





Table of Contents

Table of Contents 2
IBM ioMemory VSL 3.2.6 Release Notes
Legal Notices
Introduction
System Requirements
Hardware Requirements 5
Calculating Maximum RAM Requirements
Supported Devices
Virtual Controller Technology Support
Supported Operating Systems
Upgrade Notes
Firmware Version
Upgrading Devices for ioMemory VSL software 3.2.6
Do Not Downgrade Device Firmware
Change Log
3.2.6 Change Log
Known Issues
General
Management Specific
Windows Specific
Linux Specific
VMware Specific
Download Location 24



IBM ioMemory VSL 3.2.6 Release Notes

Legal Notices

© Copyright International Business Machines 2013. All rights reserved.

© Copyright 2006-2013 Fusion-io, Inc. All rights reserved. Fusion-io is a trademark of Fusion-io, Inc.

Part Number: D0001594-005_1 **Published**: December 11, 2013



Introduction

This document describes details about the 3.2.6 ioMemory VSL software release:

- System requirements, including supported operating systems and hardware requirements.
- Upgrade Notes, including the firmware version required for this release.
- Changes since the last generally available release.
- Issues that may arise using this release.

NOTE-

Throughout this document, when you see a reference to an IBM High IOPS Adapter, you may substitute your particular device(s), such as an Second Generation IBM High IOPS Adapter or each of the two IBM High IOPS Adapters of an IBM High IOPS Duo Adapter.

Attention!

Products with Multiple Devices

Some products, such as an IBM High IOPS Duo Adapter, are actually comprised of multiple IBM High IOPS Adapters. If your product consists of multiple IBM High IOPS Adapters, you will manage each IBM High IOPS Adapter as an independent device.

For example, if you have an IBM High IOPS Duo Adapter, you can independently attach, detach, and/or format each of the two IBM High IOPS Adapters. Each of the two devices will be presented as an individual device to your system

NOTE-

References to "ESX(i)" refers to ESX or ESXi.



System Requirements

This section outlines the hardware requirements, supported devices, and supported operating systems for this release of the ioMemory VSL software.

Hardware Requirements

NOTE-

For complete hardware requirements and installation instructions, please refer to the *IBM High IOPS* Adapter Hardware Installation Guide.

NOTE-

For the latest IBM System x server configuration information and requirements for IBM High IOPS Adapters, please see the URL below: http://www.ibm.com/support/entry/portal/docdisplay?lndocid=SERV-IOPS

Sufficient System Memory (RAM)

The amount of RAM the ioMemory VSL software requires varies according to the average block size written to the device. Using the average block size table below, you can estimate the amount of system memory needed.

Sector Sizes

Depending on your operating system, you can reduce worst-case memory use by formatting your IBM High IOPS Adapter with a 4kB sector size and thereby force the average written block size to be 4kB or greater. However, some operating systems do not allow 4kB sector sizes.

IBM High IOPS Adapters are formatted to 512B sectors when shipped.

Attention!

512B-only Support

Some applications and operating systems will only work with 512B sector sizes. These operating systems include: VMware ESX and ESXi.

Consult the fio-format section for your operating system's *IBM ioMemory VSL User Guide* for more information.

Even if you cannot force 4kB sector sizes, the average write I/O size for most workloads is 4kB or larger. For this reason, 4kB average write size is typically the most accurate representation of memory utilization.



Calculating Maximum RAM Requirements

At various block sizes, the following table shows the upper limit of RAM that may be required of your system for every GB of IBM High IOPS Adapter storage space used.

Average Written Block Size (bytes)	RAM Usage (MB) per GB of storage space
8192	1.59
4096 (Most common)	2.85
2048	5.38
1024	11
512	22

For example, if your system is equipped with a device that has a total capacity of 1200GB *formatted to use 4,096 byte sectors*, your system may require as much as:

 $(1200GB \text{ capacity}) \ge (2.85MB \text{ of RAM per GB of storage}) = *3,420MB (or around 3.4GB) of system RAM* may be used by the ioMemory VSL software in a worst-case scenario.$

Note that some products, like IBM High IOPS Duo Adapters, have more than one ioMemory device within the product. You must calculate the RAM usage for each of those ioMemory devices.

