HP Integrity Virtual Machines 4.2: Release Notes

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Legal Notices

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About This Document

The *HP Integrity Virtual Machines Release Notes* document describes the latest enhancements and changes to the HP Integrity Virtual Machines product (Integrity VM), including limitations and guidelines for using the Integrity VM software. Always read the release notes before installing and using the product. For the most current information, obtain the latest version of this document from Integrity Virtual Machines documentation.

Intended Audience

This document is intended for system and network administrators responsible for installing, configuring, and managing Integrity VM. Administrators are expected to have an in-depth knowledge of HP-UX operating system concepts, commands, and configuration. In addition, administrators must be familiar with the HP Integrity machine console and how to install the operating systems and applications running on their virtual machines.

New and Changed Information in This Edition

This document supersedes the HP Integrity Virtual Machines Version 4.2 Release Notes, T2767–90203.

Typographic Conventions

find(1)	HP-UX manpage. In this example, "find" is the manpage name and "1" is the manpage section.
Book Title	Title of a book or other document.
Linked Title	Title that is a hyperlink to a book or other document.
http://www.hp.com	A website address that is a hyperlink to the site.
`Command`	Command name or qualified command phrase.
`user input`	Commands and other text that you type.
`computer output`	Text displayed by the computer.
Enter	The name of a keyboard key. Note that **Return** and **Enter** both refer to the same key. A sequence such as **Ctrl+A** indicates that you must hold down the key labeled **Ctrl** while pressing the **A** key.
term	Defined use of an important word or phrase.
`variable`	The name of an environment variable, for example `PATH` or `errno`.
`value`	A value that you might replace in a command or function, or information in a display that represents several possible values.
`<element>`	An element used in a markup language.
`attrib=`	An attribute used in a markup language.

Document Organization

This document contains information that supplements the information in the *Integrity Virtual Machines Version 4.2: Installation, Configuration, and Administration* and includes the following chapters:

- Chapter 1: "Introduction" (page 15) describes some of the enhancements and quality improvements in the current release of the HP Integrity Virtual Machines product.
- Chapter 2: "Installation Notes" (page 19) contains information about installing and upgrading Integrity VM and associated products.
- Chapter 3: "Creating Virtual Machines" (page 39) contains information about creating virtual machines.
- Chapter 4: "Installing Guests" (page 41) contains information about installing guest operating system and management software.
- Chapter 5: "Using Integrity VM Commands" (page 55) contains information about using Integrity VM commands.
- Chapter 6: "Guest Administration" (page 61) contains information about guest system administration.
- Chapter 7: "Networking Information" (page 67) contains information about virtual networking resources.
- Chapter 8: "Storage Information" (page 75) contains information about virtual data storage for guests.
- Chapter 9: "Migrating Virtual Machines" (page 83) contains information about migrating virtual machines from one system to another.
- Chapter 10: "Error Logging" (page 87) contains information about the message logging provided by Integrity VM.
- Chapter 11: "Integrity VM Support Policy" (page 89) contains tables listing the Integrity VM support on VM Hosts and guests.

Related Information

The following documents, which are found at the Business Support Center website at http://www.hp.com/go/virtualization-manuals, might be useful to the reader of this document:

- *HP Integrity Virtual Machines 4.2: Installation, Configuration, and Administration*
- *HP Integrity Virtual Machines Manager 4.1 Software: User Guide*
- *HP Ignite-UX Reference for HP-UX 11i*
- *HP-UX Installation and Update Guide*
- *HP-UX Reference (Manpages)*
- *HP Managing Serviceguard*
- *Windows on Integrity: Smart Setup Guide*

Publishing History

Publication Number	Supported VM Host Operating System	Supported Integrity VM Version	Edition Number	Publication Date
T2767-90005	HP-UX 11i v2 May 2005 and later	HP Integrity Virtual Machines A.01.00	1.0	October 2005
T2767-90010	HP-UX 11i v2 May 2005 and later	HP Integrity Virtual Machines A.01.20	2.0	February 2006
T2767-90010	HP-UX 11i v2 May 2005 and later	HP Integrity Virtual Machines A.01.20	2.2	February 2006

Publication Number	Supported VM Host Operating System	Supported Integrity VM Version	Edition Number	Publication Date
T2767–90014	HP-UX 11i v2 May 2005 and later	HP Integrity Virtual Machines A.01.20	2.3	April 2006
T2767-90043	HP-UX 11i v2 May 2005 and later	HP Integrity Virtual Machines A.01.20	2.4	June 2006
T2767–90033	HP-UX 11i v2 May 2005 and later	HP Integrity Virtual Machines A.02.00	3.0	October 2006
T2767–90076	HP-UX 11i v2 September 2006 and later	HP Integrity Virtual Machines A.03.00	4.0	April 2007
T2767–90094	HP-UX 11i v2 December 2007 and later	HP Integrity Virtual Machines A.03.50	5.0	December 2007
T2767–90114	HP-UX 11i v2 December 2007 and later	HP Integrity Virtual Machines A.03.50	6.0	December 2007
T2767–90150	HP-UX 11i v2 March 2008 and later	HP Integrity Virtual Machines A.03.50	7.0	March 2008
T2767–90160	HP-UX 11i v3 September 2008 and later	HP Integrity Virtual Machines B.04.00	8.0	September 2008
T2767–90179	HP-UX 11i v3 September 2008 and later	HP Integrity Virtual Machines B.04.00	8.1	September 2008
T2767–90179	HP-UX 11i v3 September 2008 and later	HP Integrity Virtual Machines B.04.00	8.2	October 2008
T2767–90181	HP-UX 11i v3 March 2009 and later	HP Integrity Virtual Machines B.04.10	8.3	March 2009
T2767–90186	HP-UX 11i v3 April 2009 and later	HP Integrity Virtual Machines B.04.10	8.4	April 2009
T2767–90191	HP-UX 11i v3 April 2009 and later	HP Integrity Virtual Machines B.04.10	8.5	July 2009
T2767–90797	HP-UX 11i v3 April 2009 and later	HP Integrity Virtual Machines B.04.10	8.6	December 2009
T2767–90203	HP-UX 11i v3 March 2010 and later	HP Integrity Virtual Machines B.04.20	9.0	March 2010
T2767–90209	HP-UX 11i v3 April 2010 and later	HP Integrity Virtual Machines B.04.20	10.0	April 2010
5900–0287	HP-UX 11i v3 June 2010 and later	HP Integrity Virtual Machines B.04.20	11.0	June 2010

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1 Introduction

Thank you for installing HP Integrity Virtual Machines (also called Integrity VM). This *Release Notes* document describes the changes in this version of the Integrity VM product.

The Integrity VM Version 4.2 release introduces several new features including support for the HP-UX 11i v3 1003 as a VM Host. The following patches are required:

- On the 11i v3 VM Host:
  - PHSS_40875 HPVM core patch
  - PHSS_40876 VMAGENT patch

NOTE: Integrity VM patches for fixes developed subsequent to the Integrity VM V4.2 release are available at the HP IT Resource Center (ITRC) website: http://www.itrc.hp.com.

HP recommends that you install the latest AVIO components for both the VM Host and the guest; however, updating both guest and host components at the same time is not mandatory. Updating both components ensures that you always receive the latest bug fixes for a complete solution. HP fully supports different versions of the guest and VM Host AVIO components. For example, you can run a guest AVIO driver based on the March 2008 Fusion with a VM Host AVIO driver based on the December 2008 Fusion.

Always check the software depot website,http://software.hp.com, for the latest version of AVIO software. Search for the keyword HPVM AVIO. In addition, check this website to determine the required version of Ignite for AVIO.

This manual is organized in the following way:

- This introductory chapter contains a list of the new features provided in the new release, as well as a description of the manual organization. It also may contain information of general interest to the release, like Section 1.2 (page 16) and documentation issues.
- Chapter 2 through 10 provide release notes, which each chapter divided into two categories:
  - Changes and issues in this release — which describe changes and issues in the V4.2 release or new information needed to use V4.2.
  - Known issues — which describe issues and information persisting from previous releases and still relevant to the new release.
- Chapter 11 provides the support policy tables for Integrity VM V4.2 and its components.

For the most up-to-date information about HP Integrity Virtual Machines, see the documentation on the Business Support Center website:

HP Integrity Virtual Machines documentation

For the most recent information relevant to this update, see the `README.txt` file at the following location:

`/opt/hpvm/doc/readme.txt`

1.1 New Features and Enhancements in This Version of Integrity VM

This section describes how the current version of Integrity VM has been enhanced over previous versions. For more information about these enhancements, see the *HP Integrity Virtual Machines Version 4.2: Installation, Configuration, and Administration* manual.

The features in the following list have been included in this release of Integrity VM:

- Support for the latest Intel® Itanium® Processor 9300 series on the following VM Host and guests:

  - HP-UX 11i v3 VM Host — HP-UX 11i v3 1003
  - HP-UX 11i v3 guests — HP-UX 11i v3 0903 through 1003
  - HP-UX 11i v2 guests — HP-UX 11i v2 0712

  The following patches are required for 11i v2 and 11i v3 guests running on Intel® Itanium® 9300 Processor Series systems:

  - HP-UX 11i v2: PHCO_40685 and PHKL_40684
  - HP-UX 11i v3: PHKL_39482 and PHCO_38777
- Support for the following VM Host and guests:
  - HP-UX 11i v3 VM Host — HP-UX 11i v3 1003
  - HP-UX 11i v3 guests — HP-UX 11i v3 0709, 0803, 0809, 0903, 0909, and 1003
  - HP-UX 11i v2 guests — HP-UX 11i v2 0712 to 0806
  - Windows Server 2008 (also know as Windows Server 2008 SP1)
  - Red Hat Linux Enterprise Edition Advanced Server Release 4 update 5
  - SUSE Linux Enterprise Server (SLES) for HP Integrity servers SLES 10 update 2
- New OpenVMS guest support on HP Integrity servers, including the Intel® Itanium® 2 9000 Processor series and the Intel® Itanium® Itanium 2 9100 Processor series. The OpenVMS guest is not supported on the Intel® Itanium® Processor 9300 series.

  Support for OpenVMS guests requires the OpenVMS version 8.4 operating system.
- Automatic memory reallocation for memory balancing.
- Storage Reporting tool with VM Host and guest view for HP-UX guests.
- VMs as Serviceguard Packages and VMs as Serviceguard Nodes software and documentation enhancements.
- Encryption during migration.
- Optimal memory allocation for autoboot.
- Inclusion of the Online VM Migration feature into the VSE-OE and DC-OE.
- Improvement of migration performance on heavily loaded host systems.
- Guest-based VLAN support.

The features in the following list have been rolled-into Integrity VM V4.2 from the patch kits that were provided after Integrity V4.1 was released.

- Windows Server 2008 (also know as Windows Server 2008 SP1).
- Support for enabling or disabling vCPUs online.
- AVIO support for VxVM backing stores
- Attached device support in AVIO storage for tape, burner, and changer devices for HP-UX guests.
- Support for HP-UX 11i v3 0909 guests.
- Migration support with shared LVM storage in cluster without SGeRAC.
- AVIO LAN and vswitch changes to support AVIO guest vLAN.

1.2 Guest Management Software

Integrity VM provides specific software for each type of guest operating system. This guest management software enhances guest performance, enables Integrity VM commands, and includes providers for virtual management software, such as Integrity Virtual Machines Manager. The locations and contents of the guest management kits are modified in this version of Integrity VM. The guest management software is required on each guest.

Guest management software is installed on the guest either remotely, from a software depot, or locally, after being copied to the guest. The guest management software is located in the `/opt/hpvm/guest-images` directory. Table 1-1 lists the location of the guest management software

kit for each type of guest operating system. The instructions for installing the guest management software are provided in `README.txt` files in these directories.

Table 1-1 Guest Management Software Kit Locations

Guest Operating System	Guest Management Software Location
HP-UX 11i v2	`/opt/hpvm/guest-images/hpux/11iv2`
HP-UX 11i v3	`/opt/hpvm/guest-images/hpux/11iv3`
Linux	`/opt/hpvm/guest-images/linux`
Windows	`/opt/hpvm/guest-images/windows` and `/opt/hpvm/guest-images/windows2008`

NOTE: The HP OpenVMS guest kit is included in the HP OpenVMS Version 8.4 distribution kit.

Installing the guest management software kit causes the guest to reboot.

Whenever you upgrade Integrity VM, reinstall the guest kit on all the guests. This ensures that guests run well and continue to be manageable and supportable. Failure to install and upgrade the guest management software on each guest can cause problems that are difficult to diagnose and solve.

2 Installation Notes

This chapter contains notes about installing and upgrading Integrity VM and associated software on the VM Host system.

2.1 Installing Integrity VM

This section describes information about installing the HP Integrity Virtual Machines product and associated software on the VM Host system.

HP Integrity Virtual Machines B.04.20 is supported on HP Integrity servers or nPartitions running HP-UX 11i v3 March 2010 1003). When you upgrade or reinstall Integrity VM, guests are stopped, but they are not removed. When the new version of Integrity VM starts, the virtual machines might also start, depending on the setting of the guest boot attribute.

NOTE: Version 4.2 of Integrity Virtual Machines requires the installation of both the HostAVIOStor and HostAvioLan bundles. Other Integrity Virtual Machines documentation may state this requirement is optional, but it is not. In addition, to use the AVIO network driver on a Windows guest, you must install the VMGuestSW bundle.

The VM Host system is not a general-purpose system; it is dedicated to the hosting of virtual machines. After you install Integrity VM, no operating system or process management reconfiguration should be performed outside those provided by the Integrity VM interfaces. Specific examples of actions that are not supported on the VM Host system include:

- Changing priorities or scheduling attributes of processes on the VM Host system.
- Modifying kernel tunables in any way.

