"Implementation Considerations" on page 16
Check known issues.	"Known Issues" on page 29

Supported Hardware and Software

The following sections describe the software and firmware supported for the Oracle 3.2 TB NVMe SSD.

- "Supported Servers and Operating Systems" on page 10
- "Minimum Supported Oracle 3.2 TB NVMe SSD Firmware Version" on page 12

- ■ "Required Host Software" on page 14
- ■ "Keeping Drivers and Firmware Up To Date" on page 15

Supported Servers and Operating Systems

This section lists the servers that support the Oracle 3.2 TB NVMe SSD. For detailed information about using this storage drive with your server, see the product notes for your server, available at:

https://docs.oracle.com

The following servers are supported for the Oracle 3.2 TB NVMe SSD:

x86 Servers	Number of 3.2 TB NVMe SSDs	Slots Supported for Installing 3.2 TB NVMe SSD	Minimum Supported Operating Systems
Oracle Server X6-2	1 to 4	2, 3, 4, 5 Slots labeled NVMe0, NVMe1, NVMe2, NVMe3	■ Oracle Solaris 11.3 (SRU 2) ■ Oracle Linux 6.7, based on UEK4 (Unbreakable Linux Kernel Release 4) ■ Oracle Linux 7.2, based on UEK4 (Unbreakable Linux Kernel Release 4)
Oracle Server X6-2L			■ Oracle Solaris 11.3 (SRU 2)
8 drive:	1 to 4	2, 3, 4, 5	■ Oracle Linux 6.7, based on UEK4 (Unbreakable Linux Kernel Release 4)
24 drive:	1 to 4	3, 4, 19, 20 Slots labeled NVMe0, NVMe1, NVMe2, NVMe3	■ Oracle Linux 7.2, based on UEK4 (Unbreakable Linux Kernel Release 4) **Note -** Oracle Server X6-2L with 3.5-inch 12 drive configuration does not support Oracle 3.2 TB NVMe SSD operation.
Oracle Server X5-4	1 to 4	2, 3, 4, 5 Slots labeled NVMe0, NVMe1, NVMe2, NVMe3	■ Oracle Solaris 11.3 (SRU 10) ■ Oracle Linux 6.7, based on UEK3 (Unbreakable Linux Kernel Release 3) **Note -** Do not install Oracle 3.2 TB NVMe SSDs in the same server with Oracle Flash Accelerator F320 PCIe Cards. **Note -** Oracle Server X5-4 with pre-installed Oracle VM does not support Oracle 3.2 TB NVMe SSD operation.

SPARC Servers	Number of 3.2 TB NVMe SSDs	Slots Supported for Installing 3.2 TB NVMe SSD	Minimum Supported Operating Systems
SPARC S7-2 Server	1 to 4	2, 3, 4, 5	Oracle Solaris 11.3 (SRU 10)

SPARC Servers	Number of 3.2 TB NVMe SSDs	Slots Supported for Installing 3.2 TB NVMe SSD	Minimum Supported Operating Systems
		Slots labeled NVMe0, NVMe1, NVMe2, NVMe3	
SPARC S7-2L Server			Oracle Solaris 11.3 (SRU 10) **Note -** SPARC S7-2L with 3.5-inch 12 drive configuration does not support Oracle 3.2 TB NVMe SSD operation.
8 drive:	1 to 4	2, 3, 4, 5	
		Slots labeled NVMe0, NVMe1, NVMe2, NVMe3	
12 drive:	1 to 12		
		1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	
		Slots labeled NVMe0, NVMe1, NVMe2, NVMe3 NVMe4, NVMe5, NVMe6, NVMe7, NVMe8, NVMe9, NVMe10, NVMe11	
24 drive:	1 to 4		
		3, 4, 19, 20	
		Slots labeled NVMe0, NVMe1, NVMe2, NVMe3	
SPARC T7-1 Server	1 to 4	2, 3, 4, 5	Oracle Solaris 11.3 (SRU 10)
		Slots labeled NVMe0, NVMe1, NVMe2, NVMe3	
SPARC T7-2 Server	1 to 4	2, 3, 4, 5	Oracle Solaris 11.3 (SRU 10)
		Slots labeled NVMe0, NVMe1, NVMe2, NVMe3	
SPARC T7-4 Server	1 to 8	0, 1, 2, 3, 4, 5, 6, 7	Oracle Solaris 11.3 (SRU 10)
4 drive:	1 Oracle PCIe Switch Card	Slots labeled NVMe0, NVMe1, NVMe2, NVMe3 NVMe4, NVMe5, NVMe6, NVMe7	
8 drive:	2 Oracle PCIe Switch Cards		

Other servers and processors might be added to this list in the future, if they qualify. Check your server product notes for confirmation that your server has subsequently been qualified.

Refer to your servers product notes for up-to date information on supported servers, operating systems, and required patchsets.

⚠️ **Caution -** Any unsupported configuration causes the host to power off as soon as it is powered on. A fault is generated on the service processor when an unsupported configuration is detected. The fault clears after the unsupported configuration is fixed and the host is powered on.

Note - Slots that can contain either SAS HDD or NVMe storage drives have labels with both HDD and NVMe identification marks on the server panel.

Note - NVMe SSDs are only supported if the system is ordered with the NVMe factory option that includes the Oracle PCIe Switch Card and NVMe custom cable assembly.

Minimum Supported Oracle 3.2 TB NVMe SSD Firmware Version

The Oracle 3.2 TB NVMe SSD runs with the minimum required firmware package listed below:

Drive Firmware	Minimum Required Firmware Version	Recommended Firmware Version
Oracle 3.2TB NVME (F320 AIC/3.2TB SSD) Package	23057919 3.2TB NVME (F320 AIC/3. 2TB SSD) SW 1.0.0 - FIRMWARE KPYA8R3Q	26758830 3.2TB NVME (F320 AIC/3.2TB SSD) SW 1.3. - FIRMWARE KPYAIR3Q

Summary of Changes in SW 1.3 Firmware KPYAIR3Q Release

The following improvements and changes are included in SW 1.3 firmware KPYAIR3Q release of the Oracle 3.2 TB NVMe SSD:

- For known issues, see "Known Issues" on page 55.
- Issues fixed in KPYAIR3Q (BugId's fixed with this firmware update are listed below.)
    - CR 23331860: Early life customer failure with controller device not ready, aborted I/O
    - CR 25659092: Early life customer failure with controller device not ready, aborted I/O, with CS3.3.1
    - CR 25138105: Flash I/O abort and recovery, but cell failed for poor performance
    - CR 25415323: F320 CS2.9 - Device not ready; aborting reset - reboot did not recover

- Randomized Seed Table Corruption
- Command pending issue when chunk size is larger than MDTS.
- Wrong drive status when format is rejected by reset.
- Format command pending when multiple format came during IO command.
- Do not check open failure when FW is activated by Controller Reset.

- CR 23331860: Early life customer failure with controller device not ready, aborted I/O
- CR 25659092: Early life customer failure with controller device not ready, aborted I/O, with CS3.3.1
- CR 25138105: Flash I/O abort and recovery, but cell failed for poor performance
- CR 25415323: F320 Device not ready; aborting reset - reboot did not recover
- Randomized Seed Table Corruption
- Command pending issue when chunk size is larger than MDTS.
- Wrong drive status when format is rejected by reset.
- Format command pending when multiple format came during IO command.
- Do not check open failure when FW is activated by Controller Reset.
- CR 25993898: CS3.3.1 data corruption
- CR 22869779: Namespace not Ready on Get Log SMART/Health Page during Power Cycle
- Enhancement: Device Recovery Failure Protocol (with Hardware Reset)
- There have been many fixes in this latest firmware release in order to increase quality and stability of the F320 PCIe Card and 3.2 TB NVMe SSD. For a list of fixed issues, refer to the readme. Recommend users update to the new firmware as soon as possible.
- The SW1.3, KPYAIR3Q.bin, package includes the firmware file and associated metadata. xml files that automate the update process. Once the device has been upgraded, you cannot down grade to an earlier firmware. It is locked to protect the device from regressing to known issues.

Note - Reformat the drive after the firmware update. Recommend to wipe the user data where feasible with the update because drives with already corrupted metadata that may be slowly failing under CS3.3.1 are remediated by the format and update, and would otherwise fail more quickly on update to CS3.6.

Summary of Changes in SW 1.2 Firmware KPYAGR3Q Release

The following improvements and changes are included in SW 1.2 firmware KPYAGR3Q release of the Oracle 3.2 TB NVMe SSD:

- For known issues, see "Known Issues" on page 55.
    - Issues 23307921 and 23537941 – Enhancement of NVMe Driver NVMe Device Handling to Prevent I/O Timeouts
    - Issue 24305796 – `nvmeadm getlog -s` Command Initiates Panic on SPARC M7 Series Servers

Summary of Changes in SW 1.0.1 Firmware KPYA8R3Q Release

The following improvements and changes are included in SW 1.0.1 firmware CS2.9 KPYA8R3Q release of the Oracle 3.2 TB NVMe SSD:

- The CS2.9_KPYABR3Q firmware version additionally supports SPARC S7 series servers, SPARC T7 series servers, and SPARC M7 series servers.
- The CS2.6 KPYA8R3Q firmware version supports Oracle Server X6-2, Oracle Server X6-2L, Oracle Server X5-4, and Oracle Server X5-8.
- For known issues, see *BugId's fixed with this firmware update* listed below and "Known Issues" on page 55.
    - Issue 22893868 - Enhancement of backend RAID recovery to avoid timeouts
    - Issue 23100303 - Performance improvements
- If you install the Oracle 3.2 TB NVMe SSD as an x-option on a SPARC system, you must update the firmware from CS2.6 to CS2.9, or a subsequent release if available. Servers ordered with this option already have the updated firmware.