Attention!

The amount of RAM used by the ioMemory VSL software will depend on your use case; the table entries above are worst-case numbers. Actual RAM usage will likely be less than the amount listed.

You may run fio-status -a in the command line to see how much RAM the ioMemory VSL software is using per IBM High IOPS Adapter.

Supported Devices

This section lists the new and legacy IBM adapters that are supported with version 3.x of the ioMemory VSL software. To identify the model cards installed in a server, run the management application or use the fio-status command line tool. With the introduction of the second generation adapters, the first generation adapters are considered to be legacy devices when mixing the two generations of cards.

Enterprise Value IBM Flash Adapters

- IBM Flash Adapter F825 Enterprise Value for System x
- IBM Flash Adapter F1650 Enterprise Value for System x
- IBM Flash Adapter F3200 Enterprise Value for System x



Attention!

You must use the SCSI version of the ioMemory VSL software for VMware hypervisors in order to use capacities greater than 2TB.

First Generation IBM High IOPS Mono Adapters (Low Profile cards)

- IBM 160GB High IOPS SS Class SSD PCIe Adapter
- IBM 320GB High IOPS MS Class SSD PCIe Adapter
- 320GB High IOPS SLC Adapter for IBM System x
- 640GB High IOPS MLC Adapter for IBM System x

First Generation IBM High IOPS Duo Adapters (Full Height cards)

- IBM 320GB High IOPS SD Class SSD PCIe Adapter
- 640GB High IOPS MLC Duo Adapter for IBM System x
- 640GB High IOPS SLC Duo Adapter for IBM System x
- 1.28TB High IOPS MLC Duo Adapter for IBM System x

Second Generation IBM High IOPS Mono Adapters (Low Profile cards)

• IBM 1.2TB High IOPS MLC Mono Adapter

Second Generation IBM High IOPS Duo Adapters (Full Height cards)

• IBM 2.4TB High IOPS MLC Duo Adapter

Virtual Controller Technology Support

Virtual Controller technology is supported on Windows and Linux operating systems. The following devices support Virtual Controller technology and will result in the following approximate capacities when the device has been configured for virtual devices:

Device	Number of Virtual Devices	Capacity per Virtual Device	Combined Capacities
IBM 785GB High IOPS MLC Mono Adapter	2	367.5GB	735GB
IBM 1.2TB High IOPS MLC Mono Adapter	2	577.5GB	1155GB
IBM 2.4TB High IOPS MLC Duo Adapter	4	577.5GB	2310GB



Attention!

Only relatively new devices (with few writes performed) may be configured to use Virtual Controller technology. Devices with too much wear are unsuitable for converting to or from a Virtual Controller configuration. Merging virtual devices may also result in additional wear (depending on the wear differences of the two virtual devices). See the *IBM ioMemory VSL User Guide* for your platform for more information on considerations on using this feature.

Supported Operating Systems

All operating systems must be 64-bit and they must be x86 architecture to support IBM High IOPS Adapters. Running the latest service pack / update of a release is strongly recommended.

Supported Microsoft Windows Operating Systems

- Microsoft Windows Server 2008 64-Bit, (with SP2 or higher)
- Microsoft Windows Server 2008 R2 SP1 64-Bit
- Microsoft Windows Server 2012
- Microsoft Windows Server 2012 R2

NOTE-

IBM High IOPS Adapters cannot be used as hibernation devices.

Hyper-V support

Hyper-V, as a Type 2 hypervisor on top of Windows Server 2008 R2 or Windows Server 2012, is supported.

Attention!

With Hyper-V on Windows Server 2008 R2, only a 512B sector size is supported on IBM High IOPS Adapters. For more information on sector sizes in Windows, see the following Microsoft Knowledge Base article:http://support.microsoft.com/kb/2510009.

Supported Linux Distributions

Attention!