Do not install the VM Host software on a VM guest, and do not install the HPVM-Guest software on the VM Host. Neither configuration is supported.

If the current version of your VM Host AVIO (HostAVIOStor) storage driver is B.11.31.0903 or later, then before you install this Integrity VM V.4.2 patch kit, upgrade the guest AVIO storage driver (GuestAVIOStor) to B.11.31.0903/B.11.23.0903 or later on both HP-UX 11i v2 and HP-UX 11i v3 guests.

If you do not upgrade your AVIO guest storage drivers, you might see occasional open failures of AVIO storage devices.

For complete information about the requirements for installing Integrity VM, see the *HP Integrity Virtual Machines 4.2: Installation, Configuration, and Administration* manual.

2.2 Changes and Issues in This Release

The following sections describe changes, issues, and new information pertaining to this release.

2.2.1 Unable to Communicate with the FSS Agents Messages in `/var/opt/hpvm/common/command.log`

When Integrity VM is stopped either with the `/sbin/init.d/hpvm stop` command or as a result of removing or updating the version of Integrity VM on the VM Host, messages of the following form might be logged in the `/var/opt/hpvm/common/command.log` file:

```
ERROR|host|root|Unable to communicate with the FSS agent
```

The messages, which are a result of interactions with the performance metrics processes `scopeux` and `perfd`, are normally transient and stop after about a minute. Approximately 60-70 messages might be generated in that time. You can clear this condition by either rebooting the VM Host or by stopping and restarting the metrics collection processes.

To stop and restart the `perfd` process, use the following commands:

```
# /sbin/init.d/ovpa stop
# /sbin/init.d/ovpa start
```

To stop and restart the `scopeux` process, use the following commands:

```
# /sbin/init.d/ovpa stop
# /sbin/init.d/ovpa start
```

2.2.2 Compatibility of VSE V4.1 with Integrity VM V4.2

You can use Version 4.1 of the VSE Suite with Integrity VM Version 4.2, but this version of the VSE Suite does not support the new features in Integrity VM Version 4.2.

2.3 Known Issues and Information

The following sections describe known issues and information from previous releases that still apply to V4.2.

2.3.1 Warning Messages That Can be Ignored

During the installation or update of Integrity VM along with the HostAvioLan and/or the HostAVIOStor products, you might see the following warning messages in the `/var/adm/syslog/syslog.log` file:

```
WARNING: mod_uninstall: Attempt to uninstall hvsd module: Module is not installed
WARNING: mod_uninstall: Attempt to uninstall hssn module: Module is not installed
```

These warning messages can be safely ignored.

2.3.2 Large Page Defects in HP-UX 11i v3 on the VM Host

With patch PHSS_39784, Integrity VM Version 4.1 supports both 64KB and 4KB settings for the base_pagesize tunable, but the installation of Integrity VM automatically configures the base_pagesize tunable (see the `kctune(1m)` manpage), so that the VM Host's operating system uses 64K memory pages. This significantly improves the efficiency of Integrity VM's memory management on behalf of the virtual machines. Unfortunately, there are several defects that can significantly hamper software installation and operation when HP-UX is configured with 64K base_pagesize (BPS).

NOTE: Using a 64KB base_pagesize instead of 4KB saves approximately 700 MB on a 2 GB system.

This section highlights some of the more common and severe problems. For the latest issues related to 64K BPS, see the Integrity Virtual Machines Platform Manager section of the white paper *Tunable Base Page Size*, the latest version of which is available from Tunable Base Page Size. To avoid these problems, you can change the base_pagesize on the VM Host to 4K.

NOTE: In Integrity VM V4.2, the 64KB base_pagesize is no longer set by default during installation.

2.3.2.1 HP-UX Installation and Update Failures When Using Physical Installation Media

The update from 0903 OE media might fail on VM Host (physical) systems, leaving the operating system in an unusable state. This is caused by a defect in HP-UX when running with a base_pagesize of 64K. Installation of Integrity VM sets the base_pagesize (BPS) to 64K, and Integrity VM Version 4.1 requires HP-UX 0903 on the VM Host system. The failure manifests in at least two ways:

- You might receive a read error while reading filesets from the OE media, with a “Bad Address (14)” wording in the error message.

  Workaround: Install the PHKL_39114 patch.

- The update might hang while installing the filesets from the March 2009 OE media. Installing PHKL_39114 does NOT fix this critical problem. This problem results when you update the OE from 0809 to 0903 using physical (DVD) media. This problem does **not** occur with any of the following conditions:
  - — You use Update-UX with a network source depot.
  - — You are cold-installing from OE media or a network depot.
  - — You are updating from a release prior to September 2008.
  - — Your system is set to a BPS of 4K before the update.

  Follow these steps to work around this problem:

  1. Check the state of BPS on your system by running:

     ```
     # kctune base_pagesize
     Tunable Value Expression
     base_pagesize 64 64
     ```

     If it is 4 instead of 64, then you can proceed directly with the update.

  2. Gracefully shut down all VMs running on the VM Host system.
  3. Shut down Integrity VM:

     ```
     # /sbin/init.d/hpvm stop
     ```

  4. Change the BPS value to 4K with the following command:

     ```
     # kctune base_pagesize=4
     ```

  5. Reboot your system, and verify the 4K BPS value as in Step 1.
  6. Update the system with the OE media by completing all Update-UX steps.
  7. After your system has updated and rebooted, set the BPS to the original value:

     ```
     # kctune base_pagesize=64
     ```

  8. Reboot your system, and verify the original BPS value (in this case, 64K) as in Step 1.
  9. Verify that Integrity VM has started successfully using the `hpvmstatus` command.

  For more information, see the *HP-UX 11i v3 Read Before Installing or Updating March 2009*. For the latest information on this issue, including the updated recovery instructions, see CRs QXCR1000868519 and QXCR1000907205. You can search for them by following these steps::

  1. Go to the IT Resource Center at this website: http://www.itrc.hp.com.
  2. Click “Search knowledge base”.
  3. Select “Search by document ID” for your search mode.
  4. Enter "ttr_na-SSB_1000868519" or "ttr_na-SSB_1000907205" in the box.

2.3.2.2 After Upgrading to 11i v3, Guests Cannot Start Due to Missing USB DVD Backing Device

If you have recently upgraded or are planning to upgrade to HP-UX 11i v3, (0903 or later) from either HP-UX 11i v2 or an earlier version of HP–UX 11i v3, note that this release contains a new USB driver that uses a different device name for a USB DVD drive. Guests that have been configured to use a USB DVD as a backing storage device require modifications to access the new device name for the USB DVD. If no modifications are made to those guests, they will not be able to access the USB DVD and might fail to boot due to a change in the EFI boot-path device.

NOTE: Patch PHKL_37815 contains the new USB driver delivered with HP–UX 11i v3 (0903). Consequently, if you install this patch on an HP–UX 11i v3 system that is older than 0903, you might experience the same problem.

You can use a single `hpvmdevmgmt` to modify all guests to use the new USB DVD device. Run the following command when all affected guests are off or not running:

`/opt/hpvm/bin/hpvmdevmgmt -n gdev:`*`old_USB_devicename`*`:`*`new_USB_devicename`*

The new USB DVD devices appear in the default `ioscan` command as follows:

```
usbmsvbus 0 255/0       mass_storage CLAIMED VIRTBUS USB Mass Storage
ext_bus   1 255/0/0     usb_ms_scsi CLAIMED INTERFACE USB Mass Storage SCSI
target    4 255/0/0.0   tgt CLAIMED DEVICE
disk      7 255/0/0.0.0 sdisk CLAIMED DEVICE HP
target    3 255/0/0.2   tgt CLAIMED DEVICE
disk      6 255/0/0.2.0 sdisk CLAIMED DEVICE HP DVD Writer 630c
```

For information about `ioscan` output for USB devices, see the *Understanding HP-UX 11iv2 and v3 USB* `ioscan` white paper.

The following `ioscan` command gives you all agile device names for the DVD on the system. Generally, there is only one that is either directly connected or connected using the USB controller:

```
ioscan -FN | grep DVD | awk  -F:  '{print "/dev/rdisk/disk" $13}'
```

For information about updating to the new USB driver on HP-UX 11i v3, see the *Update to USB Driver Support on HP-UX 11i v3* white paper.

2.3.2.3 HPVM-Guest Bundle on HP-UX Guests No Longer Reduces Value of *dma32_pool_size*

The HPVM-Guest bundle on HP-UX guests no longer reduces the value of *dma32_pool_size*. Contact HP Technical Support for suggested values of *dma32_pool_size*, if necessary.

The HPVM-Guest bundle can be installed on physical Integrity servers where appropriate to facilitate migration or cloning of that system image onto a virtual machine. When installed directly onto a physical Integrity server, a warning is issued indicating that the bundle is intended for use on a virtual machine. There is no known adverse impact resulting from its installation.

Users can configure *dma32_pool_size* to the value set when the V4.0 and V3.5 HPVM-Guest software was installed, with the following command:

```
# kctune dma32_pool_size=4194304
```

The virtual machines must be rebooted for this setting to take effect.

2.3.2.4 Clicking Veritas Enterprise Administrator Link on the System Management Homepage Might Result in VEA Abort and Core Dump

Starting with the September 2008 OEUR, clicking the Veritas Enterprise Administrator (VEA) link on the System Management Homepage might result in VEA aborting and dumping core. This problem happens when HP-UX has been configured to use large pages (64K base page size) and VEA is bundled with a lower version of JRE.

This problem is also seen with VEA and the Integrity VM Host, as the Integrity VM default configuration includes large page size for performance optimization.

To work around this problem, install the patch, `PHCO_37694`, which updates the version of JRE without requiring a reboot. For availability of the patch, check the HP IT Resource Center site: http://itrc.hp.com. For additional information about adjusting base page sizes, see the *Tunable Base Page Size* information at: Tunable Base Page Size white paper.

2.3.2.5 Failures in Key Applications

Some applications fail when run on HP-UX with large pages configured (larger than 8K). Those that are frequently used on the VM Host and instructions for how to address problems with those applications follow:

- Veritas Enterprise Services Administrator

  The Veritas Enterprise Services Administrator, part of the Symantec VxVM product, as delivered into Update 3, bundles in a version of the Java Virtual Machine that does not work with values of the system base-page size greater than the default. This situation is remedied by a patch to the VxVM product that was released in October 2008. The patch, whose identifier is PHCO_37694, is now available on the HP patch hub.

- Opsware AMS Client

  The `aistat`, `rgetver`, `aiinv`, `aicfg`, and `aiclient` executables might fail with the error message:

  ```
  crt0: ERROR: mmap failed for dld (text) errno:000000022
  ```

  The failure is caused by a defect in the dynamic linker provided with HP-UX. Installation of the patch with identifier PHSS_39094 resolves the problem.

For more information, see the white paper *Tunable Base Page Size* at: Tunable Base Page Size for issues with other applications on the VM Host system.

2.3.3 Integrity VM Includes the Base Operating Environment

The HP-UX Base Operating Environment (BOE) is included with Integrity VM. Install the BOE on the VM Host on which you install Integrity VM. The license for the BOE (used in the VM Host only) is included with the purchase of Integrity VM. If you buy the VSE-OE or DC-OE, the OEs for the guests are included. However, if you buy Integrity VM stand-alone or in the VSE Suite, then you need to purchase the guest software separately.

For VM Hosts that support guests as Serviceguard packages, the High Availability Operating Environment (HA-OE) can also be used.

2.3.4 Installing the Migration Tools Including `hpvmmigrate` and Physical-to-Virtual Assist Tools

The VMMigrate SD-UX bundle no longer exists. The functionality delivered with this bundle is now delivered with installation of the Integrity VM bundle T2767CC. Installation of T2767CC causes the old VMMigrate bundle to be automatically removed. The functionality previously delivered with the VMMigrate bundle has been replaced by the contents of two SD-UX products within the T2767CC bundle, VMMIGRATE and VMCONVERT. The VMMIGRATE product contains the `hpvmmigrate` command along with its supporting tools and manual. The physical-to-virtual tools and documentation are delivered in the VMCONVERT product. These SD-UX products and others can be seen with the `swlist` command:

```
swlist -R T2767CC
```

The repackaging of the physical-to-virtual tools in the T2767CC.VMCONVERT product, allows them to be installed on any Integrity HP-UX 11i v3 system, not just on a VM Host or a virtual machine. This results in more practical use of the physical-to-virtual tools enabling them on physical Integrity servers, vPars, nPars, and so on.

To install the physical-to-virtual tools on an Integrity HP-UX 11i v3 system, enter the following command:

```
# swinstall -s path to Integrity VM install media T2767CC.VMCONVERT
```

This installs only the physical-to-virtual tools without any of the other Integrity VM functionality.

NOTE: Be sure to completely specify T2767CC.VMCONVERT, so that you do not accidentally transform your host to a VM Host that is left in an unknown state.

2.3.5 Limitations When using HP Integrity Virtual Machines Manager with Integrity VM V4.2

HP Integrity Virtual Machines Manager (VMMgr) Version 3.5 or Version 4.0 can be used with Integrity VM V4.2. Earlier versions of VMmgr (V3.0 and earlier) do not install or run on an HP-UX 11i v3 VM Host and cannot be used with Integrity VM V4.2. Users upgrading to Integrity VM V4.2 must upgrade to VMMgr V3.5 or preferably VMMgr V4.0. In addition, users of HP Insight Dynamics Virtual Software Environment software versions earlier than V4.0 must upgrade to HP Insight Dynamics — VSE V4.1 (which contains VMMgr V4.0).