Required Host Software

The Oracle 3.2 TB NVMe SSD runs with the minimum required host software listed below:

x86 Driver	Minimum Required Host Firmware Version With Patches	Recommended System Software Version (Patch No.)
Oracle Server X6-2	23035608 Oracle Server X6-2 SW 1.0.0 - FIRMWARE PACK	23119515 Oracle Server X6-2 SW 1.0.1 - FIRMWARE PACK
Oracle Server X6-2L	23035619 Oracle Server X6-2L SW 1.0.0 - FIRMWARE PACK	23119529 Oracle Server X6-2L SW 1.0.1 - FIRMWARE PACK
Oracle Server X5-4	Oracle Server X5-4 SW 1.1.1 Firmware Pack - Patch number 24297965	Oracle Server X5-4 SW 1.1.1 Firmware Pack - Patch number 24297965

SPARC Driver	Minimum Required Host Firmware Version With Patches	Recommended System Software Version (Patch No.)
SPARC S7-2 Server	S7-2 Sun System Firmware 9.7.2c - Patch number 23632951	S7-2 Sun System Firmware 9.7.2c - Patch number 23632951
SPARC S7-2L Server	S7-2 Sun System Firmware 9.7.2c - Patch number 23632952	S7-2 Sun System Firmware 9.7.2c - Patch number 23632952
SPARC T7-1 Server	T7-1 Sun System Firmware 9.7.1.c - Patch number 23291631	T7-1 Sun System Firmware 9.7.1c - Patch number 23291631
SPARC T7-2 Server	T7-2 Sun System Firmware 9.7.1c - Patch number 23291632	T7-2 Sun System Firmware 9.7.1c - Patch number 23291632
SPARC T7-4 Server	T7-4 Sun System Firmware 9.7.1c - Patch number 23291633	T7-4 Sun System Firmware 9.7.1c - Patch number 23291633

Keeping Drivers and Firmware Up To Date

Refer to the server documentation to check and update SSD firmware. For information on updating drivers and firmware for the Oracle 3.2 TB NVMe SSD, see "Accessing Software Updates and Firmware Downloads" on page 18 and refer to "Update Your System to the Latest Software Release" in *Oracle 3.2 TB NVMe SSD User Guide*.

Server Management Tools

The following single system management tools are available for the server:

- **Oracle Integrated Lights Out Manager (ILOM)** – For information, refer to the Oracle Integrated Lights Out Manager (ILOM) 4.0 Documentation Library at: `http://www.oracle.com/goto/ilom/docs`

  You can find descriptions of new Oracle ILOM 4.0 features in the the *Oracle ILOM Feature Updates and Release Notes Firmware Release 4.0.x*.

- **Oracle Hardware Management Pack** – For information, refer to:
  - Oracle Hardware Management Pack Documentation Library at `http://www.oracle.com/goto/ohmp/docs`
  - Oracle Hardware Management Pack for Oracle Solaris Documentation Library at `http://docs.oracle.com/cd/E64576_01/index.html`

In addition, the following software is available to manage multiple systems in a data center:

- **Oracle Enterprise Manager Ops Center** – For information, refer to the product information page at: `http://www.oracle.com/technetwork/oem/ops-center/index.html`

Implementation Considerations

The following sections contain important information about configuring the Oracle 3.2 TB NVMe SSD:

- "Oracle Server X6-2 Configuration" on page 16
- "Oracle Server X6-2L Configuration" on page 16
- "Oracle Server X5-4 Configuration" on page 16
- "SPARC S7-2 Server Configuration" on page 17
- "SPARC S7-2L Server Configuration" on page 17
- "SPARC T7-1 Server Configuration" on page 17
- "SPARC T7-2 Server Configuration" on page 17
- "SPARC T7-4 Server Configuration" on page 18
- "SSD Volume Management" on page 18
- "Accessing Software Updates and Firmware Downloads" on page 18

Oracle Server X6-2 Configuration

For more information about the server, refer to the server documentation at `http://www.oracle.com/goto/x6-2/docs`.

Oracle Server X6-2L Configuration

For more information about the server, refer to the server documentation at `http://www.oracle.com/goto/x6-2l/docs`.

Oracle Server X5-4 Configuration

Do not install Oracle Flash Accelerator F320 PCIe Cards in the same server with Oracle 1.6 TB NVMe SSDs or Oracle 3.2 TB NVMe SSDs.

For more information about server configuration, refer to the server documentation at `http://www.oracle.com/goto/x5-4/docs-videos`.

SPARC S7-2 Server Configuration

SPARC S7-2 servers support the Oracle 3.2 TB NVMe SSD as a boot device.

An Oracle PCIe Switch Card is not required in a four NVMe drive configuration. The switch function is included in the motherboard.

For more information about the servers, refer to the server documentation at `http://www.oracle.com/goto/s7-2/docs`.

SPARC S7-2L Server Configuration

SPARC S7-2L servers support the Oracle 3.2 TB NVMe SSD as a boot device.

An Oracle PCIe Switch Card is not required in a four NVMe drive configuration. The switch function is included in the motherboard. The SPARC S7-2L Server can support three Oracle PCIe Switch Cards. Additional Oracle PCIe Switch Cards are required to support backplane configurations with more than four NVMe drives.

For more information about the servers, refer to the server documentation at `http://www.oracle.com/goto/s7-2l/docs`.

SPARC T7-1 Server Configuration

SPARC T7 series servers support the Oracle 3.2 TB NVMe SSD as a boot device. The SPARC T7-1 Server supports only one Oracle PCIe Switch Card in PCIe slot 3.

For more information about server configuration, refer to the server documentation at `http://www.oracle.com/goto/t7-1/docs`.

SPARC T7-2 Server Configuration

SPARC T7 series servers support the Oracle 3.2 TB NVMe SSD as a boot device. The SPARC T7-2 Server supports two Oracle PCIe Switch Cards in PCIe slots 1 and 2.

For more information about server configuration, refer to the server documentation at `http://www.oracle.com/goto/t7-2/docs`.

SPARC T7-4 Server Configuration

SPARC T7 series servers support the Oracle 3.2 TB NVMe SSD as a boot device. The SPARC T7-4 Server can support one or two Oracle PCIe Switch Cards.

For more information about server configuration, refer to the server documentation at `http://www.oracle.com/goto/t7-4/docs`.

SSD Volume Management

A volume manager can present multiple SSD devices as one larger volume. Use the Automatic Storage Management (ASM) volume manager or other volume manager to concatenate multiple flash memory domains. For example, a volume manager can be used to concatenate four 3.2 TB domains into a single 12.8 TB volume.

Refer to the documentation for more information at `http://docs.oracle.com/cd/B28359_01/server.111/b31107/asmcon.htm`.

Accessing Software Updates and Firmware Downloads

Product patches, updates, and firmware are available on My Oracle Support at `https://support.oracle.com` from the Patches and Updates tab. Information on accessing and using My Oracle Support can be found at the *My Oracle Support Welcome Center for Oracle Sun Customers and Partners*.

See:

- "Downloading the SSD Software Package" on page 18
- "Update the NVMe Storage Drive Firmware" on page 19
- "Verify Oracle 3.2 TB NVMe SSD Operation" on page 25

▼ Downloading the SSD Software Package

To find the SSD software package, access *My Oracle Support* and download the latest software package for the Oracle Flash Accelerator F320 PCIe Card and 3.2 TB NVMe SSD.

1. **Sign in to *My Oracle Support* at `https://support.oracle.com`.**

2. **Click the "`Patches & Updates`" tab.**

3. **In the "Patch Search" box on the right side, select "`Product or Family (Advanced Search)`".**

4. **Enter a partial product name for "`Product is`".**

   A list of matches displays.

5. **Select the product of interest.**

   Select one or more "`releases`" in the "Release is" drop down list.

   Close the pop-up window.

6. **Click Search.**

   A list of product downloads (listed as patches) displays.

7. **Select the download of interest.**

   The Download Information Page displays.

   If, on the Download Information Page, you get the message "You do not have permissions to download this Patch...", see *How Patches and Updates Entitlement Works* at `https://support.oracle.com` to help you determine the reason.

▼ Update the NVMe Storage Drive Firmware

This topic provides instructions to update Oracle 3.2 TB NVMe SSD NAND flash controller firmware for the host for supported Oracle Solaris and Oracle Linux operating systems. Oracle 3.2 TB NVMe SSD firmware is updated as a single package using Oracle Hardware Management Pack utility CLI tools.

Note - Refer to the server documentation for detailed instructions.

Before You Begin
- Update your system to the latest software release.
- Verify that the latest supported software release of Oracle Hardware Management Pack is installed on the host.

  Refer to the Oracle Hardware Management Pack documentation for instructions at: `http://www.oracle.com/goto/ohmp/docs`.

1. **Check the Product Notes for the latest firmware requirements at**

2. **Log into the target system through SSH or through Oracle ILOM Remote System Console.**

   Refer to the server installation guide.

3. **Download and store any firmware image file updates on the server that are required to support the Oracle 3.2 TB NVMe SSD.**

   a. **Download firmware image files from this location:**

      https://support.oracle.com

      See "Downloading the SSD Software Package" on page 18.

   b. **Copy the firmware image files obtained to the target system root directory.**

4. **Identify all Oracle 3.2 TB NVMe SSDs and controller firmware versions in the server using either Oracle Hardware Management Pack command in the examples below.**

   a. **To identify all 3.2 TB NVMe SSD NVMe controllers and current firmware versions in the system, type:**

      # fwupdate list controller

      In the following examples, 3.2 TB NVMe SSD controllers c0 to c1 are enumerated in the output returned by the above command.

      # fwupdate list controller

      ```
      ==================================================
      CONTROLLER
      ==================================================
      ID    Type   Manufacturer   Model     Product Name              FW Version     BIOS
       Version   EFI Version    FCODE Version  Package Version  NVDATA Version    XML
       Support
      -----------------------------------------------------------------
      c0    NVMe   Samsung        0xa821    MS1PC2DD3ORA3.2T          KPYA8R3Q       -
      c1    NVMe   Samsung        0xa821    MS1PC2DD3ORA3.2T          KPYA8R3Q       -
      c2    SAS    LSI Logic      0x005d    LSI MegaRAID 9361-8i      4.230.40-3739
       6.17.04.2     06.06.10.05   4.16.08.00     -
      c3    FC     Qlogic         0x8031    QLE8362                   7.03.00        3.24
              5.50           4.06           -
      c4    NET    Intel          0x1528    Intel(R) Ethernet Control -            -
       80000479
      ```

```
c5    NET    Intel          0x1528    Intel(R) Ethernet Control -           -
8000047A
```

i. Verify that the firmware package file that is installed in the Oracle 3.2 TB NVMe SSD requires updating.

To identify NVMe controllers that need updated firmware image files, view the `FW Version` column in the output from the `fwdupdate list controller` command. All 3.2 TB NVMe SSD controllers `c0` through `c1` are enumerated in the output returned by the above command.

For example, 3.2 TB NVMe SSD controllers `c0` and `c1`show firmware version `KPYA8R3Q`, but the current NVMe controller firmware version is `KPYAIR3Q`.

b. View the Firmware Revision in the output from the `nvmeadm list -v` command. (Optional)

To identify NVMe controllers and current firmware versions type:

```
# nvmeadm list -v
```

To identify NVMe controllers that need updated firmware image files, view the `Firmware Revision:` line in the output from the `nvmeadm list -v` command.