The following distributions are supported. Some distribution versions may have binary packages available for download. If your version does not have a binary package available, you can build the installation package from the available source package. Check the download folders for available packages.

- Red Hat Enterprise Linux 5 (up to 5.9), 6 (up to 6.4)
- SUSE Linux Enterprise Server (SLES) 10, 10 SP4, 11, 11 SP1, 11 SP2, 11 SP3

Supported VMware Operating Systems

- ESX 4.0 Update 4
- ESX 4.1 Update 3
- ESXi 4.0 Update 4
- ESXi 4.1 Update 3
- ESXi 5.0 Update 3
- ESXi 5.1 Update 1
- ESXi 5.1
- ESXi 5.5

IBM High IOPS Adapters are only compatible with operating systems that are 64-bit x86 architecture. This means the following scenarios are supported:

- 1. Using the IBM High IOPS Adapter as VMFS datastore within the hypervisor, and then sharing that storage with guest operating systems. Guest operating systems can be 32-bit or 64-bit because they are not directly using the IBM High IOPS Adapter.
- 2. Using VMDirectPathIO, allow a virtual machine to directly use the IBM High IOPS Adapter. In this case, only supported operating systems can use the device.

Attention!

VMDirectPathIO is currently supported on Windows and Linux operating systems that are supported by IBM.

See either the *IBM ioMemory VSL User Guide for Linux* or the *IBM ioMemory VSL User Guide for Windows* for installation instructions.

If you are using VMDirectPathIO, you do not need to install the ioMemory VSL software on the ESX(i) system. Instead, install the driver on the guest system. Only install the driver if you plan on creating a VMFS on the device (s). For more information on using VMDirectPathIO, see the VMDirectPathIO appendix in the *IBM ioMemory VSL User Guide for ESX and ESXi*.



Upgrade Notes

Firmware Version

Use the firmware archive file that is released with this version of the ioMemory VSL software. The archive file fiofirmware-highiops-<version>.<date>.fff contains the controller firmware version 7.1.15.110356 for all IBM High IOPS Adapters.

If the current controller firmware version on any device is lower than the version number listed above, we recommend upgrading to the latest version. However, this version of the ioMemory VSL software will work with any controller firmware versions within this range:

- Minimum firmware required with this release: 7.1.13
- Maximum firmware version supported with this release: 7.1.19

The archive file that is released with this version of the ioMemory VSL software does support Virtual Controller technology on specific devices in Windows and Linux operating systems. <u>Virtual Controller Technology Support on page 7</u> for a list of compatible devices.

Upgrading Devices for ioMemory VSL software 3.2.6

This version of the ioMemory VSL software supports new features, including the latest generation of ioMemory architecture and improved features. These features require a minimum version of the IBM High IOPS Adapter firmware as described above. Every IBM High IOPS Adapter in a system should be upgraded to the same version of the firmware.

For example, if you have a system running 2.2.3 with Legacy IBM High IOPS Adapters previously installed, and you want to install new Second Generation IBM High IOPS Adapters (that require the latest version of the firmware), then you will need to upgrade all of the existing devices to the latest firmware version.

Attention!

You cannot revert a device's firmware to an earlier version once you have upgraded the device. If you experience problems with your upgrade, please contact Customer Support http://www.ibm.com/systems/support.

Device Upgrade Path

Depending on the current firmware version of your devices, you may need to upgrade your device's firmware multiple times in order to preserve internal structures. The following is the minimum upgrade path that must be followed. Upgrade the ioMemory VSL software on the system (and **upgrade the firmware** to the compatible version for each version of the software) in this order:

1.2.8 -> 2.2.3 -> 3.2.6



For example, if your device is using the firmware for ioMemory VSL software version 2.1.0, upgrade to 2.2.3 (both the ioMemory VSL software and compatible firmware) and then continue on the path. Download the required software and firmware versions at http://www.ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-65723 (follow that link and then select **IBM High IOPS software matrix**).

Attention!