Because VMMgr V3.5 is designed to run on HP-UX 11i v2 with Integrity VM V3.5 or earlier, VMMgr cannot use or display information about new features in Integrity VM V4.2 or new features in HP-UX 11i v3, in particular the new agile addressing hardware paths and device files for storage devices. VMMgr V4.0 is designed to run on HP-UX 11i v3 with Integrity VM V4.2 or earlier. It cannot use or display any new features in Integrity VM V4.2, but does support new features in HP-UX 11i v3, including the new agile addressing hardware paths and device files for storage devices. This means the following:

- The VMMgr product V3.5 does not display or allow the setting of minimum or maximum numbers of vCPUS, the graceful stop timeout, or entitlement caps for a virtual machine. If a new entitlement is set on the Modify > Virtual Machine Entitlement dialog that exceeds the current entitlement cap when VMMgr executes the `hpvmmodify` command to effect the change, the command rejects the setting and issues an error message that VMMgr displays. VMMgr behaves similarly if a new number of vCPUs set on the Modify > Virtual Machine vCPU Count dialog is outside the range of the current minimum and maximum number of vCPUs.

  The VMMgr product V4.0 allows the display and setting of the maximum and minimum setting of vCPUS and entitlement caps and the display of the graceful stop timeout. VMMgr V4.0 also uses the currently set entitlement caps to validate input on the Modify > Virtual Machine Entitlement dialog.

- Neither VMMgr V3.5 nor V4.0 display any information about MSE group membership for the VM Host, nor support the initiation of either an offline or online guest migration from one VM host to another. If a virtual machine is running on one member of an MSE group, it will be displayed as stopped on a different member of the MSE group without indicating that the virtual machine is not currently runnable on that host. Both versions would permit a user to attempt to start the virtual machine. However, in this case, the underlying Integrity VM V4.2 `hpvmstart` command that VMMgr executes would issue an error message indicating that the virtual machine is not runnable on the current VM Host.

  Also, if a virtual machine that is defined on 2 different VM Hosts in an MSE group has the same Integrity VM UUID on both hosts, HP Insight Dynamics — VSE V4.0 and V4.1 might not display the virtual machine as contained in the VM Host where it is currently running in the Visualization Manager component. It might appear in Visualization Manager as if the virtual machine is running on one of the other VM Hosts where it is defined.

- The limitation documented in the Integrity Virtual Machines Manager V3.5 Release Notes concerning HP SecurePath virtual device files located in `/hpap` does not apply. HP SecurePath is not supported on HP-UX 11i v3.
- With VMMgr V3.5, only legacy device files and hardware paths are displayed as backing device choices when adding a storage device to a new or existing VM. This dialog appears when invoking the Modify > Add Storage Device to Virtual Machine menu item and when defining virtual storage in the Create > Virtual Machine wizard. The new persistent device files and LUN hardware paths are not listed in the choices. To add a virtual storage device

using a persistent device file as a backing device to a new virtual machine, use the `hpvmcreate` command. To add such an I/O device to an existing VM, use the `hpvmmodify` command.

Beginning with VMMgr V4.0, you can display persistent device files (and their associated LUN hardware paths) as backing device choices when adding a storage device.

- In V3.5 of VMMgr, only legacy device files are displayed in the boxes representing physical storage devices in the rightmost column of the Storage tabs appearing in the Manage Host or Manage VM views. Hardware paths for host bus adapters are unchanged in the new agile addressing scheme and display correctly in the boxes representing them. The new persistent device files are shown, except as described in the following list:
  - If a virtual storage device is added using the `hpvmcreate` command or the `hpvmmodify` command to a virtual machine, with a persistent device file specified as the backing device, VMMgr displays the backing device on the Storage tabs with the correct persistent device file shown, but displays an icon indicating an unknown device. In addition, VMMgr is unable to link the virtual device to a physical storage device.
  - If a physical storage device is marked as restricted using a new persistent device file, VMMgr lists the device as a choice in the Add Storage dialog. Normally, restricted devices are excluded from this list. Although VMMgr allows this selection, and attempts to create the VM or add the storage device using the `hpvmcreate` command or the `hpvmmodify` command, the command fails because the device is restricted. The command rejects the specification and issues an error message, which is displayed by VMMgr. As a workaround, add additional restricted devices with the `hpvmdevmgmt` command using the legacy device files for the physical storage device. These can be determined by using the `ioscan -m` command. For example:

    ```
    # ioscan -m dsf /dev/rdisk/disk3
    ```

    The VMMgr product V4.0 correctly displays devices by either legacy and agile specifications on the storage tab, depending on which was used when the virtual storage device was added to the virtual machine, and will correctly map those virtual devices to their respective physical backing devices. In addition, VMMgr V4.0 adds a new simplified display on the storage tab that eases tracing the connections from the virtual machine's virtual device to the physical backing device. The original, more complex, display is also available by selecting the "Show host bus adapter" checkbox on the storage tab. Persistent device files and LUN hardware paths are displayed in the physical storage device representations (boxes).

- If an LVM volume group or whole-disk swap is defined using the new persistent device files, VMMgr V3.5 does the following:
  - Displays the disk in the Add Storage dialog as a valid choice. Disks used for LVM volume groups and whole-disk swap are normally excluded from this list; however, VMMgr allows this selection. When VMMgr attempts to create the VM or add the storage device using the `hpvmcreate` or the `hpvmmodify` command, the command rejects the specification and issues an error messages, which is displayed by VMMgr. As a workaround, manually make the disk restricted by using the `hpvmdevmgmt` command using the legacy device files for the disk or use legacy device files to define new whole-disk swap or volume groups. For example, if the persistent device file is `/dev/rdisk/disk3`, and a legacy device file corresponding to this disk is `/dev/rdsk/c0t1d0`, then the command would be:

    ```
    # hpvmdevmgmt -a rdev:/dev/rdsk/c0t1d0
    ```

  - If a logical volume in an LVM volume group defined using the persistent device file is used as a backing device for virtual storage in a VM, VMMgr links the virtual storage device to the correct logical volume box in the middle column of the Storage tab. However, it is not able to link the logical volume box with the correct physical device

used for the volume group. As a workaround, define LVM volume groups to be used as backing storage for VMs using legacy device files.

NOTE: This issue does not occur with disks used for VxVM volume groups. VxVM does not yet completely support the new agile addressing, but that may change with future versions of VxVM.

The VMMgr product V4.0 correctly excludes all LVM or VxVM volumes from the Add Storage dialog, regardless of whether legacy or agile specifications were used to create the volume, and correctly displays the linkages between logical volumes of either kind to the physical storage devices used for the volume group.

These limitations will be addressed in a future release of VMMgr.

2.3.6 VxVM Device Path Not Valid Error on HP-UX 0803 Guest

Installing or updating HP-UX 0803 might result in the following VxVM error:

```
NOTICE: VxVM vxdmp V-5-0-34 added disk array OTHER_DISKS, datype = OTHER_DISKS

VxVM vxdisk ERROR V-5-1-5433 Device disk1_p2: init failed:
        Device path not valid
       * smapi listener returned "ACTION_FAILURE" for message "CREATE_GROUP"
        The configuration process has incurred an error, would you like
        to push a shell for debugging purposes? (y/[n]):
```

This error is caused by a 32–byte VxVM length limitation on disk device ID information. Integrity VM virtual disks report back a standard T10 device ID created with the 8–byte T10 HP identifier followed by a null terminated string of the backing store name. For example, the resource statement, `"disk:scsi::lv:/dev/vx/rdsk/lvrackA/disk1"`, results in the T10 device ID, `"HP /dev/vx/rdsk/lvrackA/disk1"`. Therefore, to avoid this error, the length of the backing store name must not exceed 23 characters.

2.3.6.1 Installing the HP Integrity Virtual Machines Product Over the Evaluation Software

If you installed the evaluation version of Integrity VM, you must remove the evaluation software before you install the current version of the product. For example, to remove the evaluation version of Integrity VM, enter the following commands:

```
# swremove -x autoreboot=true T2801AA vmProvider
# rm  -rf /opt/hpvm
# rm  -rf /opt/hpvmprovider
```

Do not remove the directory `/var/opt/hpvm`. This directory contains all the virtual machine configurations that were created with the evaluation software.

2.3.6.2 Do Not Install Applications on the VM Host System

When you install Integrity VM, HP-UX kernel parameters are changed to accommodate the virtual machine environment. This makes the system unsuitable for running any other applications. Regardless of whether guests are configured and running, the VM Host system is not configured to allow applications to share system resources. You can run system management utilities and Serviceguard, as documented in the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual.

- **Using backup solutions for VM Host and guest backups**

  Backup solutions such as HP Data Protector or Veritas NetBackup can be used on both the VM Host system and the guest systems. Consult the support matrix of such products for supported versions. Install the backup (client) agents on the VM Host and the guests. HP highly recommends that the /var and /opt directories, in addition to the standard locations,

be backed up regularly on the VM Host system. Do not use the VM Host system as a backup server. For more information, see the *HP-UX 11i v2 Installation and Update Guide*.

- **Using HP GlancePlus/iX to monitor guests**

  You can use Glance on the VM Host to monitor guest data, but recorded measurements can be misleading. Glance receives the CPU accounting information from the guest kernel. Because the VM Host can take the guest processor away (for example, when a hardware interrupt occurs), the time spent running other guests is reported for the state that the guest was in at the time the CPU was taken away. For more information about using Glance, see *glance*(1M).

- **Using HP Global Workload Manager (gWLM)**

  If you use gWLM within VSE to manage virtual machines, when you upgrade the VM Host, make sure the gWLM agent on that host is running gWLM A.02.50 or greater. Also, the managing VSE Central Management Station (CMS) must be running A.02.50 or greater, as described in the *VSE Management Software Installation and Update Guide*. To upgrade the VM Host, use the following procedure:

  1. Remove the gWLM agent using the following command:

     ```
     # swremove gWLM-Agent
     ```

  2. Upgrade Integrity VM as described in the *HP Integrity Virtual Machines 4.2: Installation, Configuration, and Administration* manual.
  3. Upgrade the gWLM agent, as described in the *VSE Management Software Installation and Update Guide*.

  If you install the current version of Integrity VM without upgrading to gWLM A.02.50 or later, and then attempt to use gWLM within VSE to manage virtual machines, the following error is reported:

  ```
  Error acquiring workload management lock. Look in the the file
  /var/opt/gwlm/gwlmagent.log.0 on hostname for more details.
  ```

NOTE: You can use gWLM on the VM Host, but only to manage iCAP resources. gWLM is the workload management solution for managing resource allocation to virtual machines.

- **Using the HP Integrity Virtual Machines Manager (VMMgr)**

  The VMMgr product provides a graphical user interface (GUI) for Integrity VM. It is available from either of the following management interfaces:

  — HP System Management Homepage (SMH).

  For more information about using Integrity Virtual Machines Manager under SMH, see the *HP Integrity Virtual Machines Manager Version 4.0 Getting Started Guide*.

  — HP Virtual Server Environment (VSE) Management Software environment in the HP Systems Insight Manager (SIM) on the Central Management Server (CMS).

  For more information about VSE, see the *VSE Management Software Quick Start Guide*

  If you have installed the HP Integrity Virtual Machines Manager software, you must upgrade it to a version that supports this version of Integrity VM.

  To use Integrity Virtual Machines Manager, you must install the VMProvider bundle that is provided with Integrity VM. If you upgrade Integrity VM, be sure to keep the VMProvider up-to-date also. If the VMProvider version does not match the Integrity VM version, the Integrity Virtual Machines Manager will not work properly.

  For Windows guests, install the WMI Utilization Provider (UtilProvider) software provided with the HP Integrity Support Pack for Windows. Follow the instructions for installing

Windows guests in the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual.

- **Using HP Instant Capacity with Integrity VM**

  You can use HP Instant Capacity solutions on the VM Host system as you would on any other HP-UX system.

2.3.6.3 Do Not Install Integrity VM on a Virtual Partition

HP does not support running Integrity VM in a vPar. If you override the Integrity VM installation warnings and force this installation, you receive errors during the start of Integrity VM.

2.3.6.4 Do Not Install Windows as Alternate Boot on a VM Host System

Guest boot disks might become unbootable if the VM Host is restarted as a Windows system.

2.3.6.5 Trunking Software

Trunking software such as HP Auto Port Aggregation (APA) is supported only on the VM Host and not on the guest.

2.3.6.6 Warning During Startup if HP SIM is Installed

Integrity VM generates a warning during startup if HP SIM is installed, but Integrity VM continues to start.

2.4 HP-UX Patches Required in the VM Host

Table 2-1 lists the patches that are required in the VM Host system running Integrity VM A.01.00 and later. For patches required for earlier versions of Integrity VM, consult the *Release Notes* document for that version. For the most up-to-date patch list, see the HP ITRC website: http://www.itrc.hp.com.

Table 2-1 VM Host Patches

Affected HP-UX (VM Host) Version	Affected Integrity VM Version	Fix	Description/Impact	Comment
11i v2 0505 through 0509	A.01.20 or later	PHKL_33052 (11.23.0512)	FSS	This patch incorporated into 0512 update.
11i v2 0505 through 0606	A.01.20 or later	PHKL_34082 (11.23.0609)	Bug fix	Resolves panic on host.
11i v2 0512 or later	A.02.00 or later	PHNE_33724 (11.23.0706)	Bug fix	Fixes a problem of a panic on the VM Host. Likely only on Integrity VM V2.0 as HP-UX guests in V1.0 do not do what the Windows guests do in V2.0 (ping the guest).
11i v2 0505 or later	A.02.00 or later	PHNE_34474	Bug fix	Required when using linkloop over VLANs between guest and VM Host VLAN.