In the following example, controllers `SUNW-NVME-1` and `SUNW-NVME-2` show firmware version KPYAB3RQ in the output returned by the command.

```
# nvmeadm list -v
SUNW-NVME-1
        PCI Vendor ID:              144d
        Serial Number:             S2ETNYAG800224
        Model Number:              MS1PC2DD3ORA3.2T
        Firmware Revision:         KPYAB3RQ
        Number of Namespaces:      1
SUNW-NVME-2
        PCI Vendor ID:              144d
        Serial Number:             S2ETNYAG800063
        Model Number:              MS1PC2DD3ORA3.2T
        Firmware Revision:         KPYAB3RQ
        Number of Namespaces:      1
```

5. Quiesce the Oracle 3.2 TB NVMe SSD device.

Manually quiesce I/O and device usage.

> ⚠ **Caution - System hang or data loss.** Before updating device firmware, ensure that the device is quiesced and the following events are not occurring:
>
> - The operating system is not accessing the disk (for example, the system boot disk).
> - An application is not accessing the disk (for example, a database application).

6. **Update the selected 3.2 TB NVMe SSDs with the specified firmware package.**

The `fwupdate` command can update firmware for all similar devices in the system utilizing an XML metadata file. This method is called Automatic Mode and is the recommended method for upgrades. (See below for alternative methods.)

> ⚠ **Caution -** The XML metadata file does not update device firmware on SPARC servers. When running the `fwupdate` command with `-x metadata.xml` on SPARC servers, the update does not complete successfully and generates FMA errors. An error message may be output when the `fwupdate` command is executed, the command may terminate abnormally, and the device taken off-line. See "Updating Device Firmware Using XML Metadata File Fails On SPARC Servers (26234240)" on page 29

> **Note -** Alternately, if you determine that each device must be updated with a separate `fwupdate` command, perform the `fwupdate` Automatic Single Drive method, or the `fwupdate` Manual method (if an XML metadata file is not available). Refer to the Oracle Hardware Management Pack documentation for instructions at `http://www.oracle.com/goto/ohmp/docs`.

a. **Verify that an XML metadata file is available for the server.**

An XML metadata file must be included with the firmware update package to use Automatic Mode. Refer to the update package release notes for more information.

b. **To update device firmware on Oracle 3.2 TB NVMe SSDs, type:**

```
fwupdate update controller -x metadata.xml

# fwupdate update controller -x metadata.xml

The following components will be upgraded as shown:
========================================================
ID        Priority Action     Status     Old Firmware Ver.   Proposed Ver.
 New Firmware Ver.   System Reboot
--------------------------------------------------------------------------------
c0        1         Check FW   Success    KPYAB3RQ            KPYAIR3Q         N/A
                    System Power Cycle
```

```
c1       1        Check FW   Success    KPYAB3RQ          KPYAIR3Q          N/A
                  System Power Cycle
Do you wish to process all of the above component upgrades? [y/n]? y
```

If the current firmware package version on the selected drive is higher than the specified firmware package version, the command returns an error. Refer to the Oracle Hardware Management Pack documentation for error codes at http://www.oracle.com/goto/ohmp/docs.

c. **To upgrade the firmware packages and process all of the above component upgrades, type y.**

```
# fwupdate update controller -x metadata.xml

The following components will be upgraded as shown:
========================================================
ID        Priority Action     Status     Old Firmware Ver.   Proposed Ver.
 New Firmware Ver.   System Reboot
--------------------------------------------------------------------------------
c0       1        Check FW   Success    KPYAB3RQ          KPYAIR3Q          N/
A                 System Power Cycle
c1       1        Check FW   Success    KPYAB3RQ          KPYAIR3Q          N/
A                 System Power Cycle
Do you wish to process all of the above component upgrades? [y/n]? y
Updating c0:  Success
Sleeping for 10 seconds for component to recover
Updating c1:  Success
Sleeping for 10 seconds for component to recover

Verifying all priority 1 updates

Execution Summary
========================================================
ID        Priority Action     Status     Old Firmware Ver.   Proposed Ver.
 New Firmware Ver.   System Reboot
--------------------------------------------------------------------------------
c0       1        Post Power Pending   KPYAB3RQ          KPYAIR3Q          N/
A                 System Power Cycle
c1       1        Post Power Pending   KPYAB3RQ          KPYAIR3Q          N/
A                 System Power Cycle
System Reboot required for some applied firmware
Do you wish to automatically reboot now? [y/n]? y
```

d. **Reboot the host server to initialize the firmware update.**

Type **y** to reboot the system.

7. **Re-access the console.**

   Refer to the server installation guide.

8. **Verify that the updated firmware package is installed in the Oracle 3.2 TB NVMe SSD.**

   a. **Type the following from a terminal:**

   # fwupdate list controller

   ```
   # fwupdate list controller


   ===================================================
   CONTROLLER
   ===================================================
   ID    Type   Manufacturer   Model     Product Name             FW Version    BIOS
    Version    EFI Version    FCODE Version  Package Version  NVDATA Version    XML
    Support
   ------------------------------------------------------------------------------
   c0    NVMe   Samsung        0xa821    MS1PC2DD3ORA3.2T         KPYAIR3Q      -
   c1    NVMe   Samsung        0xa821    MS1PC2DD3ORA3.2T         KPYAIR3Q      -
   c2    SAS    LSI Logic      0x005d    LSI MegaRAID 9361-8i     4.230.40-3739
    6.17.04.2     06.06.10.05   4.16.08.00
   c3    FC     Qlogic         0x8031    QLE8362                  7.03.00       3.24
          5.50            4.06
   c4    NET    Intel          0x1528    Intel(R) Ethernet Control -            -
     80000479
   c5    NET    Intel          0x1528    Intel(R) Ethernet Control -            -
     8000047A
   ```

   b. **Verify host recognition of all 3.2 TB NVMe SSDs by checking ID enumeration.**

   In the above example, 3.2 TB NVMe SSD controller IDs c0 and c1 are enumerated in the output returned by the above command.

   c. **Ensure that the 3.2 TB NVMe SSD firmware was updated in the output returned by the above command.**

9. **Verify Oracle 3.2 TB NVMe SSD operation.**

   See .

10. **Repeat the firmware upgrade process as required until the Oracle 3.2 TB NVMe SSD has the most up to date firmware release.**

    For example, upgrade firmware revision from KPYAB3RQ to KPYA8R3Q, and then to KPYABR3Q.

See "Minimum Supported Oracle 3.2 TB NVMe SSD Firmware Version" on page 12.

Related Information

- "Minimum Supported Oracle 3.2 TB NVMe SSD Firmware Version" on page 12
- *Oracle Server CLI Tools User's Guide* at: `http://www.oracle.com/goto/ohmp/docs`

▼ Verify Oracle 3.2 TB NVMe SSD Operation

This topic provides instructions to verify Oracle 3.2 TB NVMe SSD operation on the host for supported Oracle Solaris and Linux operating systems. Verify Oracle 3.2 TB NVMe SSD operation using Oracle Hardware Management Pack utility CLI tools.

Note - Refer to the server documentation for detailed instructions.

Before You Begin ■ Verify that Oracle Hardware Management Pack is installed on the host.

Refer to the Oracle Hardware Management Pack documentation for instructions at `http://www.oracle.com/goto/ohmp/docs`.

■ Ensure that you have access to the server (either directly or over the network).

1. Observe the Oracle 3.2 TB NVMe SSD status indicators (LEDs).

Verify that the Service Action Required 3.2 TB NVMe SSD status indicator is not lit and that the green power status indicator is lit on the 3.2 TB NVMe SSDs that you updated.

Green (operational), Amber (faulty disk), Blue (SSD has been prepared for removal). Refer to "Status Indicators" in *Oracle 3.2 TB NVMe SSD User Guide*.

2. Log into the target system.

For example, to log into the target system through SSH or through Oracle ILOM Remote System Console, do one of the following:

■ **If you are using an SSH client connection, perform these steps.**

    a. From a shell command line in a terminal window, establish an SSH connection to the server host.

    Type: `ssh root@`*hostname*, where *hostname* can be the DNS name or the IP address for the server host.

    b. Log into the system using an account with root access.

    c. Proceed to Step 3.

■ **If you are using a KVM console, refer to the server administration guide and perform these steps.**

    a. Access the host console locally or remotely:

    To establish a local connection to the host console, perform the following steps:

      i Connect a VGA monitor to the VGA port on the server.

      ii Connect a USB keyboard and mouse to the USB connectors on the server.

      iii To establish a remote connection to the host console:

      Launch an Oracle ILOM Remote System Console Plus session.

      For instructions, see Launching Remote KVMS Redirection Sessions in the server administration guide.

    b. Ensure that the server is powered on and booted.

    c. Access the operating system command-line interface.

    You issue Oracle Hardware Management Pack commands from the operating system command-line interface.

3. Identify all 3.2 TB NVMe SSDs and verify that the latest firmware packages are installed.

    a. Type the following command:

```
# fwupdate list controller
```

```
# fwupdate list controller

==================================================
CONTROLLER
==================================================
ID   Type   Manufacturer   Model     Product Name              FW Version     BIOS
 Version   EFI Version    FCODE Version  Package Version  NVDATA Version     XML
 Support
------------------------------------------------------------------------------
```

```
c0    NVMe    Samsung       0xa821    MS1PC2DD3ORA3.2T         KPYAIR3Q      -
              -                 -              -
c1    NVMe    Samsung       0xa821    MS1PC2DD3ORA3.2T         KPYAIR3Q      -
              -                 -              -
c2    SAS     LSI Logic     0x005d    LSI MegaRAID 9361-8i     4.230.40-3739
 6.17.04.2      06.06.10.05    4.16.08.00      -
c3    FC      Qlogic        0x8031    QLE8362                  7.03.00       3.24
        5.50              4.06            -
c4    NET     Intel         0x1528    Intel(R) Ethernet Control -            -
                                        80000479
c5    NET     Intel         0x1528    Intel(R) Ethernet Control -            -
                                        8000047A
```

b. Verify host recognition of all 3.2 TB NVMe SSDs by checking controller ID enumeration.

In the above example, 3.2 TB NVMe SSD controllers `c0` and `c1` are enumerated in the output returned by the above command.

c. Ensure that all 3.2 TB NVMe SSD firmware versions are current in the output returned by the above command.

See "Minimum Supported Oracle 3.2 TB NVMe SSD Firmware Version" on page 12.

4. Check NVMe device status.

To identify NVMe controllers and current firmware versions type:

nvmeadm list -v

To identify NVMe controllers that have updated firmware, view the **Firmware Revision:** row in the output from the `nvmeadm list -v` command.