Note that when running multiple firmware upgrades in sequence (such as going from 2.1.0 to 2.2.3), after each subsequent firmware upgrade it is critical to shut down the system (including a complete power cycle of the system hardware), restart the system, load the ioMemory VSL software (if it doesn't automatically load with your OS), and attach each device.

Upgrading from ioMemory VSL software Version 2.x

Attention!

Upgrading devices previously configured for ioMemory VSL 2.x or earlier to work with VSL 3.2.6 will require a firmware upgrade and a low-level media format of the device. User data will be destroyed during the format process. **Be sure to backup all data as instructed**.

As shown in the Upgrade Path section above, you may upgrade your IBM High IOPS Adapter to the current firmware version from any firmware version that is released with ioMemory VSL software version 2.2.3 or later. If the firmware version you are upgrading from has a different major version number than the current firmware for this release, then you will see a warning that the upgrade may require a format. If your device is configured with the following firmware version **it will require a low-level format** (which will erase the user data on the device) after you upgrade the firmware: Software version 2.2.3, Firmware version **5.0.6.101583**

- ioMemory VSL software version 2.3.1: Firmware version 5.0.7.101971
- ioMemory VSL software version 2.3.10: Firmware version 5.0.7.107053

NOTE-

In the firmware version shown above, the major version number is 5 (the first number). The firmware major version number for this 3.2.6 ioMemory VSL software release is 7.

It may take an extended period of time to format each device, depending on the wear on the device. You can consult the appendix of the *IBM ioMemory VSL User Guide* for your platform for more information on upgrading the previously configured devices.

Staged Upgrade Example

For more specific on upgrading from one version to the next, see the *IBM ioMemory VSL Release Notes*, available at <u>http://www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-65723</u> (follow that link and then select **IBM High IOPS software matrix**), for each incremental version you will upgrade the device to. Then follow the upgrade instructions in that version's user guide for your operating system (including the firmware update instructions).

However, these upgrade procedures will follow this basic outline:

- 1. Unload the driver of the ioMemory VSL software.
- 2. Uninstall the ioMemory VSL software.
- 3. Install the next version of the ioMemory VSL software in the upgrade path.
- 4. Load the driver module of the ioMemory VSL software.
- 5. Update the firmware on the device(s) to the firmware that came with the ioMemory VSL software.
- 6. Reboot
- 7. Ensure that the newly installed ioMemory VSL software loads correctly and that all {IBM High IOPS Adapters attach properly.
- 8. Repeat this procedure (if necessary) for all upgrades in the sequence.

Once you are ready to install this version of the ioMemory VSL software (3.2.6), consult the user guide for this version for further upgrade instructions.

Do Not Downgrade Device Firmware

Attention!

Do not downgrade the IBM High IOPS Adapter to an earlier version of the firmware. Earlier versions of the firmware may not be compatible with the device, and downgrading the firmware will result in data loss. If you have issues with your firmware upgrade, contact Customer Support http://www.ibm.com/systems/support for compatibility information and to discuss your use case.

If you are installing new IBM High IOPS Adapters in a system using older devices and firmware, upgrade the older devices to the latest firmware and driver as a best practice.



Change Log

3.2.6 Change Log

In addition to various improvements, the following are changes made to the ioMemory VSL software since version 3.2.3, including:

General Changes

General Improvements and Features

- General performance improvements.
- Updated supported operating systems. See Supported Operating Systems on page 8 for details.
- Improved performance on systems with the Intel IOMMU (Input/Output Memory Management Unit) enabled. This enhancement improves how efficiently the VSL software handles DMA mappings, and it therefore helps minimize soft lockup warnings on systems with IOMMU enabled.
- The fio-status utility now reports the alert values that triggered an error. For example, if voltage spikes out of range, then the utility will report the peak voltage that caused the error.
- The fio-sure-erase utility will now stop and report an error if the device is attached during the erase process.
- Improved fio-status processing times.
- New fio-pci-check -n option allows you to return just a status report without clearing any errors or making other changes.
- New fio-pci-check -o option allows you to optimize the ioMemory device PCIe link settings by increasing the maximum read request size if it is too low.
- Increased the number of PCI devices that the fio-pci-check utility can detect.
- Improved PCIe link reporting and error handling.
- The fio-status utility now reports the NAND flash board temperature and related thermal thresholds. See the *IBM High IOPS Adapter Hardware Installation Guide* for more information.
- Improved mixed traffic I/O scheduling.
- Improved handling of errors caused by poorly seated NAND modules.
- Improved failure handling for some Legacy IBM High IOPS Adapters.