Table 2-1 VM Host Patches *(continued)*

Affected HP-UX (VM Host) Version	Affected Integrity VM Version	Fix	Description/Impact	Comment
11i v2 0505 or later	A.01.00 or later	Cimserver 02.00.09 PHSS_34429	Bug fix	Resolves potential corruption of guest configuration, cimserver, or other WBEM files when under extreme load. Download HP WBEM Services for HP-UX Product Bundle B8465BA from the HP software depot.
11i v2 0505 thru 0606	A.02.00 or later	PHKL_33604 (11.23.0609) PHKL_33605 (11.23.0609)	FSS	Must install PHKL_33605 before PHKL_33604.
11i v2 0512 thru 0606	A.01.00 or later	PHKL_33827 (11.23.0609)	Bug fix	Resolves panic on guest. Specific to EVA8000 environment. (corrected to be Host patch, not guest)
11i v2 0505 or later	A.01.00 or later	PHKL_34278	Bug fix	Resolves panic and system hang symptoms
11i v2 0505 or later	A.01.00 or later	PHNE_35182	Bug fix	Cumulative ARPA transport patch, resolves panic. Requires prerequisite PHNE_32277.
11i v2 Intel Itanium 9000 (Montecito)	A.01.20 or later	HPVM A.02.00 11.23.0609 HWE	Montecito HW support	HPVM V2.0 or later is strongly recommended for use with Intel Itanium 9000-based systems.
11i v2 0505 or later	A.01.20 or later	PHSS_35863 (Serviceguard A.11.16) PHSS_35427 (Serviceguard A.11.17)	Bug fix	Specific to Serviceguard. If Serviceguard is running on a node with only one CPU, threads can get blocked, and the node will TOC. This happens only on nodes with a single CPU and pthreads patch installed (PHCO_34944, or later). Nodes with more than 1 CPU will not see this problem.
11i v2 0706 or later	A.03.00	PHSS_36737	Bug fix	Dynamic memory expansion might fail on guest running on 11.23.0706 host.
11i v2 0505 to 0706	A.03.50	PHNE_36839	Bug fix	DLPI is modified to pre-enable network performance enhancements.

Table 2-1 VM Host Patches *(continued)*

Affected HP-UX (VM Host) Version	Affected Integrity VM Version	Fix	Description/Impact	Comment
11i v2 0505 or later	A.03.00 or later	PHSS_36997 (Serviceguard A.11.18)	Bug fix	Serviceguard support for 11i v2.
11i v2 0712	A.03.50	PHSS_37306	Bug fix	Mandatory Integrity VM patch
11i v2 0712	A.03.50	PHSS_37845	Bug fix	Enables users to create Red Hat 4.6 guests.
11i v2 0712	A.03.50	PHSS_38297	Bug fix	Mandatory patch: HPVM A.03.50 HPVM-CORE (cell-based memory tuning, support for USB 2.0 driver, other fixes).
11i v2 0712	A.03.50	PHSS_38298	Bug fix	Mandatory patch: HPVM A.03.50 VMAGENT vmProvider (cell-based memory tuning).
11i v2 0609 to 0712	A.03.00 or later	PHSS_38610	Bug fix	Mandatory patch: HPVM B.04.00 VMUPGRADE (for upgrading from 11i v2 to 11i v3 host).
11i v3 0809	B.04.00	PHSS_38566	Bug fix	Mandatory patch: HPVM B.04.00 CORE (fixes for hangs/panics).
11i v3 0809	B.04.00	PHSS_38567	Bug fix	Mandatory patch: HPVM B.04.00 VMAGENT (fix for VSE/Integrity VM reported CPU speed; scheduler performance).
11i v3 0809	B.04.00	PHSS_38611	Bug fix	Mandatory patch: HPVM B.04.00 VMUPGRADE (for upgrading from 11i v2 to 11i v3 host).
11i v3 0809	B.04.00	PHSS_38631	Bug fix	Mandatory patch: HPVM B.04.00 HPVM-VMSGTK (Serviceguard Toolkit fixes for SG packaged guests).
11i v3 0809	B.04.00	PHKL_39114	Bug fix	11i v3 cdfs cumulative patch for 64K base page size. Fixed in 0903.
11i v3 0809 or later	B.04.00 or later	PHCO_37694	Bug fix	11i v3 VRTSobgui Command Patch with updated JRE.

Table 2-1 VM Host Patches *(continued)*

Affected HP-UX (VM Host) Version	Affected Integrity VM Version	Fix	Description/Impact	Comment
11i v3 0809 or later	B.04.00 or later	PHSS_39094	Bug fix	11i v3 Linker and fdp cumulative patch.
11i v3 0809 or later	B.04.00 or later	PHKL_38750	Bug fix	11i v3 estape cumulative patch (Recommended for working with multipath tape devices.)
11i v3 0903	B.04.10	PHSS_39342	Bug fix	HPVM B.04.10 CORE PATCH
11i v3 0903	B.04.10	PHSS_39354	Bug fix	HPVM B.04.10 HPVM-VMSGTK
11i v3 0903 and later	B.04.10	PHKL_39407	Bug fix	11i v3 USB 2.0, DVD Write, Cumulative USB Patch (Avoid lengthy `hpvmcreate` and `hpvmmodify` operations when adding USB DVD.
11i v3 0903 and later	B.04.10	PHSS_39784	Bug fix and enhancements	HPVM B.04.10 CORE — Windows Server 2008 * Attached AVIO Tape Support
11i v3 0903 and later	B.04.10	PHSS_39785	Bug fix	HPVM B.04.10 vmProvider — Windows Server 2008 * Attached AVIO Tape Support
11i v3 0903 and later	B.04.10	PHSS_39819	Bug fix	HPVM B.04.10 VMMIGRATE — Windows Server 2008 * Attached AVIO Tape Support
11i v3 0903 and later	B.04.10	PHSS_39866	Bug fix	HPVM B.04.10 VMAGENT — Integrity VM max entitlement bug fix
11i v3 0809	B.04.00	PHSS_40107	Bug fix	HPVM B.04.00 VMAGENT — Integrity VM max entitlement bug fix
11i v3 0903 and later	B.04.10	PHSS_40274	Bug fix and enhancements	HPVM B.04.10 CORE: Virtprovider, Attached AVIO Boot, OVMM support for Shared LVM
11i v3 0903 and later	B.04.10	PHSS_40275	Bug fix and enhancements	HPVM B.04.10 VMMIGRATE: Virtprovider, Attached AVIO Boot, OVMM support for Shared LVM

Table 2-1 VM Host Patches *(continued)*

Affected HP-UX (VM Host) Version	Affected Integrity VM Version	Fix	Description/Impact	Comment
11i v3 0903 and later	B.04.10	PHSS_40277	Bug fix and enhancements	HPVM B.04.10 vmProvider: Virtprovider, Attached AVIO Tape Boot, OVMM support for Shared LVM
11i v3 0903 and later	B.04.10	PHSS_40152 (Serviceguard A.11.19)	Enhancements	SG 11.19: Support for Shared LVM
11i v3 0903 and later	B.04.10	B.11.31.0910.01 (HostAVIOStor)	Enhancements	HostAVIOStor: Support for Shared LVM and bug fixes
11i v3 1003	B.04.20	PHKL_40383	Bug fix	HostAVIOStor: AVIO Host driver
11i v3 1003	B.04.20	PHSS_40875	Enhancements	HPVM core: Itanium 9300 series host support
11i v3 1003	B.04.20	PHSS_40876	Enhancements	VMAGENT: Itanium 9300 series host support
11i v3 1003	B.04.20	PHSS_40901	Enhancements	VMMIGRATE: Itanium 9300 series host support
11i v3 1003 0809 to 0909	B.04.00 and B.04.10	PHKL_40390	Bug fix	HPVM Fix RID length (vmm_cdio)

Table 2-2 Do Not Install Product or Patch

Affected HP-UX Host Version	Affected Integrity VM Version	Fix	Description/Impact	Comment
11i v2 0505 or later	A.02.00 or later	PHNE_35793	igelan patch	An Integrity VM guest that uses a virtual interface that belongs to an IGELAN interface configured on the Integrity VM Host can experience hangs with network services like ping, NFS, rcp, ftp for data transfers that use full-sized frames.

2.5 Patches Required in the HP-UX Guest

Table 2-3 lists the patches that are required in HP-UX guests:

Table 2-3 HP-UX Guest Patches

Affected Guest OS and Version	Affected Integrity VM Version	Fix	Description/Impact	Comment
11i v2 0505	A.01.00 or later	U320 SCSI MPT driver version B.11.23.03, bundle A7173A	Includes fixes for performance and stability.	MPT driver update. This patch is included in the 0512 update.
11i v2 0505 or later	A.01.00 or later	PHKL_34278	Bug fix	Resolves panic and system hang symptoms.
11i v2 0505 through 0606	A.01.00 or later	PHKL_34589 (11.23.0609)	Bug fix	Resolves panic on guest.
11i v2 0505 or later	A.01.20 or later	PHKL_34540 (11.23.0609 HWE) PHKL_34336 (11.23.0606) PHKL_34928 (11.23.0609)	Fix to allow sharing of idle CPU cycles between guests.	Ensure loaded when using 0606 and later. Must be manually installed if feature 11i is not installed. Without this patch, Integrity VM might not detect guest is idle and not share resources, heavily impacting performance.
11i v2 0505 through 0606	A.01.00 or later	PHKL_33823 (11.23.0609)	Bug fix	Resolves panic on guest.
11i v2 0505 or later	A.02.00 or later	PHSS_34760	Serviceguard Monitor fix	Required for running in Serviceguard 11.16 environment.
11i v2 0505 or later	A.02.00 or later	PHSS_34337	Serviceguard Monitor fix	Required for running in Serviceguard 11.17 environment.
11i v2 0505 or later	A.01.00 or later	Cimserver 02.00.09 (PHSS_34429)	Bug fix	Resolves potential corruption of guest configuration, cimserver, or other WBEM Services files when under extreme load.
11i v2 0505 or later	A.01.00 or later	PHNE_35182	Bug fix	Cumulative ARPA transport patch, resolves panic. Requires prerequisite PHNE_32277.

11i v2 Intel Itanium 9000 (Montecito)	A.01.20 or later	HPVM A.02.00 11.23.0609 HWE	Intel Itanium 9000 hardware support	Integrity VM V2.0 or later is strongly recommended for use with Intel Itanium 9000-based systems.
11i v2 0505 or later	A.01.20 or later	PHSS_35863 (Serviceguard A.11.16) PHSS_35427 (Serviceguard A.11.17)	Bug fix	Specific to Serviceguard. If Serviceguard is running on a node with only one CPU, threads can get blocked, and the node will TOC. This happens only on nodes with a single CPU and pthreads patch installed (PHCO_34944, or later). Nodes with more than 1 CPU will not see this problem.
11i v3	A.03.00	PHKL_36261 PHKL_36242	Bug fix performance	Without these patches, 11i v3 guest performance is severely impacted when running applications that continually spawn a large number of short-lived processes (that is, a software build environment).
11i v2 0505 or later	A.03.00	PHSS_36997 (Serviceguard A.11.18)	Bug fix	Serviceguard 11.18 support for 11i v2.
11i v3	A.03.00	PHSS_36998 (Serviceguard A.11.18)	Bug fix	Serviceguard 11.18 support for 11i v3.
11i v3 0703 through 0709	A.03.00 or later	PHKL_37452	Bug fix	DMA32 exhaustion during boot on small (>=2GB) Integrity VM guests.
11i v2 0505 or later	A.03.50	PHNE_35765	Bug fix	Fixes NAT consumption panic.
11i v2 0505 through 0706	A.03.50	PHCO_37038 (11.23.0712)	Bug fix	Fixes `mkboot` command with AVIO.
11i v2 0505 or later	A.03.50	PHCO_36563	Bug fix	SAM-NNC support in the guest for Integrity VM V3.5 AVIO support.
11i v3 0703	A.03.50	PHKL_36009 (11.31.0709)	Bug fix	Fixes panic caused by failure to allocate alias page table entry.
11i v2 0505 through 0706	A.03.50	PHKL_37091 (11.23.0712)	Bug fix	Fixes EFI bootpath with AVIO.
11i v3	A.03.50	PHSS_37843	Bug fix	
11i v3	B.04.10	PHSS_39376	Bug fix	HPVM-Guest
11i v2	A.04.10	PHSS_39377	Bug fix	HPVM-Guest

Table 2-3 HP-UX Guest Patches *(continued)*

11i v2	A.04.10	PHSS_39786	Bug fix and enhancements	HPVM A.04.10 vmProvider — Windows Server 2008 * Attached AVIO Tape Support
11i v2	A.04.10	PHSS_39807	Bug fix	HPVM A.04.10 HPVM-Guest – Windows Server 2008 * Attached Tape Support
11i v3	B.04.10	PHSS_39785	Bug fix	HPVM B.04.10 vmProvider — Windows Server 2008 * Attached AVIO Tape Support
11i v3	B.04.10	PHSS_39806	Bug fix	HPVM B.04.10 HPVM-Guest — Windows Server 2008 * Attached AVIO Tape Support
11i v3	B.04.10	PHSS_40277	Bug fix and enhancements	HPVM B.04.10 vmProvider: Virtprovider, Attached AVIO Tape Boot, OVMM support for Shared LVM
11i v2	A.04.10	PHSS_40276	Bug fix and enhancements	HPVM A.04.10 vmProvider: Virtprovider, Attached AVIO Tape Boot, OVMM support for Shared LVM
11i v3 0909 or later	B.04.20	PHKL_38604	Bug fix	GuestAVIOStor: AVIO guest driver
11i v2 0712	B.04.20	PHKL_40684	Enhancements	11i v2 guest support for Itanium 9300 series host
11i v2 0712	B.04.20	PHCO_40685	Enhancements	11i v2 guest support for Itanium 9300 series host
11i v3 0903	B.04.20	PHCO_38777	Enhancements	11i v2 guest support for Itanium 9300 series host
11i v3 0903	B.04.20	PHKL_39482	Enhancements	11i v2 guest support for Itanium 9300 series host

For more information about updates to HP-UX software, contact your HP representative or support specialist.