Ensure that all 3.2 TB NVMe SSD firmware revisions are current.

In the following example, controllers `SUNW-NVME-0` and `SUNW-NVME-1` show Firmware Revision: `KPYAIR3Q`.

```
# nvmeadm list -v
SUNW-NVME-0
        PCI Vendor ID:              144d
        Serial Number:             S2ETNYAG800224
        Model Number:              MS1PC2DD3ORA3.2T
        Firmware Revision:         KPYAIR3Q
        Number of Namespaces:      1
SUNW-NVME-1
        PCI Vendor ID:              144d
        Serial Number:             S2ETNYAG800063
        Model Number:              MS1PC2DD3ORA3.2T
```

```
        Firmware Revision:              KPYAIR3Q
        Number of Namespaces:           1
```

5. Check health of the Oracle 3.2 TB NVMe SSD.

To check the selected 3.2 TB NVMe SSD health and SMART information, type:

nvmeadm getlog -h

Ensure the 3.2 TB NVMe SSDs have remaining drive life in the output returned by the above
command.

```
# nvmeadm getlog -h
SUNW-NVME-0
SMART/Health Information:
        Critical Warning: 0
        Temperature: 313 Kelvin
        Available Spare: 100 percent
        Available Spare Threshold: 10 percent
        Percentage Used: 0 percent
        Data Unit Read: 0xc41f27 of 512k bytes.
        Data Unit Written: 0xc8559e of 512k bytes.
        Number of Host Read Commands: 0x4f661e5
        Number of Host Write Commands: 0x1603ecd0
        Controller Busy Time in Minutes: 0xdd
        Number of Power Cycle: 0x21f
        Number of Power On Hours: 0x72a
        Number of Unsafe Shutdown: 0x1ea
        Number of Media Errors: 0x0
        Number of Error Info Log Entries: 0x0

SUNW-NVME-1
SMART/Health Information:
        Critical Warning: 0
        Temperature: 312 Kelvin
        Available Spare: 100 percent
        Available Spare Threshold: 10 percent
        Percentage Used: 0 percent
        Data Unit Read: 0x33620e of 512k bytes.
        Data Unit Written: 0x529336 of 512k bytes.
        Number of Host Read Commands: 0x183cc9d
        Number of Host Write Commands: 0x7f730a0
        Controller Busy Time in Minutes: 0x53
        Number of Power Cycle: 0x1dd
        Number of Power On Hours: 0x976
        Number of Unsafe Shutdown: 0xbb
        Number of Media Errors: 0x0
        Number of Error Info Log Entries: 0x0
```

The critical warning parameters are described in the following list.

- 0 - Available spare space has fallen below threshold.
- 1 - Temperature exceeded critical threshold.
- 2 - Reliability has degraded due to significant media related errors or any internal error that degrades device reliability.
- 3 - Media has been placed in read only mode.
- 4 - Volatile memory backup device has failed.

Related Information

- "Minimum Supported Oracle 3.2 TB NVMe SSD Firmware Version" on page 12
- *Oracle Server CLI Tools User's Guide* at: `http://www.oracle.com/goto/ohmp/docs`

Known Issues

These topics provide supplementary and workaround information for the Oracle 3.2 TB NVMe SSD. Specific Change Request (CR) identification numbers are provided for service personnel.

The following table lists known issues for the Oracle 3.2 TB NVMe SSD:

Issues	Workaround?
Updating Device Firmware Using XML Metadata File Fails On SPARC Servers	Yes
3.2 TB Devices Exceed MBR 2 TB Boundary	Yes

Updating Device Firmware Using XML Metadata File Fails On SPARC Servers (26234240)

The XML metadata file does not update device firmware on SPARC servers. When running the `fwupdate` command with `-x metadata.xml` on SPARC servers, the update does not complete successfully and generates FMA errors. The following error message may be output when the `fwupdate` command is executed, the command may terminate abnormally, and the device taken off-line.

```
fwupdate update controller -x metadata.xml

The following components will be upgraded as shown:
```

```
=========================================================
ID        Priority Action    Status      Old Firmware Ver.  Proposed Ver.    New
 Firmware Ver.   System Reboot
---------------------------------------------------------------------------
c2        1        Check FW   Success     KPYABR3Q          KPYAGR3Q         N/A
          None

Do you wish to process all of the above component upgrades? [y/n]? y
Updating c2:  Success
Sleeping for 10 seconds for component to recover
Resetting c2
Mandatory post Reset 60 second sleep
Verifying all priority 1 updates

Execution Summary
=========================================================
ID        Priority Action    Status      Old Firmware Ver.  Proposed Ver.    New
 Firmware Ver.   System Reboot
---------------------------------------------------------------------------
-         -        -          -           -                 -
--------------- ------------------------------------- --------------- ---------
TIME            EVENT-ID                              MSG-ID          SEVERITY
--------------- ------------------------------------- --------------- ---------
Jun 05 12:31:40 98d87727-e3a3-438d-85f7-c55b37d56828  PCIEX-8000-0A   Critical


Problem Status    : open
Diag Engine       : eft / 1.16
System
    Manufacturer  : unknown
    Name          : ORCL,SPARC64-X
    Part_Number   : unknown
    Serial_Number : 9999999
    Host_ID       : 9999999


----------------------------------------
Suspect 1 of 3 :
    Problem class : fault.io.pciex.device-interr
    Certainty    : 40%
    Affects      : dev:////pci@8400/pci@4/pci@0/pci@1/nvme@0
    Status       : ok and in service

    FRU
      Status          : acquitted
      Location        : "/SYS/BB#0-PCI#6"
      Manufacturer    : unknown
      Name            : unknown
      Part_Number     : unknown
      Revision        : unknown
```

```
      Serial_Number    : unknown
      Chassis
         Manufacturer  : unknown
         Name          : ORCL,SPARC64-X
         Part_Number   : 9999999
         Serial_Number : 9999999
-----------------------------------------
```

Workaround:

Use the `fwupdate` Manual method. Refer to the following example.

`fwupdate update nvme-controller-firmware -r -f MS1PC5ED3.GR3Q.fw -n c2`

```
The following components will be upgraded as shown:
========================================================
ID        Priority Action     Status      Old Firmware Ver.   Proposed Ver.       New
 Firmware Ver.   System Reboot
--------------------------------------------------------------------------------
c2       1          Check FW   Success     KPYABR3Q            Not Provided        N/A
             None
Do you wish to process all of the above component upgrades? [y/n]? y
Updating c2:  Success
```

Refer to the Oracle Hardware Management Pack documentation for instructions at http://www.
oracle.com/goto/ohmp/docs.

3.2 TB Devices Exceed MBR 2 TB Boundary

The Master Boot Record (MBR) boundary has a 2 TB limit. The 3.2 TB NVMe SSD exceeds
the 2 TB MBR boundary. Depending on the OS, the partitioning scheme used, and the boot
loader, tools that work on less than 2 TB storage devices may not work on greater than 2 TB
devices. For 3.2 TB NVMe SSDs which are greater than the 2 TB master boot record, the MBR
is restricted and can only handle drives to 2 TB. Thus the partitioning schemes and tools which
use MBR no longer operate. On some OSes, the MBR only describes 2 TB. The MBR on a 3.2
TB NVMe SSD incorrectly shows the device as 2 TB. An MBR still exists in the first sector to
avoid breaking legacy tools, but declares the device to be 2 TB.

Workaround:

The partitioning tools must use `gpt`. Use an alternate partioning scheme such as `GPT GUID`
`Partition`, or `Table GUID Partition Table`. On Linux, instead of `fdisk`, use `parted`
(`gparted` for graphical view) and `gdisk` instead. The Linux tool `dd` can only handle up to a 2

TB MBR. In general, for handling labels, erase the first few MBs of storage, which allows a new label to be created.

Oracle Flash Accelerator F320 PCIe Card Product Notes

This section contains late-breaking information about the Oracle Flash Accelerator F320 PCIe Card. Read this section before reading other Oracle Flash Accelerator F320 PCIe Card documentation.

For specific installation instructions, see your server documentation. For late-breaking information about the installation and use of the Oracle Flash Accelerator F320 PCIe Card on your server, see the most recent version of the server product notes.

These topics are included in this section.

Description	Links
Review the software and firmware supported for the Oracle Flash Accelerator F320 PCIe Card.	"Supported Hardware and Software" on page 34
Review important information for configuring the Oracle Flash Accelerator F320 PCIe Card.	"Implementation Considerations" on page 40
Check known issues.	"Known Issues" on page 55

Supported Hardware and Software

These topics describe the software and firmware supported for the Oracle Flash Accelerator F320 PCIe Card.

Supported Servers and Operating Systems

This topic lists the servers that support the Oracle Flash Accelerator F320 PCIe Card. For detailed information about using this storage drive with your server, see the product notes for your server, available at:

https://docs.oracle.com

The following servers are supported for the Oracle Flash Accelerator F320 PCIe Card:

x86 Servers	Number of Cards	Slots Supported for Installing Cards	Minimum Supported Operating Systems
Oracle Server X6-2L	1 to 4	2, 3, 4, 5	- Oracle Solaris 11.3 (SRU 2) - Oracle Linux 6.7, based on UEK4 (Unbreakable Linux Kernel Release 4) - Oracle Linux 7.2, based on UEK4 (Unbreakable Linux Kernel Release 4)
Oracle Server X5-8	1 to 4 in 4-CPU System 1 to 8 in 8-CPU System	7, 5, 3, 1 11, 9, 7, 5, 3, 1, 15, 13	- Oracle Solaris 11.3 (SRU 8) - Oracle Solaris 11.2 (SRU 10) - Oracle Linux 6.7, based on UEK4 (Unbreakable Linux Kernel Release 4) - Oracle Linux 7.2, based on UEK4 (Unbreakable Linux Kernel Release 4) **Note -** Oracle Server X5-8 with pre-installed Oracle VM does not support Oracle Flash Accelerator F320 PCIe Card operation.
Oracle Server X5-4	1 to 2 in 2-CPU System 1 to 4 in 4-CPU System	6 and 4 10, 7, 6, 4	- Oracle Solaris 11.3 (SRU 10) - Oracle Linux 6.7, based on UEK3 (Unbreakable Linux Kernel Release 3) **Note -** Do not install Oracle Flash Accelerator F320 PCIe Cards in the same server with

x86 Servers	Number of Cards	Slots Supported for Installing Cards	Minimum Supported Operating Systems
			Oracle 1.6 TB NVMe SSDs or Oracle 3.2 TB NVMe SSDs. **Note -** Oracle Server X5-4 with pre-installed Oracle VM does not support Oracle Flash Accelerator F320 PCIe Card operation.