Fixed General Issues

• Incorrect time value in log message

Issue	In a system log error message indicating a watchdog was fired, the time was erroneously given in ms.
Resolution	The time is now given in us (micro seconds).

• Invalid device information in system logs

Issue	When an ioMemory device was no longer enumerated on the PCIe bus, the ioMemory VSL software would log device information that was no longer valid.
Resolution	The VSL software no longer attempts to add invalid information to the system logs.

• Large misaligned IOs

Issue	Submitting maximum-sized IOs (1MB) on a non-page aligned boundary could cause IO failure and immediate channel failure.
Resolution	The ioMemory VSL now adequately handles large misaligned IOs.

• Problems attaching Virtual Controller devices using the fio-attach utility

Issue	When an IBM High IOPS Adapter is configured with two Virtual Controller devices, one or more of the Virtual Controller devices may fail to attach.
Resolution	The fio-attach utility now attaches these devices.

• Format statistics not showing new formatting results

Issue	After completing a new format of the device using the fio-format utility, the statistics printed in the system logs reflected the previous formatting conditions.
Resolution	The system logs now show the statistics for the current formatting conditions.

• Invalid fio-update-iodrive error message

Issue	The fio-update-iodrive utility returned the following error (which was no longer a valid error):
	Error: unlock failed addr <address> status 0xff</address>
Resolution	The utility no longer returns the invalid message:



• The fio-bugreport utility fails to complete

Issue	The fio-bugreport utility fails to complete when one or more IBM High IOPS Adapters are in minimal mode.
Resolution	The utility now completes while in minimal mode.

• Device signal and noise values incorrect

Issue	The signal and noise values for IBM High IOPS Adapters returned by lspci were incorrect.
Resolution	The devices now show accurate signal and noise values in the PCIe capabilities listed by lspci.

Windows Changes

Due to a known issue with the IBM TRIM service on Windows Server 2003 and Windows Server 2008 R1, this release of the ioMemory VSL installer does not install the IBM TRIM service.

Windows Improvements and Features

• Changed the default value for the WIN_LOG_VERBOSE module parameter to 1 (enabled). This does increase the size of the system log, and the parameter can be disabled using the fio-config utility, see the *IBM ioMemory VSL User Guide for Windows* for more information.

Fixed Windows Issues

• Potential Windows installation issue

Issue	The ioMemory VSL software installer may fail to install with this error message: There is a problem with this Windows Installer package. A DLL required for this install to complete could not be run. Contact your support personnel or package vendor.
Resolution	The installer package no longer fails with this error.

• System crashes during format

Issue	Under certain circumstances formatting a device using the Disk Manager utility may crash the Windows system.
Resolution	The system will no longer crash while formatting ioMemory devices.



• fio-config not working when the ioMemory VSL software is not loaded

Issue	The fio-config utility would not work without the ioMemory VSL driver loaded.
Resolution	The utility now works whether the software is loaded or not.

Linux Changes

Fixed Linux Issues

• Issue with Veritas Cluster Service and fio-status

Issue	The fio-status utility could hang when the Veritas Cluster Server configuration performed a check on the clusters.
Resolution	The utility will no longer hang when this check is performed.

• Continued issues with write performance that involve FLUSH functions.

Issue	Decreased write performance with file systems and other operations that use asynchronous IO or libaio and performed FLUSH functions on certain Linux kernels (for example, 2.6.32 and 2.6.38).
Resolution	The issue in these kernels no longer impacts write performance.

• FLUSH watchdog error

Issue	A watchdog error was erroneously reporting a stuck flush while the flush was still completing.
Resolution	The ioMemory VSL software now makes sure all current processes are completed before declaring a watchdog error.