Table 2-4 lists patches and products that you should not install on HP-UX guests. In guests where these patches are installed, degradations and regressions have been observed.

Table 2-4 Do Not Install Products or Patches on HP-UX Guests

Affected Guest OS and Version	Affected Integrity VM Version	Fix	Description/Impact	Comment
HP–UX 11i v2 0505 or later	A.01.00 A.01.20	PHKL_33361	Cumulative kernel SCSI patch	Resolved in Integrity VM A.02.00 and later.
HP–UX 11i v2 0505 or later	A.01.00 A.01.20 A.02.00	PHKL_35739 PHKL_35891	VxVM 4.1 Kernel Patch 04 or 05	Installing VxVM 4.1 Kernel Patch 04 onto HP-UX 11i v2 guest with VxVM boot disk results in an unbootable system. Resolved in Integrity VM V3.0.

2.6 Patches Required for Ignite/UX Servers

Table 2-5 lists the patches that are required in the Ignite/UX server:

Table 2-5 Ignite/UX Patches

Affected OS and Version	Affected Integrity VM Version	Fix	Description/Impact	Comment
HP-UX 11.00	A.01.00 or later	PHNE_25355	tftpd	
HP-UX 11.11	A.01.00 or later	PHNE_32825	tftpd	

2.7 Patches Required for Windows Guests

Table 2-6 lists the patches that are required in the guests.

Table 2-6 Windows Patches

Affected Guest OS and Version	Affected Integrity VM Version	Fix	Description/Impact	Comment
Windows Server 2003	A.02.00 or later	SSM 4.6	Bug fix	Microsoft patches correct a compiler issue that can affect Windows guests in various ways.

Table 2-7 lists patches and products that you should not install on Windows guests.

Table 2-7 Do Not Install Products or Patches on Windows Guests

Affected Guest OS and Version	Affected Integrity VM Version	Fix	Description/Impact	Comment
SSM 4.5 SSM 4.6 Intel Itanium 9000 (Montecito)	A.02.00	PalHaltLightRegEdit component	Idle detection	See Section 4.1.2.9: "Running Windows Guests on a Dual Core Intel Itanium Processor (Montecito) System" (page 42)

2.8 Patches Required for Red Hat Linux Guests

Table 2-8 lists the patches that are required in the guests.

Table 2-8 Red Hat Linux Patches

Affected Guest OS and Version	Affected Integrity VM Version	Fix	Description/Impact	Comment
RHEL4U4 through U5	A.03.00 or later	SGLX_00190 (Serviceguard or Linux A.11.18.02)	Bug fix	Serviceguard on Linux SG A.11.18.02

2.9 Patches Required for SUSE Enterprise Linux Guests

Table 2-9 lists the patches that are required in the guests.

Table 2-9 SUSE Enterprise Linux Guests

Affected Guest OS and Version	Affected Integrity VM Version	Fix	Description/Impact	Comment
SLES10U1	A.03.50	SGLX_00196 (Serviceguard or Linux A.11.18)	Bug fix	Serviceguard on Linux SG A.11.18.02

3 Creating Virtual Machines

This chapter contains notes about creating and configuring virtual machines on the VM Host system.

3.1 Changes and Issues in this Release

There are no new virtual machine creation or configuration issues in the V4.2 release.

3.2 Known Issues and Information

The following sections describe known issues and information from previous releases that still apply to V4.2.

3.2.1 Failed API Access to Local Running Guest

A `Failed API access to local running guest.`, message in the `command.log` is a notification that a communication attempt with the `hpvmapp` process has failed. This message is not an indication of a problem and can be ignored.

3.2.2 Cell Local Memory on Cellular Hosts

Integrity Virtual Machine now supports the use of Cell Local Memory on cellular hosts. In general, you should see performance improvement by using cell local memory when running on cell-based systems. If you encounter performance issues with this feature, you should revert back to using 100% interleaved memory on the host.

3.2.3 Pass-Through Devices Used by Guest Devices Might Not be Valid After Recovery Using Ignite

After performing a recovery of the host using Ignite, pass-throug devices found in `/dev/pt/*` might be invalid, which in turn might prevent guests from recognizing tape or disk devices. Symptoms of this problem might include error messages like the following in the guest log file (`/var/opt/hpvm/guests/`*`guest image`*`/log`):

```
UsrMapScsiDevice: Opened failed on /dev/pt/pt_tape1: No such device or address
```

You might receive messages in `/var/opt/hpvm/common/command.log` file, like the following:

```
mksf: Couldn't find driver matching arguments
  hpvmdevmgmt: ERROR (host): system() failed on command '/usr/sbin/mksf -P -C disk -I 44 2>&1 >/dev/null' - No
 such file or directory.
```

These messages can be caused by pass-through files being stale and in need of re-creation, pass-throug files pointing to devices that no longer correspond to devices that their names suggest, or device special file names (DSFs) for devices that no longer exist for which `hpvmdevmgmt -I` attempts to create pass-through devices.

To correct `/dev/pt/*` files that might be stale or which might point to the wrong device, do the following on the VM Host to re-create them:

```
# rm /dev/pt/*
# rm /var/opt/hpvm/common/hpvm_devinit
# hpvmdevmgmt -I
```

To correct failed attempts by `hpvmdevmgmt -I` to create pass-through devices for devices that no longer exist, use `ioscan` to verify the validity of devices that no longer appear to exist:

```
# ioscan -fuNC disk
# ioscan -fuNC tape
```

Remove the DSFs for any devices that no longer exist and verify that your guests are not configured to use those DSFs.

3.2.4 Do Not Run `hpvmstart` in Background When Starting Multiple Guests With Resource Conflicts

Do not run the `hpvmstart` command in the background when starting multiple guests that have resource conflicts. The locking that would normally catch and report the resource conflicts does not always work properly in this situation.

3.2.5 Numbers Reported by Glance 4.6 or Later Running on VM Host Depend on Context

Glance 4.6 or later is supported running in a VM Host or in a guest; however, certain measurements might not apply in a particular context or report only limited results. For example, measuring CPU utilization on the VM Host reports all the time spent running in guests as "system time"; to receive "user time" or "nice time" for a given guest, you must run Glance in that guest. Similarly, memory-related faults, or system calls for a guest, are not visible from Glance running in the VM Host, only from Glance running in that guest. Glance also offers a number of virtualization-related measurements. Note, Glance refers to virtual machines as logical systems.

3.2.6 Increasing Guest Default SCSI Queue Depths for MPT Virtual Devices can Lead to I/O Failures

MPT virtual storage devices (VIO) have a maximum SCSI queue depth of 8. This is sufficient for the default SCSI queue depth of all guest types that have applied their guest kits. Increasing SCSI queue depths beyond the defaults might result in some I/O failures due to exhaustion of guest I/O retries.

4 Installing Guests

This chapter describes notes pertaining to installing guest software on the virtual machines.

4.1 Windows Guests

The following sections contain the release notes specific to installing Windows guests.

4.1.1 Changes and Issues in This Release

The following sections describe changes, issues, and new information pertaining to this release.

4.1.1.1 Windows Server 2003 Guests No Longer Supported

Starting with Integrity VM V4.2, the Windows Server 2003 guest is not supported.

4.1.2 Known Issues and Information

The following sections describe known issues and information from previous releases that still apply to V4.2.

4.1.2.1 Disable the NetBIOS Over TCP (NBT) Protocol for Windows Server 2008 Guests

Due to instability with the NetBIOS over TCP (NBT) protocol when using network shares in Windows Server 2008 guests, HP strongly advises that this protocol be disabled until this problem is fixed in a future release of Windows Server 2008.

For information about this issue, including how to disable the protocol, see the article, Direct hosting of SMB over TCP/IP, at the Microsoft support website.

4.1.2.2 Removing Media During Installation Hangs Guest

If you begin the installation of the Windows operating system and then eject the media from the virtual console, the guest hangs. To recover from the problem, restart the guest from the virtual console.

4.1.2.3 Network Driver for Some Windows Guests Not Behaving Correctly

The network driver for some Windows guests is not behaving correctly if the network device is configured at PCI bus 0, device 3, function 1, because of an interaction with the console device at PCI bus 0, device 3, function 0. To avoid this issue, do not specify PCI bus 0, device 3 as an address when adding network devices to a Windows virtual machine.

There is no issue if `hpvmcreate` or `hpvmmodify` automatically assign PCI addresses. This problem can be corrected by removing any network devices at PCI bus 0, device 3 and adding them at any other free PCI address.

4.1.2.4 Setting a Static IPv4 Address at the SAC> Prompt

If you want to set a static IPv4 address at the SAC> prompt using the `i` command after a guest boot, the first `i` command entered to set the guest IPv4 address to a static IP address can fail with the `SAC could not set the IP Address.` SAC> prompt message. This can cause Remote Desktop connection to this guest to fail. Enter the same `i` command to set the static IPv4 address correctly.

4.1.2.5 Guest Kit for Windows Server 2008

The guest kit for Windows Server 2008 is different from the guest kit for Windows Server 2003. To operate correctly, each version of Windows (2003 and 2008) must use the guest kit for that

version. Installing the other (wrong) version of the Windows guest kit into either version of the Windows operating system results in incorrect operation of the Windows guest.

4.1.2.6 Palhaltlight in Windows Server 2008 Guests

The use of palhaltlight is enabled by default in a Windows 2008 guest, which allows the VM Host to be notified when the guest is idle, so that the VM Host avoids spinning the physical processor. The VM Host can then use the physical processor for other useful purposes (for example, running other guests or running host service processes and threads) whenever the Windows guest does not need it. Consequently, keep palhaltlight set to on to ensure the best performance.

4.1.2.7 Virtual DVD Misconfiguration can Lead to Windows Slow Down

Windows 2003 Server constantly polls the status of a DVD. If you configure the virtual DVD incorrectly, such as inserting a blank DVD as a backing store, the virtual DVD disappears from the Guest. However, the Windows 2003 Server Guest continues to scan for the DVD to come back. This scanning activity can cause a slow down in Windows performance. Bad DVD configurations are reported in the /var/opt/hpvm/common/hpvm_mon_log, like the following:

```
9   ScsiDiskOpen: block open failed dev=1f000000 cdev=bc000000 errno=16
9   DVD dev 0xbc000000 may be empty
```

You can correct this error by first placing the virtual DVD into ejection state (vMP> ej) and then replacing the media in the VM Host CD or DVD drive with a readable disc.

4.1.2.8 HP Insight Manager Automatic Server Recovery Does Not Work

On Windows guests, the HP Insight Manager product supports Automatic Server Recovery: if a system does not send out a heartbeat within a specified interval, a user-specified action takes place (for example, automatic reboot). Integrity VM takes no action if a heartbeat is not detected; instead, a message is logged on the console and the VM Host System Event Log. You should monitor these log files and manually perform the reboot if the guest does not respond.

4.1.2.9 Running Windows Guests on a Dual Core Intel Itanium Processor (Montecito) System

If you use a version of the OPK Smart Setup Media released prior to Version 5.0, and wish to run a Windows guest on an Intel Itanium 9000 server, you must disable the `PalHaltLightRegEdit` patch. To do this, go to **Add/Remove Programs** and remove the `PalHaltLightRegEdit` component.

4.1.2.10 Installing Windows with Virtual NullDVD is Not Recommended

To use a Virtual NullDVD as installation media, define the device as a file or as the physical drive. For example, use one of the following commands:

```
# hpvmmodify -P guest-name -a dvd:scsi::file:/InstallMedia/Windows.iso

# hpvmmodify -P guest-name -a dvd:scsi::disk:/dev/rdsk/c0t0d0
```

Insert and remove media (for software installation using multiple CDs) using the `hpvmmodify` command (effectively ejecting and inserting files) or, in the case of a physical drive, actually eject and insert the media in the drive. For example, to change the media in an existing virtual DVD defined in the above example, enter the following command:

```
# hpvmmodify -m dvd:scsi:0,0,1:file:/InstallMedia/SmartSetup.iso
```

Where the path name `/InstallMedia/SmartSetup.iso` indicates the new media to use.

Defining the virtual DVD as a null type (for example: `hpvmmodify -a dvd:scsi:null:/path/to/media/`) is not recommended for software installation.

Software installation from virtual DVDs defined with the null storage type (also referred to as *removable media* functionality) often results in installation failures because the removable media

is automatically ejected when the virtual machine is stopped and started during software installation.

To complete Windows installation from removable media, follow these steps:

- After the automatic reboot, Windows controls the console. When you see the `SAC>` prompt, use **Esc-Tab** to change the channel to the product key prompt.
- Stop and start the virtual machine and interrupt the automatic boot sequence.
- Before the system is allowed to continue, from the virtual console, execute the necessary insert (`IN`) command to reload the media.
- After the media is reloaded into the virtual DVD, select the Windows Media install (the first boot option) and allow the system to boot.
- When prompted, enter the product key. The installation process proceeds normally from this point.

For more information about using removable media, see the *HP Integrity Virtual Machines 4.2: Installation, Configuration, and Administration* manual.

4.1.2.11 Enabling MP Services on Windows Guest Logs telnetd Errors

If you enable MP Services on a guest, the following `telnetd` errors might be written to the VM Host's log file (`/var/adm/syslog/syslog.log`). You can safely ignore these messages:

```
Jun 13 11:41:41 AGTVM telnetd[21551]: getmsg error:no data
Jun 14 20:38:00 AGTVM telnetd[29216]: getmsg error:no data
Jun 14 21:52:07 AGTVM telnetd[29504]: getmsg error:no data
```

To prevent this problem, disable MP Services.