SPARC Servers	Number of Cards	Slots Supported for Installing Cards	Minimum Supported Operating Systems
SPARC S7-2 Server	1 to 3	1 to 3	Oracle Solaris 11.3 (SRU 10)
SPARC S7-2L Server	1 to 6	1 to 6	Oracle Solaris 11.3 (SRU 10)
SPARC T7-1 Server	1 to 6	1 to 6	Oracle Solaris 11.3 (SRU 10)
SPARC T7-2 Server	1 to 6	1 to 8	Oracle Solaris 11.3 (SRU 10)
SPARC T7-4 Server	1 to 8	3, 16, 4, 15, 7, 12, 8, 11, 1, 14, 5, 10, 2, 13, 6, 9	Oracle Solaris 11.3 (SRU 10)
SPARC M7-8 Server with one PDomain	1 to 16 Up to 16 per system.	1 to 16	Oracle Solaris 11.3 (SRU 10)
SPARC M7-8 Server with two PDomains	1 to 16 Up to 8 per PDomain or 16 per system.	1 to 16	Oracle Solaris 11.3 (SRU 10)
SPARC M7-16 Server	1 to 32 Up to 8 per 4 CMIOU PDomain. Up to 32 per PDomain larger than 4 CMIOU.	1 to 48	Oracle Solaris 11.3 (SRU 10)
Fujitsu M10-1 Server	1 to 3	0 to 2	Oracle Solaris 11.3 (SRU 10)
Fujitsu M10-4 Server	1 to 11	0 to 10	Oracle Solaris 11.3 (SRU 10)
Fujitsu M10-4S Server	1 to 8	0 to 7	Oracle Solaris 11.3 (SRU 10)
Fujitsu SPARC M12-1 Server	1 to 3	0 to 2	Oracle Solaris 11.3 (SRU 17)
Fujitsu SPARC M12-2 Server	1 to 11	0 to 10	Oracle Solaris 11.3 (SRU 17)
Fujitsu SPARC M12-2S Server	1 to 8	0 to 7	Oracle Solaris 11.3 (SRU 17)

Other servers and processors might be added to this list in the future, if they qualify. Check your server's product notes for confirmation that your server has subsequently been qualified.

Refer to your servers product notes for up-to date information on supported servers, operating systems, and required patchsets.

> ⚠ **Caution -** Any unsupported configuration causes the host to power off as soon as it is powered on. A fault is generated on the service processor when an unsupported configuration is detected. The fault clears after the unsupported configuration is fixed and the host is powered on.

Minimum Supported Card Firmware Version

The Oracle Flash Accelerator F320 PCIe Card runs with the minimum required firmware package listed below:

Drive Firmware	Minimum Required Firmware Version	Recommended Firmware Version
Oracle 3.2TB NVME (F320 AIC/3.2TB SSD) Package	23057919 3.2TB NVME (F320 AIC/3.2TB SSD) SW 1.0.0 - FIRMWARE KPYA8R3Q	26758830 3.2TB NVME (F320 AIC/3.2TB SSD) SW 1.3. - FIRMWARE KPYAIR3Q

> **Note -** The Minimum Required Firmware Version of Fujitsu M10 and Fujitsu SPARC M12 series servers is SW 1.2 Firmware KPYAGR3Q or later. The Recommended Firmware Version of Fujitsu M10 and Fujitsu SPARC M12 series servers is SW 1.3 Firmware KPYAIR3Q or later.

Summary of Changes in SW 1.3 Firmware KPYAIR3Q Release

The following improvements and changes are included in SW 1.3 firmware KPYAIR3Q release of the Oracle 3.2 TB NVMe SSD:

- For known issues, "Known Issues" on page 55.
- Issues fixed in KPYAIR3Q (BugId's fixed with this firmware update are listed below.)
  - CR 23331860: Early life customer failure with controller device not ready, aborted I/O
  - CR 25659092: Early life customer failure with controller device not ready, aborted I/O, with CS3.3.1
  - CR 25138105: Flash I/O abort and recovery, but cell failed for poor performance
  - CR 25415323: F320 Device not ready; aborting reset - reboot did not recover
  - Randomized Seed Table Corruption
  - Command pending issue when chunk size is larger than MDTS.
  - Wrong drive status when format is rejected by reset.
  - Format command pending when multiple format came during IO command.
  - Do not check open failure when FW is activated by Controller Reset.

- CR 25993898: CS3.3.1 data corruption
- CR 22869779: Namespace not Ready on Get Log SMART/Health Page during Power Cycle
- Enhancement: Device Recovery Failure Protocol (with Hardware Reset)
- There have been many fixes in this latest firmware release in order to increase quality and stability of the F320 PCIe Card and 3.2 TB NVMe SSD. For a list of fixed issues, refer to the readme. Recommend users update to the new firmware as soon as possible.
- The SW1.3, KPYAIR3Q.bin, package includes the firmware file and associated metadata. xml files that automate the update process. Once the device has been upgraded, you cannot down grade to an earlier firmware. It is locked to protect the device from regressing to known issues.

Note - Reformat the drive after the firmware update. Recommend to wipe the user data where feasible with the update because drives with already corrupted metadata that may be slowly failing under CS3.3.1 are remediated by the format and update, and would otherwise fail more quickly on update to CS3.6.

Summary of Changes in SW 1.2 Firmware KPYAGR3Q Release

The following improvements and changes are included in SW 1.2 firmware KPYAGR3Q release of the Oracle 3.2 TB NVMe SSD:

- For known issues, see "Known Issues" on page 55.
  - Issues 23307921 and 23537941 – Enhancement of NVMe Driver NVMe Device Handling to Prevent I/O Timeouts
  - Issue 24305796 – `nvmeadm getlog -s` Command Initiates Panic on SPARC M7 Series Servers

Summary of Changes in SW 1.0.1 Firmware KPYABR3Q Release

The following improvements/changes are included in SW 1.0.1 firmware CS2.9 KPYABR3Q release of the Oracle Flash Accelerator F320 PCIe Card:

- The CS2.9_KPYABR3Q firmware version additionally supports SPARC S7 series servers, SPARC T7 series servers, SPARC M7 series servers, and Fujitsu M10 series servers.
- The CS2.6 KPYA8R3Q firmware version supports Oracle Server X6-2, Oracle Server X6-2L, Oracle Server X5-4, and Oracle Server X5-8.

- For known issues, see "Known Issues" on page 55.
  - Issue 22893868 - Enhancement of backend RAID recovery to avoid timeouts
  - Issue 23100303 - Performance improvements
- If you install the Oracle Flash Accelerator F320 PCIe Card as an x-option on a SPARC system, you must update the firmware from CS2.6 to CS2.9, or a subsequent release if available. Servers ordered with this option already have the updated firmware.

Required Host Software

The Oracle Flash Accelerator F320 PCIe Card runs with the minimum required host software listed below:

x86 Driver	Minimum Required Host Firmware Version With Patches	Recommended System Software Version (Patch No.)
Oracle Server X6-2L	23035619 Oracle Server X6-2L SW 1.0.0 - FIRMWARE PACK	23119529 Oracle Server X6-2L SW 1.0.1 - FIRMWARE PACK
Oracle Server X5-8	Oracle Server X5-8 SW 1.1.1 Firmware Pack - Patch number 24297999	Oracle Server X5-8 SW 1.1.1 Firmware Pack - Patch number 24297999
		Oracle Server X5-8 Platform Software Release 1.1.1
Oracle Server X5-4	Oracle Server X5-4 SW 1.1.1 Firmware Pack - Patch number 24297965	Oracle Server X5-4 SW 1.1.1 Firmware Pack - Patch number 24297965

SPARC Driver	Minimum Required Host Firmware Version With Patches	Recommended System Software Version (Patch No.)
SPARC S7-2 Server	S7-2 Sun System Firmware 9.7.2c - Patch number 23632951	S7-2 Sun System Firmware 9.7.2c - Patch number 23632951
SPARC S7-2L Server	S7-2 Sun System Firmware 9.7.2c - Patch number 23632952	S7-2 Sun System Firmware 9.7.2c - Patch number 23632952
SPARC T7-1 Server	T7-1 Sun System Firmware 9.7.1.c - Patch number 23291631	T7-1 Sun System Firmware 9.7.1c - Patch number 23291631
SPARC T7-2 Server	T7-2 Sun System Firmware 9.7.1c - Patch number 23291632	T7-2 Sun System Firmware 9.7.1c - Patch number 23291632
SPARC T7-4 Server	T7-4 Sun System Firmware 9.7.1c - Patch number 23291633	T7-4 Sun System Firmware 9.7.1c - Patch number 23291633
SPARC M7-8 Server with one PDomain	SPARC M7-SYSTEMS SUN SYSTEM FIRMWARE 9.7.1.B - Patch number 23291634	SPARC M7-SYSTEMS SUN SYSTEM FIRMWARE 9.7.1.B - Patch number 23291634
SPARC M7-8 Server with two PDomains	SPARC M7-SYSTEMS SUN SYSTEM FIRMWARE 9.7.1.B - Patch number 23291634	SPARC M7-SYSTEMS SUN SYSTEM FIRMWARE 9.7.1.B - Patch number 23291634

SPARC Driver	Minimum Required Host Firmware Version With Patches	Recommended System Software Version (Patch No.)
SPARC M7-16 Server	SPARC M7-SYSTEMS SUN SYSTEM FIRMWARE 9.7.1.B - Patch number 23291634	SPARC M7-SYSTEMS SUN SYSTEM FIRMWARE 9.7.1.B - Patch number 23291634
Fujitsu M10-1 Server	Patch 23711064: FUJITSU M10-1 XCP2320 FW	Patch 23711064: FUJITSU M10-1 XCP2320 FW
Fujitsu M10-4 Server	Patch 23711067: FUJITSU M10-4 XCP2320 FW	Patch 23711067: FUJITSU M10-4 XCP2320 FW
Fujitsu M10-4S Server	Patch 23711070: FUJITSU M10-4S XCP2320 FW	Patch 23711070: FUJITSU M10-4S XCP2320 FW
Fujitsu SPARC M12-1 Server	Patch 26553449: FUJITSU M12-1 XCP3030 FW	Patch 26553449: FUJITSU M12-1 XCP3030 FW
Fujitsu SPARC M12-2 Server	Patch 25987114: FUJITSU M12-2 XCP3021 FW	Patch 25987114: FUJITSU M12-2 XCP3021 FW
Fujitsu SPARC M12-2S Server	Patch 25987128: FUJITSU M12-2S XCP3021 FW	Patch 25987128: FUJITSU M12-2S XCP3021 FW

Keeping Drivers and Firmware Up To Date

Refer to the server documentation to check and update card firmware. For information on updating drivers and firmware for Oracle Flash Accelerator F320 PCIe Card, see "Accessing Software Updates and Firmware Downloads" on page 44 and refer to "Update Your System to the Latest Software Release" in *Oracle Flash Accelerator F320 PCIe Card User Guide*.