• Incompatible kernel

Issue	The 3.10 Linux kernel is incompatible with previous versions of the ioMemory VSL software. This is a known issue with some newer kernel updates for Fedora 18.
Resolution	This release of the ioMemory VSL software is compatible with the 3.10 kernel.



• Mount points with similar names do not mount using the init script

Issue	When using the init script to load the VSL driver, some mount points with very similar names did not mount.
Resolution	All mount points mount as expected.

• Change to default setting of the use_workqueue parameter

Issue	When the use_workqueue parameter was changed to a default value of 0 in VSL version 3.2.2, it exposed an issue with certain Linux kernels that resulted in decreased write performance with file systems and other operations that use asynchronous IO or libaio and performed flush functions.
Resolution	The issue in these kernels no longer impacts write performance.

Fixed VMware Issues



Known Issues

This section describes issues you may encounter when using this ioMemory VSL release.

General

Don't disable CPUs after loading the ioMemory VSL driver

If you plan to take any CPUs offline (including disabling Hyper-Threading Technology), you should do so before the ioMemory VSL driver loads and begins to use the available CPUs. If you disable any CPUs that were being used by the ioMemory VSL software, then the software may hang.

Keep default Message Signaled Interrupts for better performance

With ioMemory VSL software 3.x and later, all IBM High IOPS Adapters have changed from using legacy-style interrupts to message signaled interrupts (MSI). This improves performance while decreasing CPU load.

If you wish to continue using legacy interrupts, set the disable_msiVSL module parameter value to 1. For examples on setting module parameters, please see the **Module Parameter** appendix in the *IBM ioMemory VSL User Guide* for your platform (Windows uses the fio-config utility and the parameter is in all caps: DISABLE_MSI).

In limited situations, using legacy interrupts with the 3.x.x series VSL may degrade performance as much as 10% compared to previous releases. With the 3.x.x series VSL, customers are strongly encouraged to use MSI (default setting) for optimal performance.

Proper Time On Startup

If the IBM High IOPS Adapter does not boot up with proper time set on system, this may delay starting the software as the ioMemory VSL software self-tunes to the difference between the reflected age data and actual age of data.

If the time is set backwards on a running system, this may result in decreased card performance for the lesser of 1 day or the amount the time is set backwards.

"Proper time" is within a few minutes of actual time.

Firmware update may fail with a TDO mismatch error

A Legacy IBM High IOPS Adapter firmware upgrade may fail with the following error:

ERROR: TDO mismatch

This generally occurs when upgrading multiple devices at once.

To resolve this issue, update the devices again, but perform the update one device at a time. This includes IBM High IOPS Duo Adapters, upgrade each IBM High IOPS Adapter (on the duo product) individually.

IBM



Attention!

Do not reboot the system until the devices have been successfully updated.

Device capacity may change after upgrade

If you upgrade a device that was previously formatted using a much earlier version of IBM High IOPS Adapter, the device capacity may change. The capacity difference may be minimal (for example 160.94GB becomes 160GB), but it may be an issue if the device was part of a application or database that expects the exact same capacity.

To solve this issue, use the -o (overformat) option with the fio-format utility. For example:

fio-format -o 160940M /dev/fct1

Management Specific

Do not run multiple fio-format commands in parallel

We do not recommend running multiple instances of fio-format commands at the same time. If you do run multiple commands in parallel, one or more of the commands may fail and it may cause the device to fail. To avoid this issue, either run multiple commands in sequence or (if you are formatting all devices to the same settings) specify multiple devices within one command.

Make sure the utilities match the ioMemory VSL software version

When you install this version of the ioMemory VSL software, make sure you install the utilities that go with this version. Each set of utilities is designed to work with a specific version of the ioMemory VSL software.

If you use a set of utilities that does not match the ioMemory VSL software, you may see an error in the command line or logs such as unhandled ioctlor Error: This version of <utility> is not compatible with the running driver. To solve this issue, reinstall the utilities using the package with the correct version number.