4.1.2.12 Using Windows Firewall Requires ICMP to Allow Echo

When the Microsoft firewall is on, ICMP must be enabled so that you can ping the guest (echo). This setting can be found in the network properties applet, as follows: Control Panel => Network Connections => Local Area Connection/Properties Advanced => Windows Firewall => Settings ICMP. Check the **Allow Incoming Echo Requests** box.

4.1.2.13 Poor Console Screen Formatting

The Windows guest console might not format the virtual console display properly. Manage the guest using the Remote Desktop or make a network connection to the Windows guest.

4.1.2.14 The `hpvmstop` Command Does Not Shut Down Windows Guests Gracefully

Do not use the following commands to shut down Windows guests:

```
# hpvmstop -P winguest

# hpvmconsole -P winguest -c "pc -off"
```

These commands do not stop the Windows operating system gracefully. To shut down a Windows guest, use the standard Windows operating system commands.

4.1.2.15 Do Not Delete EFI Shell Boot Option

Do not delete the `EFI Shell [Built-in]` EFI Boot Manager option. Deleting this option might interfere with the subsequent installation of the guest operating system. To recover if there are no options present on the EFI Boot Manager menu screen:

1. Enter the `Boot option maintenance menu`.
2. Select `Add a Boot Option`.
3. Select `Load File [EFI Shell [Built-in]]`.
4. Save the setting to NVRAM.

4.1.2.16 Restoring the NVRAM for Windows Guests

When a guest has been terminated unexpectedly due to a panic or another critical condition, the guest's boot settings (which are stored in a per-guest NVRAM file on the VM Host) can become corrupted. This can cause problems with subsequent reboots of that guest. To correct the problem, copy the file `/opt/hpvm/guest-images/common/nvram` to `/var/opt/hpvm/guests/`*`vm_name`*`/nvram` on the VM Host system. This procedure restores the copy of the NVRAM that was used when the guest was created. Then you can used the EFI Boot Manager to recreate the guest's boot path and other data. (The installed guest's operating system should be intact and unaffected by the corruption.)

To build the EFI Boot Menu Entry for Windows Server 2003 guest:

1. From the EFI Shell, enter the following command, which assumes that the guest boot disk is fs0:

   ```
   fs0> ls \EFI\Microsoft\WINNT50
   ```

   Look for the `Boot`*`xxxx`* filename.

2. Change to the `MSUtil` directory. For example:

   ```
   fs0> cd \MSUtil
   ```

3. Enter the following command:

   ```
   fs0:> nvrboot
   ```

4. Enter the `I` command to import the Windows boot entry. Then enter the correct location of the boot entry. For example:

   ```
   \EFI\Microsoft\WINNT50\Boot xxxx
   ```

To build the EFI Boot Menu Entry for a Windows Server 2008 guest:

1. From the EFI Shell, enter the following command, which assumes that the guest boot disk is fs0:

   ```
   Shell> bcfg boot add 1 fs0:\EFI\Microsoft\Boot\bootmfgw.efi "Windows Boot Disk"
   ```

4.2 HP-UX Guests

The following sections contain release notes specific to installing HP-UX guests.

4.2.1 Changes and Issues in this Release

The following sections describes new information and issues pertaining to HP-UX guests in the V4.2 release.

4.2.1.1 HP-UX Guests Supported on Intel® Itanium® 9300 Processor Series

Only HP-UX 11i v2 (Fusion release December 2007 and later) and HP-UX 11i v3 (Fusion release March 2009 and later) are supported on Intel® Itanium® 9300 Processor Series systems.

4.2.1.2 LV Mirroring Supported on HP-UX Guests

LV Mirroring is supported on HP-UX guests as long as GuestAVIOStor version B.11.31.1003 or later is installed on the VM guest and HostAVIOStor version B.11.31.1003.01 or later is installed on the VM Host.

4.2.1.3 Machinfo Problems with VM Guests on Intel® Itanium® 9300 Processor Series System

The HP-UX machinfo command on HP-UX 11i v2 and 11i v3 guests running on 9300 series systems will report incorrect information if the following required HP-UX patches have not been installed:

- HP-UX 11i v2: PHCO_40685 and PHKL_40684
- HP-UX 11i v3: PHKL_39482 and PHCO_38777

You can download these patches from the ITRC website, http://itrc.hp.com

4.2.2 Known Issues and Information

The following sections describe known issues and information from previous releases that still apply to V4.2.

4.2.2.1 HP-UX 11i v3 Guests Might Fail to Configure Interface Cards Due to Lack of Memory

HP-UX 11i v3 guests with small memory resources (less than or equal to 2 GB RAM) might fail to configure one or more virtual interface cards. Messages like the following might be seen on the guest console:

```
wsio_claim init failed isc=0xe000000109c41400 name=mpt or
igssn: The device at hardware path 0/0/1/0 failed initialization (3309).
```

The error messages displayed in the case of guest system installation are as follows:

```
  * Preparing to execute init...
=======  05/02/08 08:07:57 EDT  HP-UX Installation Initialization. (Fri May 02
         08:07:56 EDT 2008)
         @(#)Ignite-UX Revision C.7.0.212
         @(#)ignite/launch (opt) $Revision: 10.590.1.2 $ $Date: 2006/12/18
         20:51:11 $
       * Configuring RAM filesystems...
       * Scanning system for IO devices...
WARNING: Could not find Q_BOOT device.  Cannot determine what the boot device
         was.
ERROR:   Could not get io-device data (ioscan)
WARNING: Could not find source device in ioscan output.  You must select from
         the list of devices below to use for the source device:
index       HW-path         Class   description
0)  120                   processor  Processor
1)  121                   processor  Processor
2)  122                   processor  Processor
3)  123                   processor  Processor
4)  124                   processor  Processor
5)  125                   processor  Processor
6)  126                   processor  Processor
7)  127                   processor  Processor
8)  0/0/0/0               ext_bus    SCSI_Ultra320
9)  0/0/0/0.0x0.0x0       disk       HP_Virtual_LvDisk
10)  0/0/0/0.0x2.0x0      disk       HP_Virtual_FileDVD
11)  0/0/0/0.0x1.0x0      disk       HP_Virtual_FileDVD
```

The issue is resolved in PHKL_37452 that must be installed on the guest to prevent the problem. The problem might occur during installation, in which case it results in some devices not being presented in the installation interface.

The solution is either to install the guest from the 11.31.0803 OE, which does not have the problem, or temporarily increase memory assigned to the guest above 2GB (for example 2.5GB), and lower it back to the intended size after the guest OS and PHKL_37452 is installed.

4.2.2.2 Patches for HP-UX 11i v3 Guests

Customers running HP-UX 11i v3 guests should install the following patches (or their superseding patches) in each guest running HP-UX 11i v3 :

- PHKL_36261
- PHKL_36242

These patches prevent performance problems in environments where applications spawn large numbers of short-lived processes (such as development environments). To obtain these patches, contact your support specialist or HP representative.

4.2.2.3 Do Not Run Live Kernel Debuggers Inside a Guest

Do not run tools that write kernel text, such as live kernel debuggers and performance tools such as `kgmon` and `ktracer` inside a guest. Under rare circumstances, these tools cause the guest to panic.

4.2.2.4 Do Not Use the `iomap(7)` Mechanism on HP-UX Guests

The `iomap(7)` mechanism allows you to map physical I/O addresses into the user process address space. Do not use this command on HP-UX guests.

4.2.2.5 iCAP Commands Fail on HP-UX Guests

iCAP is installed as part of the HP-UX OS installation. Install-time configuration of iCAP reports failure with messages similar to the following:

```
NOTE:    Checking for partitionable system.
ERROR:   Software configuration has failed. After addressing the issues
         in the following output, configure this software with
         'swconfig B9073BA'.

ERROR:   Command not allowed to run on a Virtual Machine Guest.
ERROR:   The "configure" script for "iCOD.ICOD-RUN" failed (exit code
         "1"). The script location was
         "/var/adm/sw/products/iCOD/ICOD-RUN/configure".
       * This script had errors and the execution of this fileset
         cannot proceed until the problem is fixed.  Check the above
         output from the script for further details.
       * Running config clean command /usr/lbin/sw/config_clean.

       * Summary of Execution Phase:
ERROR:       Installed     iCOD.ICOD-RUN,l=/,r=B.11.23.08.00.00.95
ERROR:   1 of 882 filesets had Errors.
       * 881 of 882 filesets had no Errors or Warnings.
ERROR:   The Execution Phase had errors.  See the above output for
         details.
```

These startup messages in `/etc/rc.log` can be disregarded.

iCAP commands cannot be used on virtual machines. iCAP commands are designed to work on the VM Host system.

This problem is resolved in guests running HP-UX 11i v2 0706 and later.

4.3 Linux Guests

The following sections describe release notes for Linux guests.

4.3.1 Changes and Issues in This Release

There are no new Linux guest issues in the V4.2 release.

4.3.2 Known Issues and Information

The following sections describe known issues and information from previous releases that still apply to V4.2.

4.3.2.1 Using Linux Guests

This version of Integrity VM supports SUSE Linux SLES 10 Update 2 guests and Red Hat Linux Enterprise Edition Advanced Server Release 4 Update 5 guests. You can install the SUSE Linux or the Red Hat Linux on a virtual machine.

For information about this Red Hat Linux operating system, see www.redhat.com. Specifically:

- *Red Hat Enterprise Linux 4 Installation Guide for x86, Itanium, AMD64*
- *Intel Extended Memory 64 Technology (Intel EM64T)*
- *Red Hat Linux Customization Guide*

For information about the SUSE Linux operating system for HP Integrity servers, see http://docs.hp.com/en/linuxsuse.html

The guest parameter settings for Linux guests are listed in the *HP Integrity Virtual Machines 4.2: Installation, Configuration, and Administration* manual.

For information about installing Linux guests, see the *HP Integrity Virtual Machines 4.2: Installation, Configuration, and Administration* manual.

4.3.2.2 SUSE Linux Cloned Guests Boot-Disk Boot Problems

SUSE Linux (SLES) cloned guests have issues with the cloned guest boot disk. The first issue occurs when a SLES Linux guest is cloned using a new boot device using the `hpvmclone -b` option, the cloned guest requires updates in the elilo config file (`elilo.conf`) and the `fstab` file with the new boot device's SCSI WWID before it can be booted to the multi-user mode. The cloned guest's OS image on the new boot device still contains the orignal guest boot device's SCSI WWID in these config files. Therefore, the cloned guest with the new boot device fails the boot when it tries to access the original guest's boot device.

In SLES Linux, the boot config file `/boot/efi/SuSE/elilo.conf` and `/etc/fstab` file both contain the guest boot disk's SCSI WWID. To correct this cloned boot disk boot problem, boot the cloned guest to the "Rescue System" mode, then mount the cloned guest's boot-disk, root-file system (where `/etc/fstab` resides) and boot file system (where `elilo.conf` resides), update these config files with the cloned boot disk's SCSI WWID, and then reboot the guest.

The second issue involves the use of the `hpvmmigrate` command with the offline migration and backing store copy. The offline-migrated guest encounters this boot failure when the backing store copy completes and the migrated guest on the target host attempts to boot. This occurs because the migrated guest's boot disk has been changed to the copied disk, which has a different WWID.

To correct the cloned-guest, boot-disk boot problems, follow these steps:

1. Boot the guest to the Rescue System mode from the SLES Linux CD 1:
   a. Configure the SLES Linux CD onto the guest for boot to the Rescue System mode:
      ```
      # hpvmmodify -P cl_suse -a dvd:scsi:file:/iso/linux/SLES-10-SP2/SLES-10-SP2-DVD-ia64-RC5-DVD1.iso
      ```
   b. Boot the guest:
      ```
      # hpvmconsole -P cl_sue -fi -c "pc -on"
      ```
   c. Interrupt the guest boot from the auto boot, then boot from the Linux CD:
      1) Select the “Boot option maintenance menu” in the EFI menu.
      2) Select the “Boot from a File” option.
      3) Select the “Removable Media Boot” item. (This boots from the SLES Linux CD to the Installation menu.
   d. At the SLES Linux installation menu, select the item “Rescue System”.
   e. At the Boot: text field, enter **`console=ttyS0`** and press Return. This action boots the guest to the Rescue login.
   f. To log in, enter the user name, root, at the Rescue Login: prompt and press Return:
      ```
      Rescue login: root
      Rescue:~ #
      ```
2. Mount the guest's root file system `/dev/sda3` and boot file system `/dev/sda1`:
   ```
   Rescue:~ # mount /dev/sda3 /mnt
   Rescue:~ # mount /dev/sda1 /boot
   ```

3. Edit the elilo configuration file, `/boot/efi/SuSE/elilo.conf`, and the fstab file, `/mnt/etc/fstab`, to update all entries of the guest boot disk SCSI WWID with the cloned guest boot disk's SCSI WWID.