Server Management Tools

The following single system management tools are available for the server:

- **Oracle Integrated Lights Out Manager (ILOM)** – For information, refer to the Oracle Integrated Lights Out Manager (ILOM) 4.0 Documentation Library at: `http://www.oracle.com/goto/ilom/docs`

  You can find descriptions of new Oracle ILOM 4.0 features in the the *Oracle ILOM Feature Updates and Release Notes Firmware Release 4.0.x.*

- **Oracle Hardware Management Pack** – For information, refer to:
  - Oracle Hardware Management Pack Documentation Library at `http://www.oracle.com/goto/ohmp/docs`

- Oracle Hardware Management Pack for Oracle Solaris Documentation Library at `http://docs.oracle.com/cd/E64576_01/index.html`

In addition, the following software is available to manage multiple systems in a data center:

- **Oracle Enterprise Manager Ops Center** – For information, refer to the product information page at: `http://www.oracle.com/technetwork/oem/ops-center/index.html`

Implementation Considerations

These topics provide important information for configuring Oracle Flash Accelerator F320 PCIe Cards in supported servers:

Oracle Server X6-2L Configuration

For more information about the server, refer to the server documentation at `http://www.oracle.com/goto/x6-2l/docs`.

Oracle Server X5-8 Configuration

Oracle Server X5-8 requires a doublewide PCIe hot plug carrier extension for each installed Oracle Flash Accelerator F320 PCIe Card to facilitate air flow. The server PCIe cards are

housed inside card carriers called DPCCs (dual PCIe card carriers, Mkt PN 710710). The DPCCs allow the cards to be hot serviced while the server is powered on.

To access a PCIe card, you must first remove its Dual PCIe Card Carrier (DPCC). One PCIe card can be installed in each DPCC. DPCCs do not allow the use of one adjacent PCIe slot. DPCCs are installed in odd numbered PCIe slots.

The following figure shows an example of a Dual PCIe Card Carrier (DPCC) that populates two PCIe slots for each Oracle Flash Accelerator F320 PCIe Card.

For more information about the server, refer to the server documentation at `http://www.oracle.com/goto/x5-8/docs-videos`.

Oracle Server X5-4 Configuration

Do not install Oracle Flash Accelerator F320 PCIe Cards in the same server with Oracle 1.6 TB NVMe SSDs or Oracle 3.2 TB NVMe SSDs.

For more information about server configuration, refer to the server documentation at `http://www.oracle.com/goto/x5-4/docs-videos`.

SPARC S7-2 Server Configuration

SPARC S7-2 series servers support the Oracle Flash Accelerator F320 PCIe Card as a boot device.

For more information about the servers, refer to the server documentation at `http://www.oracle.com/goto/s7-2/docs`.

SPARC S7-2L Server Configuration

SPARC S7-2 series servers support the Oracle Flash Accelerator F320 PCIe Card as a boot device.

For more information about the servers, refer to the server documentation at `http://www.oracle.com/goto/s7-2l/docs`.

SPARC T7-1 Server Configuration

SPARC T7 series servers support the Oracle Flash Accelerator F320 PCIe Card as a boot device.

For more information about the servers, refer to the server documentation at `http://www.oracle.com/goto/t7-1/docs`.

SPARC T7-2 Server Configuration

SPARC T7 series servers support the Oracle Flash Accelerator F320 PCIe Card as a boot device.

For more information about the server, refer to the server documentation at `http://www.oracle.com/goto/t7-2/docs`.

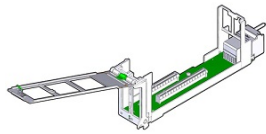## SPARC T7-4 Server Configuration

SPARC T7-4 Servers require a singlewide PCIe hot plug carrier extension for each installed Oracle Flash Accelerator F320 PCIe Card to facilitate air flow.

SPARC T7 series servers support the Oracle Flash Accelerator F320 PCIe Card as a boot device.
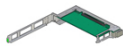
For more information about the servers, refer to the server documentation at `http://www.oracle.com/goto/t7-4/docs`.

SPARC M7 Series Servers Configuration

SPARC M7 series servers support the use of only PCIe x16 hot-plug card carriers, which are physically labeled with "x16 CAR" on the faceplate. PCIe x8 card carriers from earlier generations of Oracle servers, which are labeled with "CAR" on the faceplate, are not supported for use in M7 series servers. PCIe x8 and PCIe x16 cards are supported for use in these servers.

SPARC M7 series servers support the Oracle Flash Accelerator F320 PCIe Card as a boot device. Use slot 3 for the NIC and Boot device. Treat SPARC M7 series server slots 1 and 3 in CMIOUs 0-2 and 4-6 the same. Oracle F320 Flash Cards should be in the lowest number slots available. If the Oracle F320 Flash Card contains the operating system for the physical domain, then bring the physical domain down to the ILOM prompt (power down the PDomain).

For more information about the servers, refer to the server documentation at `http://www.oracle.com/goto/m7/docs`.

Fujitsu M10 Series Servers Configuration

Fujitsu M10 series servers support the Oracle Flash Accelerator F320 PCIe Card as a boot device.

Refer to 24305796 for restrictions concerning PHP and DR and the `nvmeadm getlog -s` command (24305796) for Fujitsu M10 and Fujitsu SPARC M12 series servers.

For more information about the servers, refer to the server documentation at `http://docs.oracle.com/cd/E38160_01/`.

Fujitsu SPARC M12 Series Servers Configuration

Fujitsu SPARC M12 series servers support the Oracle Flash Accelerator F320 PCIe Card as a boot device.

Refer to 24305796 for restrictions concerning PHP and DR and the `nvmeadm getlog -s` command (24305796) for Fujitsu M10 and Fujitsu SPARC M12 series servers.

For more information about the servers, refer to the server documentation at `http://docs.oracle.com/cd/E86029_01`.

SSD Volume Management

A volume manager can present multiple SSD devices as one larger volume. Use the Automatic Storage Management (ASM) volume manager or other volume manager to concatenate multiple flash memory domains. For example, a volume manager can be used to concatenate four 3.2 TB domains into a single 12.8 TB volume.

Refer to the documentation for more information at `http://docs.oracle.com/cd/B28359_01/server.111/b31107/asmcon.htm`.

Accessing Software Updates and Firmware Downloads

Product patches, updates and firmware are available on My Oracle Support at `https://support.oracle.com` from the Patches and Updates tab. Information on accessing and using My Oracle Support can be found at the *My Oracle Support Welcome Center for Oracle Sun Customers and Partners*.

See:

- "Downloading the SSD Software Package" on page 44
- "Update the NVMe Storage Drive Firmware" on page 19
- "Verify Oracle 3.2 TB NVMe SSD Operation" on page 25

▼ Downloading the SSD Software Package

To find the SSD software package, access *My Oracle Support* and download the latest software package for the Oracle Flash Accelerator F320 PCIe Card and 3.2 TB NVMe SSD.

1. **Sign in to *My Oracle Support* at `https://support.oracle.com`.**

2. **Click the "`Patches & Updates`" tab.**

3. **In the "Patch Search" box on the right side, select "`Product or Family (Advanced Search)`".**

4. **Enter a partial product name for "`Product is`".**
   A list of matches displays.

5. **Select the product of interest.**

Select one or more "`releases`" in the "Release is" drop down list.

Close the pop-up window.

6. Click Search.

A list of product downloads (listed as patches) displays.

7. Select the download of interest.

The Download Information Page displays.

If, on the Download Information Page, you get the message "You do not have permissions to download this Patch...", see *How Patches and Updates Entitlement Works* at `https://support.oracle.com` to help you determine the reason.

▼ Update the NVMe Storage Drive Firmware

This topic provides instructions to update Oracle F320 Flash Card NAND flash controller firmware for the host for supported Oracle Solaris and Oracle Linux operating systems. Oracle F320 Flash Card firmware is updated as a single package using Oracle Hardware Management Pack utility CLI tools.

Note - Refer to the server documentation for detailed instructions.

Before You Begin
- Update your system to the latest software release.
- Verify that the latest supported software release of Oracle Hardware Management Pack is installed on the host.

    Refer to the Oracle Hardware Management Pack documentation for instructions at `http://www.oracle.com/goto/ohmp/docs`.

1. Check the Product Notes for the latest firmware requirements at:

2. Log into the target system through SSH or through Oracle ILOM Remote System Console.

Refer to the server installation guide.

3. Download and store any firmware image file updates on the server that are required to support the Oracle Flash Accelerator F320 PCIe Card and 3.2 TB NVMe SSD.

   a. Download firmware image files from this location:

https://support.oracle.com

See "Downloading the SSD Software Package" on page 44.

    b. **Copy the firmware image files obtained to the target system root directory.**

4. **Identify all Oracle Flash Accelerator F320 PCIe Card and controller firmware versions in the server using either Oracle Hardware Management Pack command in the examples below.**

    a. **To identify all Oracle Flash Accelerator F320 PCIe Card controllers and current firmware versions in the system, type:**

fwupdate list controller

In the following examples, Oracle Flash Accelerator F320 PCIe Card controllers c1 and c2 are enumerated in the output returned by the above command.

```
# fwupdate list controller

===================================================
CONTROLLER
===================================================
ID    Type   Manufacturer   Model      Product Name              FW Version     BIOS
 Version   EFI Version    FCODE Version  Package Version  NVDATA Version    XML
 Support
-------------------------------------------------------------------------------
c0    SAS    LSI Logic      0x005d     LSI MegaRAID 9361-8i       4.230.40-3739
 6.17.04.2      06.06.10.05    4.16.08.00    -                 -     N/A
c1    NVMe   Samsung        0xa821     MS1PC5ED3ORA3.2T           KPYAB3RQ
c2    NVMe   Samsung        0xa821     MS1PC5ED3ORA3.2T           KPYAB3RQ
c3    NET    Intel          0x1528     Intel(R) Ethernet Control -            -
        80000479
c4    NET    Intel          0x1528     Intel(R) Ethernet Control -            -
        8000047A
```

Verify that the firmware package file that is installed in the Oracle Flash Accelerator F320 PCIe Card requires updating.

To identify NVMe controllers that need updated firmware image files, view the FW Version column in the output from the fwdupdate list controller command.