Utility failed while running fio-bugreport

The fio-bugreport utility uses other utilities to create the report. Depending on the operating system, some of these additional utilities may not be available and fio-bugreport will display an error that a fio utility failed or was not found.

The fio-bugreport utility is designed to continue even if a component fails and the report will still be created.

Do not run fio-status during driver load

Run fio-status after the driver has loaded and not during driver load. Running fio-status while the ioMemory VSL software driver is loading may yield the message:

Missing MIDS. Coming up in minimal mode.



If this message is received while running fio-status while loading driver, unload and then reload the driver and run fio-status after the driver has loaded.

fio-status may not display failed devices

On rare occasions, when an IBM High IOPS Adapter fails, the device may no longer appear in fio-status. If your device has failed, contact Customer Support.

Windows Specific

ioMemory VSL software not loading or attaching devices after install

If the ioMemory VSL software is not loading or attaching IBM High IOPS Adapters after installation (including an upgrade), make sure that you have rebooted the system after the installation.

If a reboot does not solve the problem, follow the manual installation procedure in the appendix of the *IBM ioMemory VSL User Guide for Windows*. Repeat this procedure to install each device.

Linux Specific

Upgrading the Kernel in Linux

If you ever plan to upgrade the kernel when the ioMemory VSL software is installed, you must:

- 1. Unload the ioMemory VSL driver.
- 2. Uninstall the ioMemory VSL software.
- 3. Upgrade the kernel.
- 4. Install an ioMemory VSL software package that is compiled for the new kernel.

Failure to follow this procedure may result in driver load issues.

Compiler Cache (ccache) causes ioMemory VSL software src.rpm rebuild failures on some distributions

If the ccache package is installed, rebuilding the ioMemory VSL software src.rpm may fail with an error similar to the following:

```
CC [M] /root/fio/iomemory-vsl-<version>/root/usr/src/iomemory-vsl/driver_
init.o /root/fio/iomemory-vsl-<version>/root/usr/src/iomemory-vsl/driver_
init.c:116: error: initializer element is not constant
[...]
```

To allow the VSL to rebuild, remove the ccache package or disable ccache.



Rare error on driver unload using kernels older than 2.6.24

An issue in Linux kernels prior to 2.6.24 can cause a general protection fault or other kernel error when the driver is unloaded. This issue also affects non-IBM drivers. The issue has been resolved in newer kernels. More information is available here:

http://www.kernel.org/pub/linux/kernel/v2.6/ChangeLog-2.6.24

(search for "commit 5a622f2d0f86b316b07b55a4866ecb5518dd1cf7")

Because this is an issue in the Linux kernel, IBM cannot resolve this issue for older kernels.

ext4 in Kernel 2.6.33 or earlier may silently corrupt data when discard (TRIM) is enabled

The ext4 filesystem in kernel.org kernel 2.6.33 and earlier has an issue where the data in a portion of a file may be improperly discarded (set to all 0x00) under some workloads. Use 2.6.34 or newer to avoid this issue. For more info see the patch [1] and bug report [2] below.

The fix is included in RHEL6 as of pre-release kernel kernel-2.6.32-23.el6. The production RHEL6 kernel is not affected by this issue.

Discard support was added to the kernel.org mainline ext4 in 2.6.28 and was enabled by default. For fear of damaging some devices, discard was set to default to disabled in v2.6.33-rc1 and was back ported to 2.6.31.8 and v2.6.32.1.

- 1. http://git.kernel.org/?p=linux/kernel/git/torvalds/linux-2.6.git;a=commitdiff;h=b90f687018e6d6
- 2. https://bugzilla.kernel.org/show_bug.cgi?id=15579
- 3. http://git.kernel.org/?p=linux/kernel/git/torvalds/linux-2.6.git;a=commitdiff;h=5328e635315734d

Kernels 2.6.34/35 don't handle switching interrupt types

Linux kernels around 2.6.34/35 may have problems processing interrupts if the ioMemory VSL driver is loaded using one interrupt type, unloaded, and then loaded again using a different interrupt type. The primary symptom is that the ioMemory device is unusable, and the kernel logs have errors with "doIRQ". For example, the following sequence on an affected system would likely result in errors.