NOTE: The cloned guest's boot disk SCSI WWID can be copied from the `/dev/disk/by-id/` device names. For example, the cloned guest boot disk device names are as follows:

```
Rescue:~ # ls -l /dev/disk/by-id
total 0
 lrwxrwxrwx 1 root root  9 Dec  5 17:08 scsi-0HP_Virtual_FileDVD_isoLinuxSLES10-SP2SLES-10-SP2-
 DVD-i -> ../../sr0
 lrwxrwxrwx 1 root root  9 Dec  5 17:08 scsi-3600508b4001049440001200002f20000 -> ../../sda
 lrwxrwxrwx 1 root root 10 Dec  5 17:08 scsi-3600508b4001049440001200002f20000-part1 -> ../../sda1
 lrwxrwxrwx 1 root root 10 Dec  5 17:08 scsi-3600508b4001049440001200002f20000-part2 -> ../../sda2
 lrwxrwxrwx 1 root root 10 Dec  5 17:08 scsi-3600508b4001049440001200002f20000-part3 -> ../../sda3
```

4. In `/boot/efi/SuSE/elilo.conf`, there are two root device entries with the original quest's boot disk SCSI WWID:

```
root = /dev/disk/by-id/scsi-3600508b4001049440000d000026c0000-part3
     root = /dev/disk/by-id/scsi-3600508b4001049440000d000026c0000-part3
```

   Replace these entries with the cloned boot disk's SCSI WWID:

```
root = /dev/disk/by-id/scsi-3600508b4001049440001200002f20000-part3
     root = /dev/disk/by-id/scsi-3600508b4001049440001200002f20000-part3
```

5. In `/mnt/etc/fstab`, there are three entries (for /, /boot/efi, and swap devices) with the original guest's boot disk SCSI WWID:

```
/dev/disk/by-id/scsi-3600508b4001049440000d000026c0000-part3 /                    reiserfs
 acl,user_xattr        1 1
 /dev/disk/by-id/scsi-3600508b4001049440000d000026c0000-part1 /boot/efi            vfat
 defaults              0 0
 /dev/disk/by-id/scsi-3600508b4001049440000d000026c0000-part2 swap
 defaults              0 0
```

   Replace these entries with the cloned boot disk's SCSI WWID:

```
/dev/disk/by-id/scsi-3600508b4001049440001200002f20000-part3 /                    reiserfs
 acl,user_xattr        1 1
 /dev/disk/by-id/scsi-3600508b4001049440001200002f20000-part1 /boot/efi            vfat
 defaults              0 0
 /dev/disk/by-id/scsi-3600508b4001049440001200002f20000-part2 swap                 swap
 defaults              0 0
```

6. Reboot the guest:

```
Rescue:/# reboot
```

4.3.2.3 TC INIT Dump Messages Fail to Appear in SUSE Linux Guest Consoles Running Multi CPUs

The `hpvmconsole TC` command causes INIT dump messages to be displayed in the guest console. These messages appear with the one-way SUSE Linux guest; however, they fail to appear with SUSE Linux guests with multi-CPUs. The INIT dump is logged into the `hpvm_mon_log` file.

To resolve this problem, restart the guest after the `hpvmconsole TC` command is issued.

4.3.2.4 SLES10 SP2 Guests Supported on Integrity Servers

SLES10 SP2 guests are supported on all Integrity servers except the following:

- HP Integrity rx1600 server
- HP Integrity rx2600 server
- HP Integrity rx5600 server

4.3.2.5 Before Installing the SUSE Linux Guest

You must install the tog-pegasus RPM kit prior to installing the SUSE Linux RPM guest; however, the SUSE Linux installation media does not contain the tog-pegasus RPM kit. This RPM kit is available in the "HP Integrity Essentials Foundation Pack for Linux" (also known as HPIEFL for Linux).

The SUSE Linux RPM guest kit is actually two parts, a guest kit and a provider kit. The Hpvm.*.rpm kit contains:

- Tuning scripts
- hpvminfo
- hpvmcollect
- Guest library

The Hpvmprovider.*.rpm kit contains the VMprovider and related files. This RPM requires that both the hpvm and tog-pegasus kits must be installed.

http://h20293.www2.hp.com/portal/swdepot/displayProductInfo.do?productNumber=T2387AA

The information you need is provided in Chapter 5 of the *HP Integrity Essentials Foundation Pack for Linux User's Guide*.

To download the HPIEFL for Linux kit, click the link http://www.hp.com/go/integritylinuxessentials listed in Chapter 5, then click *Download for HP Integrity Essentials Foundation Pack for Linux* link on this website.

4.3.2.6 Installing Linux Guest Management Software for the First Time

The first time you install the Linux guest management software, the following error might occur:

```
=== from /var/log/messages file ===
Jan 18 22:45:00 1sn000 kernel: ipmi_si: Error clearing flags: cl

=== from "dmesg" command ===
ipmi_si: Error clearing flags: cl
```

You can ignore this error message.

4.3.2.7 ACPI Warnings, Errors, and Exceptions Displayed when SUSE Guest Booted

When an installed SUSE guest is booted, messages similar to the following are displayed on the guest's console:

```
Loading processor
  ACPI Error (acpi_processor-0500): Invalid PBLK length [0] [20060127]
  ACPI Error (acpi_processor-0500): Invalid PBLK length [0] [20060127]
  ACPI Error (acpi_processor-0500): Invalid PBLK length [0] [20060127]
  ACPI Error (acpi_processor-0500): Invalid PBLK length [0] [20060127]
  ACPI Warning (acpi_processor-0555): BIOS reporting wrong ACPI id for the processor [20060127]
  ACPI Exception (evxface-0538): AE_BAD_PARAMETER, Removing notify handler [20060127]
  ACPI Error (acpi_processor-0500): Invalid PBLK length [0] [20060127]
  ACPI Warning (acpi_processor-0555): BIOS reporting wrong ACPI id for the processor [20060127]
  ACPI Exception (evxface-0538): AE_BAD_PARAMETER, Removing notify handler [20060127]
  ACPI Error (acpi_processor-0500): Invalid PBLK length [0] [20060127]
  ACPI Warning (acpi_processor-0555): BIOS reporting wrong ACPI id for the processor [20060127]
  ACPI Exception (evxface-0538): AE_BAD_PARAMETER, Removing notify handler [20060127]
  ACPI Error (acpi_processor-0500): Invalid PBLK length [0] [20060127]
  ACPI Warning (acpi_processor-0555): BIOS reporting wrong ACPI id for the processor [20060127]
  ACPI Exception (evxface-0538): AE_BAD_PARAMETER, Removing notify handler [20060127]
  ACPI Error (acpi_processor-0500): Invalid PBLK length [0] [20060127]
  ACPI Warning (acpi_processor-0555): BIOS reporting wrong ACPI id for the processor [20060127]
  ACPI Exception (evxface-0538): AE_BAD_PARAMETER, Removing notify handler [20060127]
  ACPI Error (acpi_processor-0500): Invalid PBLK length [0] [20060127]
  ACPI Warning (acpi_processor-0555): BIOS reporting wrong ACPI idfor the processor [20060127]
  ACPI Exception (evxface-0538): AE_BAD_PARAMETER, Removing notify handler [20060127]
  ACPI Error (acpi_processor-0500): Invalid PBLK length [0] [20060127]
  .
  .
  .
  ACPI Warning (acpi_processor-0555): BIOS reporting wrong ACPI id for the processor [20060127]
  ACPI Exception (evxface-0538): AE_BAD_PARAMETER, Removing notify handler [20060127]
```

These warnings, errors, and exceptions occur because some optional elements are not provided by the Integrity VM ACPI table. These messages are printed because the SUSE startup/initialization code is trying to reference these optional elements, particularly for configured guest CPUs.

The messages do not impede the SUSE boot process; the boot/startup process completes. The only known side-effect of these messages is that there is an extra CPU created in the `/proc/acpi/processor` file system, which might lead to confusion as to the actual number of CPUs configured in the guest.

4.3.2.8 HP SIM CMS Cannot Connect to SLES10 over SSH

SSH password authentication is turned off by default in SLES10. In this default setting, HP SIM CMS cannot connect to the SUSE guest.

To enable password authentication for SSH, do the following:

1. Login to SUSE.
2. Edit the `/etc/ssh/sshd_config` file.
3. Set *passwordauthentication* value to yes.
4. Restart *sshd*.

For more information, see *Secure Shell (SSH) in HP SIM 5.x*, Troubleshooting section (page 31).

4.3.2.9 Preparing Linux Guests for Integrity Virtual Machines Manager

If Linux guests are to be managed by Integrity Virtual Machines Manager:

1. Install the `tog-pegasus` package.
2. On Red Hat Enterprise Linux, modify the file `/etc/Pegasus/access.conf` to allow WBEM access using your designated WBEM user name and password. Follow the steps below to configure this file. In this example, your designated WBEM user name is assumed to be `wbemuser`.
   a. Look for the following line in this file:

      ```
      -: ALL EXCEPT pegasus:wbemNetwork
      ```

   b. Change this line to either of the following options:

      - ```
        # Allow access only from user 'wbemuser':
        -: ALL EXCEPT wbemuser pegasus:wbemNetwork
        ```

      - ```
        # Allow access by all users:
        +: ALL EXCEPT :wbemNetwork
        ```

3. Start the `tog-pegasus` package by executing the following command:

   ```
   # /etc/init.d/tog-pegasus start
   ```

For information on where to download the Utilization Provider for the Red Hat Linux guest, see the *VSE Management Software Installation and Update Guide*.

NOTE: If using SUSE Linux SLES10 SP2 guests, install the HP Integrity Essentials Foundation Pack for Linux (HPIEFPL) Version 2.1 kit or later to get an appropriate version of the Utilization Provider. To get the VMProvider for the SLES10 guest, install the HPIEFPL Version 2.2 kit or later or make sure you install the Integrity VM V3.5 guest kit. For more information about obtaining the Utilization Provider, see the *HPIEFPL 2.2 Release Notes*.

4.3.2.10 Linux Guests with FC Tapes Display Errors

MPT errors might appear while booting a Linux guest if FC tapes are attached to it. FC tape devices return EIO on device reset, which causes timeout of the MPT reset. The boot proceeds after the reset timeouts; these errors can be ignored. For example:

```
Use ^ and v to change option(s). Use Enter to select an option
Loading:  Red Hat Enterprise Linux AS
```

```
Starting: Red Hat Enterprise Linux AS- - - - - - - - - - - -

ELILO boot: Uncompressing Linux... done
Loading initrd initrd-2.6.9-42.EL.img...done
i8042.c: i8042 controller self test timeout.
Red Hat nash version 4.2.1.8 starting
mptbase: ioc0: ERROR - Doorbell ACK timeout (count=4999), IntStatus=80000000!
mptbase: ioc0: ERROR - Doorbell ACK timeout (count=4999), IntStatus=80000000!
  Reading all physical volumes.  This may take a while...
  Found volume group "VolGroup00" using metadata type lvm2
  2 logical volume(s) in volume group "VolGroup00" now active
INIT: version 2.85 booting
                Welcome to Red Hat Enterprise Linux AS
```

4.3.2.11 Disable IPv6 on Linux Guests

Integrity VM does not support IPv6 on Linux guests. Red Hat Linux enables IPv6 by default. When the Linux guest boots, the following message is displayed:

```
printk: 1 message suppressed
```

The `dmesg` command reports numerous `duplicate address detected!` messages on every IPv6 configured interface. These messages indicates an issue in the IPv6 DAD (Duplicate Address Detect) mechanism and are harmless. You can ignore them, or you can disable them by including the following line in the `/etc/modprobe.conf` file:

```
alias net-pf-10 off
```

4.3.2.12 Infrequent "Ooops: timer ticks before it is due" Errors

Infrequent `Ooops: timer ticks before it is due` messages appear on the console. You can safely ignore this message, because it is harmless.

4.3.2.13 Infrequent "e1000: eth1: e1000_clean_tx_irq: Detected Tx Unit Hang" Errors

Infrequent `e1000: eth1: e1000_clean_tx_irq: Detected Tx Unit Hang` messages appear on the console. You can safely ignore this message, because it is harmless.

4.3.2.14 Inconsistent "Bogomips" Values between Virtual CPU0 and Other Virtual CPUs

"Bogomips" values can be inconsistent between virtual CPU0 and other virtual CPUs. This condition is harmless. To prevent this problem, add the `lpj=4000000` boot option in `/boot/efi/efi/redhat/elilo.conf`. For example:

```
# cat elilo.conf
prompt
timeout=20
default=linux
relocatable

image=vmlinuz-2.6.9-42.EL.img
        label=linux
        initrd=initrd-2.6.9-42.EL.img
        read-only
        root=/dev/VolGroup00/LogVo100
        append="console=tty0 console=ttyS0 rhgb quiet lpj=4000000
```

4.3.2.15 Incorrect Display of Special Characters when Displayed Using HP-UX Terminal

The Linux Red Hat installation program does not display correctly when run within `hpvmconsole` on an HP-UX terminal. It displays accented `A` characters instead of boxes.

4.3.2.16 Occasional Floating-Point Assist Fault Messages.

Occasional floating-point assist fault messages appear when running Mozilla. This problem also occurs on native Integrity servers running Linux. For more information, see the "Developer &

Solution Partner Program (DSPP)" webpage on http://www.hp.com, and search for "floating-point assist fault".

4.3.2.17 Serviceguard in VM Host Configuration

The default KILLTIME of 10 seconds (in `hpvmsg_stop` for a legacy package) and a wait of 10 seconds (in `hpvmsg_ext` for a modular package) might be too aggressive in some environments and can result in a file system corruption on Linux guests. HP recommends that you tune this value, so that the file systems on the guests are successfully unmounted before the guest is powered off.

4.4 OpenVMS Guests

The following sections contain the release notes specific to OpenVMS guests.

4.4.1 Creating OpenVMS Guests

To create an OpenVMS guest (virtual machine) on the VM Host, use the following command, where *vmsg1* is the name of the guest:

```
# hpvmcreate -P vmsg1 -O OpenVMS -c 2 -r 2g
```

For information about installing OpenVMS guests, see the *HP OpenVMS V8.4 for Integrity Servers Upgrade and Installation Guide* at the following website: OpenVMS Documentation.

4.4.2 Minimum Processor Requirement for OpenVMS Guests

OpenVMS guests are supported only on Integrity VM Host systems with Intel® Itanium® 2 9000/9100 Series processors.

4.4.3 Minimum VM Host Page Size

The OpenVMS guest might have problems booting if one or more of the following occurs:

- The VM Host is under memory pressure due to frequent allocations and freeing large amounts of memory.
- The VM Host has just enough physical memory to support the guest's requirements and the VM Host's base_pagesize is set to 4K.