In the above example, Oracle Flash Accelerator F320 PCIe Card controllers c1 and c2 show firmware version KPYAB3RQ.

    b. **View the Firmware Revision in the output from the nvmeadm list -v command (Optional).**

To identify NVMe controllers and current firmware versions type:

`# nvmeadm list -v`

In the following example, controllers `SUNW-NVME-1` and `SUNW-NVME-2` show Firmware Revision `KPYAB3RQ` in the output returned by the above command.

```
# nvmeadm list -v
SUNW-NVME-1
        PCI Vendor ID:                  144d
        Serial Number:                  S2FHNYAG800126
        Model Number:                   MS1PC5ED3ORA3.2T
        Firmware Revision:              KPYAB3RQ
        Number of Namespaces:           1
SUNW-NVME-2
        PCI Vendor ID:                  144d
        Serial Number:                  S2FHNYAG800030
        Model Number:                   MS1PC5ED3ORA3.2T
        Firmware Revision:              KPYAB3RQ
        Number of Namespaces:           1
```

Verify that the firmware package file that is installed in the Oracle Flash Accelerator F320 PCIe Card requires updating.

To identify NVMe controllers that need updated firmware image files, view the `Firmware Revision:` line in the output from the `nvmeadm list -v` command.

In the above example, Oracle Flash Accelerator F320 PCIe Card controllers `SUNW-NVME-1`and `SUNW-NVME-2` show firmware version `KPYAB3RQ`.

5. **Quiesce the Oracle Flash Accelerator F320 PCIe Card and 3.2 TB NVMe SSD devices.**

   Manually quiesce I/O and device usage.

   Caution - System hang or data loss. Before updating device firmware, make sure that the device is quiesced and the following events are not occurring:

   - The operating system is not accessing the disk (for example, the system boot disk).
   - An application is not accessing the disk (for example, a database application).

6. **Update the selected Oracle Flash Accelerator F320 PCIe Cards with the specified firmware package.**

   The `fwupdate` command can update firmware for all similar devices in the system utilizing an XML metadata file. This method is called Automatic Mode and is the recommended method for upgrades. (See below for alternative methods.)

![Caution icon] **Caution -** The XML metadata file does not update device firmware on SPARC servers. When running the `fwupdate` command with `-x metadata.xml` on SPARC servers, the update does not complete successfully and generates FMA errors. An error message may be output when the `fwupdate` command is executed, the command may terminate abnormally, and the device taken off-line. See "Updating Oracle F320 Flash Card Device Firmware Using XML Metadata File Fails On SPARC Servers (26234240)" on page 55

Note - Alternately, if you determine that each device must be updated with a separate `fwupdate` command, perform the `fwupdate` Automatic Single Drive method, or the `fwupdate` Manual method (if an XML metadata file is not available). Refer to the Oracle Hardware Management Pack documentation for instructions at `http://www.oracle.com/goto/ohmp/docs`.

a. **Verify that an XML metadata file is available for the server.**

An XML metadata file must be included with the firmware update package to use Automatic Mode. Refer to the update package release notes for more information.

b. **To update device firmware on Oracle Flash Accelerator F320 PCIe Card and 3.2 TB NVMe SSDs, type:**

```
fwupdate update controller -x metadata.xml
```

```
# fwupdate update controller -x metadata.xml

The following components will be upgraded as shown:
==========================================================
ID       Priority Action    Status     Old Firmware Ver.   Proposed Ver.
 New Firmware Ver.   System Reboot
--------------------------------------------------------------------------------
c1       1        Check FW   Success    KPYAB3RQ            KPYAIR3Q            N/
A                 System Power Cycle
c2       1        Check FW   Success    KPYAB3RQ            KPYAIR3Q            N/
A                 System Power Cycle
Do you wish to process all of the above component upgrades? [y/n]? y
```

If the current firmware package version on the selected drive is higher than the specified firmware package version, the command returns an error. Refer to the Oracle Hardware Management Pack documentation for error codes at `http://www.oracle.com/goto/ohmp/docs`.

c. **To upgrade the firmware packages and process all of the above component upgrades, type y.**

```
Do you wish to process all of the above component upgrades? [y/n]? y
Updating c1:  Success
Sleeping for 10 seconds for component to recover
Updating c2:  Success
Sleeping for 10 seconds for component to recover

Verifying all priority 1 updates

Execution Summary
==========================================================
ID       Priority Action     Status     Old Firmware Ver.  Proposed Ver.
 New Firmware Ver.   System Reboot
--------------------------------------------------------------------------------
c1       1        Post Power Pending   KPYAB3RQ            KPYAIR3Q           N/
A                 System Power Cycle
c2       1        Post Power Pending   KPYAB3RQ            KPYAIR3Q           N/
A                 System Power Cycle
System Reboot required for some applied firmware
Do you wish to automatically reboot now? [y/n]? y
```

   d. Reboot the host server to initialize the firmware update.

   Type **y** to reboot the system.

7. Re-access the console.

Refer to the server installation guide.

8. Verify that the updated firmware package is installed in the Oracle Flash Accelerator F320 PCIe Card.

   a. Type the following from a terminal:

   # fwupdate list controller

   # fwupdate list controller

```
===================================================
CONTROLLER
===================================================
ID    Type   Manufacturer   Model      Product Name              FW Version   BIOS
 Version   EFI Version    FCODE Version  Package Version NVDATA Version   XML
 Support
--------------------------------------------------------------------------------
c0    SAS    LSI Logic      0x005d     LSI MegaRAID 9361-8i       4.230.40-3739
 6.17.04.2      06.06.10.05    4.16.08.00    -
c1    NVMe   Samsung        0xa821     MS1PC5ED3ORA3.2T           KPYAIR3Q        -
           -              -              -
```

```
c2    NVMe   Samsung       0xa821    MS1PC5ED3ORA3.2T          KPYAIR3Q      -
              -             -         -
c3    NET    Intel         0x1528    Intel(R) Ethernet Control -          -
                                      80000479
c4    NET    Intel         0x1528    Intel(R) Ethernet Control -          -
                                      8000047A
```

b. Verify host recognition of all Oracle Flash Accelerator F320 PCIe Cards by checking PCIe ID enumeration.

In the above example, Oracle Flash Accelerator F320 PCIe Card controllers `c1` and `c2` are enumerated in the output returned by the above command.

c. Ensure that the Oracle Flash Accelerator F320 PCIe Card firmware was updated in the output returned by the above command.

9. Verify Oracle Flash Accelerator F320 PCIe Card operation.

See .

10. Repeat the firmware upgrade process until the Oracle Flash Accelerator F320 PCIe Card has the most up to date firmware release.

For example, upgrade firmware revision from KPYA6R3Q to KPYAB3RQ, and then to KPYABR3Q.

See .

Related Information

-
- *Oracle Server CLI Tools User's Guide* at: `http://www.oracle.com/goto/ohmp/docs`

▼ Verify Oracle Oracle Flash Accelerator F320 PCIe Card Operation

This topic provides instructions to verify Oracle Flash Accelerator F320 PCIe Card operation for the host for supported Oracle Solaris and Linux operating systems. Verify Oracle Flash Accelerator F320 PCIe Card and 3.2 TB NVMe SSD operation using Oracle Hardware Management Pack utility CLI tools.

Note - Refer to the server documentation for detailed instructions.

Before You Begin   ■   Verify that Oracle Hardware Management Pack is installed on the host.

Refer to the Oracle Hardware Management Pack documentation for instructions at `http://www.oracle.com/goto/ohmp/docs`.

- Ensure that you have access to the server (either directly or over the network).

1. **Observe the Oracle Flash Accelerator F320 PCIe Card status indicators (LEDs).**

   Verify that the Service Action Required status indicator is not lit and that the green Power status indicator is lit on the Oracle Flash Accelerator F320 PCIe Cards that you updated. Refer to "Status Indicators" in *Oracle Flash Accelerator F320 PCIe Card User Guide*.

2. **Log into the target system.**

   Refer to the server installation guide.

   For example, to log into the target system through SSH or through Oracle ILOM Remote System Console, do one of the following:

   - **If you are using an SSH client connection, perform these steps.**

     a. **From a shell command line in a terminal window, establish an SSH connection to the server host.**

        Type: `ssh root@`*hostname*, where *hostname* can be the DNS name or the IP address for the server host.

     b. **Log into the system using an account with root access.**

     c. **Proceed to Step 3.**

   - **If you are using a KVM console, refer to the server administration guide and perform these steps.**

     a. **Access the host console locally or remotely:**

        To establish a local connection to the host console, perform the following steps:

        i **Connect a VGA monitor to the VGA port on the server.**

        ii **Connect a USB keyboard and mouse to the USB connectors on the server.**

        iii **To establish a remote connection to the host console:**

           Launch an Oracle ILOM Remote System Console Plus session.

> For instructions, see Launching Remote KVMS Redirection Sessions in the
> server administration guide.

    b. Ensure that the server is powered on and booted.

    c. Access the operating system command-line interface.

> You issue Oracle Hardware Management Pack commands from the operating system
> command-line interface.

**3. Identify all Oracle F320 Flash Cards and verify that the latest firmware packages
are installed.**

    a. Type the following command:

```
# fwupdate list controller
```

```
# fwupdate list controller

=================================================
CONTROLLER
=================================================
ID    Type   Manufacturer   Model      Product Name             FW Version     BIOS
 Version   EFI Version   FCODE Version  Package Version  NVDATA Version    XML
 Support
-------------------------------------------------------------------------------
c0    SAS    LSI Logic      0x005d     LSI MegaRAID 9361-8i      4.230.40-3739
 6.17.04.2     06.06.10.05   4.16.08.00      -
c1    NVMe   Samsung        0xa821     MS1PC5ED3ORA3.2T          KPYAIR3Q       -
           -             -             -
c2    NVMe   Samsung        0xa821     MS1PC5ED3ORA3.2T          KPYAIR3Q       -
           -             -             -
c3    NET    Intel          0x1528     Intel(R) Ethernet Control -            -
                                          80000479
c4    NET    Intel          0x1528     Intel(R) Ethernet Control -            -
                                          8000047A
```

    **b. Verify host recognition of all Oracle F320 Flash Cards by checking controller
ID enumeration.**

> In the above example, Oracle F320 Flash Card controllers c1 and c2 are enumerated in the
> output returned by the above command.

    **c. Ensure that all Oracle F320 Flash Card firmware versions are current in the
output returned by the above command.**

> See "Minimum Supported Card Firmware Version" on page 36.