1. Load the driver with the module parameter disable msi=1 which selects APIC interrupts

		\$ modprobe iomemory-vsl
		\$ modprobe -r iomemory-vsl
2.	Load th	ne driver, enabling MSI interrupts
		<pre>\$ modprobe iomemory-vsl disable_msi=0</pre>

To work around this issue, reboot if you see the error and always load with the same interrupt type selected. To change between interrupt types, reboot first.

- IBN

RHEL6 udevd warning

When using an IBM High IOPS Adapter under RHEL6 (or any Linux distro with udev version 147 or greater), udevd may emit the following innocuous messages:

```
udevd[154]: worker [19174] unexpectedly returned with status 0x0100
udevd[154]: worker [19174] failed while handling
'/devices/virtual/block/fioa'
```

You can ignore this warning.

RHEL6 warn_slowpath during device attach

When attaching an IBM High IOPS Adapter under RHEL6, you may find log messages similar to the following:

This is due to an issue in the 2.6.32 kernel, and the warning can safely be ignored.

Switching interrupt types with newer kernels can cause errors

With newer Linux kernels, switching interrupt types after initial driver load can cause doIRQ errors to be reported by the kernel. As a work around, reboot your system before loading the driver with the new interrupt type specified.

Do not use an IBM High IOPS Adapter as a kdump target

Do not direct kdump to dump the crash information to an IBM High IOPS Adapter. Due to the restricted memory environment in kdump, the ioMemory VSL software does not load in the kdump crashkernel and IBM High IOPS Adapters are not supported as kdump targets.

VMware Specific

Only 512B Sectors Supported

Only a 512B sector size is supported onVMware hypervisors. Consult the fio-format section of the *IBM ioMemory VSL User Guide* for more information.



No Device Names with Raw Block VSL Software for ESXi 5.x

The 3.2.4 release of the Raw block version of the ioMemory VSL software for ESXi 5.x does not support device names. The devices now appear as: "No name provided -" under **Storage Adapters** in the **Configuration** tab of the vSphere client. The SCSI version of the VSL software does support device names.

16 block device limit with VMware hypervisors

VMware ESX(i) hypervisors will only recognize up to 16 IBM High IOPS Adapters installed as raw block devices in the host system. This limit includes each device in a multi-device product. For example, VMware will recognize up to eight IBM High IOPS Duo Adapters (each with two IBM High IOPS Adapters).

This limit only applies to IBM High IOPS Adapters that are used directly by the hypervisor system as raw block devices.

If you pass devices through to a guest OS, those devices are not counted toward the 16 block device limit.

Using VMDirectPathIO with multiple-device products

Some products contain multiple IBM High IOPS Adapters on one PCIe adapter, such as the IBM High IOPS Duo Adapter. The ioMemory VSL software does not support splitting the two IBM High IOPS Adapters between two functions or virtual machines. The following scenarios are supported:

- Both IBM High IOPS Adapters are used as a VMFS datastore in ESX(i).
- Both IBM High IOPS Adapters are passed through (using VMDirectPathIO) to the same virtual machine.

ESXi 5.x injected installer allows installation on an IBM High IOPS Adapter

IBM High IOPS Adapters are not designed to be bootable, therefore you should not install the host OS on an IBM High IOPS Adapter. The ESXi injected installer will permit you to install the OS on an IBM High IOPS Adapter, but the installation will fail on reboot.

vCenter cannot manage extents on IBM High IOPS Adapters

You cannot use vSphere vCenter to manage extents on IBM High IOPS Adapters, including growing or spanning extents. However, you can connect directly to the host using the vSphere client and manage extents on IBM High IOPS Adapters.



Download Location

Software, utilities, and related documentation for this version can be found at

http://www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-65723 (follow that link and then select **IBM High IOPS software matrix**)

IBM part number 00AH230