4. **Check NVMe device status (Optional).**

   a. **To identify NVMe controllers and current firmware versions type:**

   `# nvmeadm list -v`

   ```
   # nvmeadm list -v
   SUNW-NVME-1
           PCI Vendor ID:              144d
           Serial Number:             S2FHNYAG800126
           Model Number:              MS1PC5ED3ORA3.2T
           Firmware Revision:         KPYAIR3Q
           Number of Namespaces:      1
   SUNW-NVME-2
           PCI Vendor ID:              144d
           Serial Number:             S2FHNYAG800030
           Model Number:              MS1PC5ED3ORA3.2T
           Firmware Revision:         KPYAIR3Q
           Number of Namespaces:      1
   ```

   b. **Verify host recognition of all Oracle F320 Flash Cards by checking controller ID enumeration.**

   In the above example, Oracle F320 Flash Card controllers `SUNW-NVME-1` and `SUNW-NVME-2` are enumerated in the output returned by the above command.

   c. **Ensure that all Oracle F320 Flash Card firmware revisions are current in the device output returned by the above command.**

   To identify NVMe controllers that have updated firmware, view the `Firmware Revision:` row in the output from the `nvmeadm list -v` command.

   In the above example, controller `SUNW-NVME-1` and `SUNW-NVME-2` show firmware version `KPYABR3Q` in the output returned by the above command.

   See .

5. **Check health of the Oracle F320 Flash Card.**

   To check the selected Oracle F320 Flash Card health and SMART information, type:

   `# nvmeadm getlog -h`

   Ensure the Oracle F320 Flash Cards have remaining drive life in the output returned by the above command.

   ```
   # nvmeadm getlog -h SUNW-NVME-1
   SMART/Health Information:
   ```

```
        Critical Warning: 0
        Temperature: 318 Kelvin
        Available Spare: 100 percent
        Available Spare Threshold: 10 percent
        Percentage Used: 0 percent
        Data Unit Read: 0x35902b of 512k bytes.
        Data Unit Written: 0x152f5f of 512k bytes.
        Number of Host Read Commands: 0x46fb6c3
        Number of Host Write Commands: 0x1798e3a
        Controller Busy Time in Minutes: 0x6d
        Number of Power Cycle: 0xf58
        Number of Power On Hours: 0x646
        Number of Unsafe Shutdown: 0xf40
        Number of Media Errors: 0x0
        Number of Error Info Log Entries: 0x0

SUNW-NVME-2
SMART/Health Information:
        Critical Warning: 0
        Temperature: 316 Kelvin
        Available Spare: 100 percent
        Available Spare Threshold: 10 percent
        Percentage Used: 0 percent
        Data Unit Read: 0x4d8ed21 of 512k bytes.
        Data Unit Written: 0x14d8369 of 512k bytes.
        Number of Host Read Commands: 0xb5e88c6
        Number of Host Write Commands: 0x1bcf428e
        Controller Busy Time in Minutes: 0x163
        Number of Power Cycle: 0x5b
        Number of Power On Hours: 0x683
        Number of Unsafe Shutdown: 0x46
        Number of Media Errors: 0x0
        Number of Error Info Log Entries: 0x0
```

The critical warning parameters are described in the following list.

- 0 - Available spare space has fallen below threshold.
- 1 - Temperature exceeded critical threshold.
- 2 - Reliability has degraded due to significant media related errors or any internal error that degrades device reliability.
- 3 - Media has been placed in read only mode.
- 4 - Volatile memory backup device has failed.

Related Information

- "Minimum Supported Card Firmware Version" on page 36

- *Oracle Server CLI Tools User's Guide* at: http://www.oracle.com/goto/ohmp/docs

Known Issues

These topics provide supplementary and workaround information for the Oracle Flash Accelerator F320 PCIe Card. Specific Change Request (CR) identification numbers are provided for service personnel.

The following table lists known issues for the Oracle Flash Accelerator F320 PCIe Card:

Issues	Workaround?
Updating Device Firmware Using XML Metadata File Fails On SPARC Servers	Yes
`nvmeadm getlog -s` Command Initiates Panic on SPARC M7 Series Servers (24305796)	No
3.2 TB Devices Exceed MBR 2 TB Boundary	Yes

Updating Oracle F320 Flash Card Device Firmware Using XML Metadata File Fails On SPARC Servers (26234240)

The XML metadata file does not update device firmware on SPARC servers. When running the `fwupdate` command with `-x metadata.xml` on SPARC servers, the update does not complete successfully and generates FMA errors. The following error message may be output when the `fwupdate` command is executed, the command may terminate abnormally, and the device taken off-line.

```
fwupdate update controller -x metadata.xml

The following components will be upgraded as shown:
==========================================================
ID        Priority Action    Status      Old Firmware Ver.  Proposed Ver.      New
 Firmware Ver.   System Reboot
---------------------------------------------------------------------------------
c2        1         Check FW  Success     KPYABR3Q           KPYAGR3Q           N/A
            None

Do you wish to process all of the above component upgrades? [y/n]? y
Updating c2:  Success
Sleeping for 10 seconds for component to recover
```

```
Resetting c2
Mandatory post Reset 60 second sleep
Verifying all priority 1 updates

Execution Summary
==========================================================
ID        Priority Action    Status    Old Firmware Ver.  Proposed Ver.     New
 Firmware Ver.   System Reboot
----------------------------------------------------------------------------
--------------- ------------------------------------  -------------- ---------
TIME           EVENT-ID                         MSG-ID        SEVERITY
--------------- ------------------------------------  -------------- ---------
Jun 05 12:31:40 98d87727-e3a3-438d-85f7-c55b37d56828  PCIEX-8000-0A  Critical

Problem Status   : open
Diag Engine      : eft / 1.16
System
    Manufacturer : unknown
    Name         : ORCL,SPARC64-X
    Part_Number  : unknown
    Serial_Number : 9999999
    Host_ID      : 9999999


----------------------------------------
Suspect 1 of 3 :
   Problem class : fault.io.pciex.device-interr
   Certainty   : 40%
   Affects     : dev:////pci@8400/pci@4/pci@0/pci@1/nvme@0
   Status      : ok and in service

   FRU
     Status         : acquitted
     Location       : "/SYS/BB#0-PCI#6"
     Manufacturer   : unknown
     Name           : unknown
     Part_Number    : unknown
     Revision       : unknown
     Serial_Number  : unknown
     Chassis
        Manufacturer  : unknown
        Name          : ORCL,SPARC64-X
        Part_Number   : 9999999
        Serial_Number : 9999999
----------------------------------------
```

Workaround:

Use the fwupdate Manual method. Refer to the following example.

```
fwupdate update nvme-controller-firmware -r -f MS1PC5ED3.GR3Q.fw -n c2

The following components will be upgraded as shown:
=========================================================
ID        Priority Action     Status      Old Firmware Ver.   Proposed Ver.     New
 Firmware Ver.   System Reboot
--------------------------------------------------------------------------------
c2        1        Check FW    Success     KPYABR3Q            Not Provided      N/A
              None
Do you wish to process all of the above component upgrades? [y/n]? y
Updating c2:  Success
```

Refer to the Oracle Hardware Management Pack documentation for instructions at http://www.oracle.com/goto/ohmp/docs.

`nvmeadm getlog -s` Command Initiates Panic on SPARC M7 Series Servers (24305796)

Using the Oracle Hardware Management Pack command `nvmeadm getlog -s` initiates a system panic on SPARC M7 Series Servers, Fujitsu M10 Series Servers, and Fujitsu SPARC M12 Series Servers with Oracle Flash Accelerator F320 PCIe Cards running CS2.9 KPYA8R3Q device firmware.

Documentation for Oracle Hardware Management Pack can be found on the web at: http://www.oracle.com/goto/ohmp/docs

Workaround:

None

3.2 TB Devices Exceed MBR 2 TB Boundary

The Master Boot Record (MBR) boundary has a 2 TB limit. The 3.2 TB NVMe SSD exceeds the 2 TB MBR boundary. Depending on the OS, the partitioning scheme used, and the boot loader, tools that work on less than 2 TB storage devices may not work on greater than 2 TB devices. For Flash Accelerator F320 PCIe Cards which are greater than the 2 TB master boot record, the MBR is restricted and can only handle drives to 2 TB. Thus the partitioning schemes and tools which use MBR no longer operate. On some OSes, the MBR only describes 2 TB. The MBR on a 3.2 TB NVMe SSD incorrectly shows the device as 2 TB. An MBR still exists in the first sector to avoid breaking legacy tools, but declares the device to be 2 TB.

Workaround:

The partitioning tools must use `gpt`. Use an alternate partioning scheme such as `GPT GUID Partition`, or `Table GUID Partition Table`. On Linux, instead of `fdisk`, use `parted` (`gparted` for graphical view) and `gdisk` instead. The Linux tool `dd` can only handle up to a 2 TB MBR. In general, for handling labels, erase the first few MBs of storage, which allows a new label to be created.

Product Accessibility

This section describes the accessibility features that are part of Oracle x86 hardware components.

Oracle strives to make its products, services, and supporting documentation usable and accessible to the disabled community. To that end, products, services, and documentation include features that make the product accessible to users of assistive technology.

Hardware Accessibility

Oracle x86 hardware has color-coded labels, component touch points, and status indicators (LEDs) that provide information about the system. These labels, touch points, and indicators can be inaccessible features for sight-impaired users. The product HTML documentation provides context and descriptive text available to assistive technologies to aid in interpreting status and understanding the system. System-level descriptions and status indicator interpretation can be found in the product Service Manual. The documentation also provides diagrams and screenshots that do not rely on color. Within the diagrams, callouts indicate the referenced component information. The callout descriptions are mapped within a table. All images and tables in the documentation include descriptive alternative text.

Another method to obtain information about the system is to use the built-in Oracle Integrated Lights Out Manager (ILOM). Oracle ILOM provides a browser-based interface and a command-line interface that support assistive technologies for real-time viewing of system status, indicator interpretation, and system configuration. For details, see "Oracle ILOM Accessibility."

You can access the accessible HTML documentation for Oracle x86 hardware products at:

http://docs.oracle.com/en/servers/

Documentation Accessibility

Documentation for Oracle hardware is provided in HTML and PDF formats. The HTML documents are accessible using standard operating system controls and assistive technology. PDF documents are also provided; however, PDF is not an accessible format. PDF documents are considered support documents because the PDF content is available in accessible HTML format.

Product documentation provides figures, other types of images, and screenshots that do not rely on color for interpretation. Within the figures, callouts indicate the referenced component information. The callouts are mapped within a table to provide text descriptions of the referenced parts of the figures. In addition, alternative text is provided for all tables and images that provides the context of the information and images.

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