OpenVMS expects a guest pagesize of 8K, and the boot processing can have issues loading an in-memory disk used during the boot process. If either of the following situations occur, setting the VM Host's base_pagesize to 64K or setting the guest's preferred pagesize to 8K should resolve the problem:

- The following message is written to the VM Host's `/var/opt/hpvm/common/hpvm_mon_log file`:

  ```
  #  WARNING: Host memory is fragmented.
  #           Reducing VHPT preferred page size from 64K to 16K.
  #           This may result in degraded performance for this virtual machine.
  ```

  Where # is a guest vm number assigned by hpvmdvr.

- Depending on how fragmented and how small the VM Host pagesizes are, the following OpenVMS error message and text appear on the guest's console:

  ```
  %SYSBOOT-F-LDFAIL, unable to load SYS$PUBLIC_VECTORS.EXE, status = 00000044


  ************************************************************
  * Exception taken before exception handler has been loaded!  *
  * Unable to take crashdump.                                  *
  ************************************************************

  * Exception Frame Display: *
  ```

…

Crash dump information follows this output.

Use one of the following solutions to fix either of these issues:

- Set the VM Host base_pagesize = 64K (See the base_pagesize(5) manpage for details of determining and setting the VM Host's base_pagesize.)
- Set the guest preferred pagesize to 8K:

  # **hpvmmodify -P *vm-name* -x tunables=ptsz=13**

4.4.4 Guest Device Placement and Adapter Limitation

The OpenVMS guest utilizes the PKDRIVER SCSI port driver and the DKDRIVER SCSI class driver. A guest configuration uses a UNIX-like algorithm to place storage devices on an AVIO storage adapter starting with entry "0,0" and continuing through "7,7", where each AVIO storage adapter can have up to 128 targets. The default device placement algorithm places 14 devices on each adapter, in order. Thus, when the guest creation (`hpvmcreate`) or modification (`hpvmmodify`) utility attempts to add a device (using the `-a` option), it adds, in order, from "0,0,0" through "0,0,14" before creating a new adapter and starting over again with "0,1,0" through "0,1,14". You can specify usage of any target value from 0 through 127.

Each Integrity VM adapter corresponds to the OpenVMS controller letters A through Z. The exact mapping depends on the order of devices found in the guest configuration file. Typically, "0,0" maps to PKA/DKA, while "0,1" maps to PKB/DKB, and so on. The following are known restrictions:

- The guest target value is a pure number assigned as the unit number of the device. The guest target value is not the same as a hardware SCSI target, where the disk in the 0th slot would be DKA0, the disk in the 1st slot would be DKA100, the disk in the 2nd slot would be DKA200, and so forth. Furthermore, it is not possible to assign the 'lun' number for the storage devices, such as DKA101. Placing a device at "0,0,1" results in the guest device "DKA1:".
- Only 16 unique DKDRIVER SCSI class adapters can be created. OpenVMS identifys them as DKAn: through DKPn:, where 'n' is the target value. Attempts to use a 17th adapter results in only a port class PKQ0: being created with no corresponding DKQn: devices. The Integrity VM guest creation (`hpvmcreate`) and modification (`hpvmmodify`) utilities are not aware of this restriction.

You can add devices dynamically by using the `hpvmmodify` command on the VM Host to add the storage in conjunction with the OpenVMS command `sysman io autoconfigure all` on the guest to find the storage.

4.4.5 OpenVMS System Dump Analyzer (SDA)

Using the OpenVMS SDA command `CLUE CONFIG` the first time results in a `CLUE-W-NOSYMBIOS, cannot access SYMBIOS table` warning. Subsequent `CLUE CONFIG` commands display incorrect data. Additionally, using `EXAM/PHYS FE000` to view the guests SMBIOS data results in the message `%SDA-E-NOREAD, unable to access location 00000000.000FE000`. This issue seems to affect only the SDA utility.

4.4.6 Formatting SYSTEM UUID

The sys$getsyi() or f$getsyi lexical for SYSTEM_UUID appear to return a UUID that is incorrectly formatted as compared to the value seen in the VM Host's guest configuration output (`hpvmstatus -V -P` *vm-name*). However, the returned value is normal and expected. The returned string needs to be properly formatted to be viewed as a "normal" UUID. Use the following DCL code to format and print the UUID value:

```
$! Format and print a UUID
$uuid = f$getsyi("system_uuid")
```

```
$len=f$len(uuid)
$if (len .eq. 32)
$then
$    part1 = f$fao("!AS",f$ext(24,8,uuid))
$    part2 = f$fao("!AS",f$ext(20,4,uuid))
$    part3 = f$fao("!AS",f$ext(16,4,uuid))
$    part4 = f$fao("!AS!AS",f$ext(14,2,uuid),f$ext(12,2,uuid))
$    part5 = f$fao("!AS!AS!AS!AS!AS", -
               f$ext(10,2,uuid),f$ext(8,2,uuid), -
               f$ext(6,2,uuid),f$ext(4,2,uuid), -
               f$ext(2,2,uuid),f$ext(0,2,uuid))
$    pr_uuid = f$edit("''part1'-''part2'-''part3'-''part4'-''part5'", -
                      "lowercase")
$
$    write sys$output "SYSTEM_UUID=''pr_uuid'"
```

5 Using Integrity VM Commands

This chapter contains notes about the Integrity VM commands.

5.1 Changes and Issues in This Release

The following sections describe changes, issues, and new information pertaining to this release.

5.1.1 Integrity VM Command Changes

The Integrity VM commands have changed in the following ways:

- The following new commands have been added:
  - The `hpvmdevinfo` command — Reports storage information about a virtual machine.
  - The `hpvmdevmgmt` command has a new attribute, `SHARE_LUNPATHS`, for AVIO devices.
  - The `hpvmsg_move` command — Initiates an online migration of a virtual machine that has previously been associated with a Serviceguard package.
  - The `hpvmsg_package` command — Assists the user who is developing and managing a set of Serviceguard package configurations.
- The `hpvmclone` , the `hpvmcreate`, and the `hpvmmodify` commands have the following new `-x` option attributes:
  - `-x ram_dyn_entitlement=amount` — Specifies the minimum guaranteed amount of memory.
  - `-x amr_enable={0|1}` — Enables or disables AMR monitoring for a guest, where 1 enables and 0 disables.
  - `- x amr_chunk_size=amount` — Specifies the increment amount of changes in memory size (default is 256 MB).
- The `hpvmmgmt` command has the new option, `-c` *`num`* — Specifies the number of vCPUs to enable on the guest.
- The `hpvmmodify` command `-x` option has the following new attributes:
  - `-x modify_status = [enabled|disabled]` — Allows you to enable or disable the ability to modify the status of a virtual machine.
  - `-x visible_status= [enabled|disabled]` — Allows you to set whether the virtual machine is visible to graphical tools like Logical Server Manager.
  - `-x register_status= [enabled|disabled]` — Allows the alias register_status to equate to modify_status, visible_status, and runnable_status.
- The `hpvmresources` command has the new `attach_path` device listed for AVIO.
- The `hpvmstatus` command lists the following new states:
  - On (Rmt): The virtual machine is a Serviceguard-packaged VM that is running on another member of the cluster.
  - Off (NR): This designates that the guest is not running and has been set to prevent starting using the not-runnable, (NR), attribute.
  - On (MGT): This designates that the guest is the target of a migration between two Integrity VM servers.
  - On (MGS): This designates that the guest is the source of a migration between two Integrity VM servers.
- The `hpvmstatus` command virtual machine memory section lists the following:

- DynMem Min: The minimum memory that can be dynamically allocated to this virtual machine with the dynamic memory allocation capability or automatic memory reallocation (AMR).
- Memory EntitleDynMem Target: The value of the desired memory allocation for the virtual machine. It may be set manually or automatically (by AMR). The amount of memory entitlement this virtual machine is guaranteed to have allocated to it, provided it has memory demand. This value is meaningful only if AMR is enabled for the virtual machine. Otherwise, the value is ignored.
- DynMem Max: The maximum memory that can be dynamically allocated to this virtual machine with the dynamic memory allocation capability or AMR.
- DynMem Current: The actual, current memory allocated to the virtual machine.
- Comfort Min: The memory allocation required to relieve memory "pressure" in the virtual machine.
- Total Memory: The absolute maximum amount of memory this virtual machine may be allocated.
- Free Memory: Amount of free memory in the virtual machine (according to the operating system running there).
- Available Memory: Amount of memory allocated to the virtual machine's user processes but not locked. This memory is available for paging by the virtual machine's operating system.
- Memory Pressure: A value between 0 and 100 used as an indicator of memory deficit and paging. The higher the number the longer the system has been in a memory deficit.
- AMR Chunk: The granularity of memory allocation used by AMR to increase or decrease that allocated to a virtual machine.
- AMR State: Indicator for whether AMR is enabled or disabled for this virtual machine.

5.1.2 Boot-Problem Messages Now Found In Log File

Boot-problem messages generated by either the `hpvmcreate`, `hpvmmodify`, or `hpvmstart` command and displayed on your screen are now also saved to your log file, `/var/opt/hpvm/common/command.log`.

5.2 Known Issues and Information

The following sections describe known issues and information from previous releases that still apply to V4.2.

5.2.1 Display Output from Some Integrity VM Tools Might Change in Form and Content

Specific display output from some Integrity VM tools, such as the `hpvmstatus` command, is subject to occasional changes of form and content. Program scripts should always use machine-readable output options (for example, `hpvmstatus -M`) whenever available to avoid future script maintenance.

5.2.2 Enabling or Disabling Virtual CPUs Online

Starting with HP Integrity VM V4.2, it is possible to change the number of enabled CPUs in HP-UX guests, using the `hpvmmgmt -c num` command. This command sets the number of enabled virtual CPUs to the number indicated by `num`, and disables the others. Depending on the kernel version, Linux guests might support enabling or disabling virtual CPUs by writing into `/sys/devices/system/cpu/cpuN/` online, as on a physical system. Disabled virtual CPUs no longer show up in the guest in commands such as `top` or `GlancePlus`, and no longer consume resources on the host. However, disabled virtual CPUs still appear on the host, for example in the `hpvmsar` command.

5.2.3 The hpvmdevmgmt -r Command Might Report an Error When a Device is Marked as EXIST=NO

On HP-UX 11i v3 VM Hosts, the device management report and repair function hpvmdevmgmt -r might successfully complete, but generate one or more instance of the following error message (one for each legacy device without a corresponding agile device name):

```
# hpvmdevmgmt -r
INFO - Analyzing all devices in /dev/rdsk for their device identification
strings.  This may take a while.
 hpvmdevmgmt: ERROR (host): Could not find an agile device name that
corresponds to the legacy device name: '/dev/rdsk/cxtxdxsx'.
```

This error might be reported when a device entry in /var/opt/hpvm/common/hpvm_mgmtdb has been marked as no longer existing (attribute set to EXIST=NO). The report and repair function attempts to examine all the disks it finds in /dev/rdsk and /dev/rdisk, looking for a match between the stored World-Wide ID (WWID) for the device that no longer exists and a WWID of a device that does exist.

If a legacy device (in /dev/rdsk or /dev/rscsi) is found on the VM Host that does not have an agile-name device equivalent (in /dev/rdisk or /dev/pt), the error message might be displayed for each device without a corresponding agile-named device.

You may safely ignore this error if you are not using the legacy device with any virtual machine.

5.2.4 An hpvmmodify Command Not logged in the command.log file for DVDs When Guest Booted to EFI

You might receive the following note-level message in the /var/opt/hpvm/common/command.log file under certain circumstances:

```
mm/dd/yy hh:mm:ss|NOTE|host|root|Unable to open file '/dev/rdisk/diskxxx' - Device busy.
```

This note might be logged if,:

- A guest is configured with an attached scsi burner:

  resource: -a burner:scsi:[b,d,t]:*attach:pass-through-device-path*

- The guest is then booted to EFI.
- Then the hpvmmodify command is run to add a device or remove a device other than the burner.

You may safely ignore this note.

5.2.5 Running the hpvmdevtranslate Script

Running the hpvmdevtranslate script produces a new copy of the Integrity VM device database that is missing the default restricted directories, such as /etc and /stand. To restore the default restricted directories, run hpvmdevmgmt -I either immediately after you run the hpvmdevtranslate script or after you run the hpvm_dev_convert script that is generated by the hpvmdevtranslate script.

5.2.5.1 The hpvmdevtranslate Command Can be Used to Translate Devices Like SecurePath and AutoPath

The hpvmdevtranslate command can be used to translate devices like SecurePath and AutoPath after starting Integrity VM Version 4.0 on HP-UX 11i v3. The devices are translated to agile devices if they have legitimate WWIDs in the /var/opt/hpvm/common/hpvm_mgmtb_pre1131 device database file.

5.2.5.2 Error Comments from hpvmdevtranslate Command

The hpvmdevtranslate command creates ERROR messages for all devices used by guests that have WWID set to WWID_NULL. This message indicates that no translation could be done.

These ERROR messages can often be ignored, because they relate to devices like network adapters (lan0, lan1) or vswitches (localnet, hostnet) that have no unique identifiers.

However, when these ERROR messages reference device backing storage items like a disk, volume, file, or directory; check to see if they really do reference the correct device, volume, file, or directory. If they do not, then the guest that uses these devices might not be fully functional. The following are example ERROR messages:

```
# ERROR: No mapping for device /var/opt/hfs_1_system/file_1500 with wwid WWID_NULL
# ERROR: No mapping for device /var/opt/hfs_1_system/file_500 with wwid WWID_NULL
# ERROR: No mapping for device /hfs_0_system/file_500 with wwid WWID_NULL
# ERROR: No mapping for device /hfs_0_system/file_1500 with wwid WWID_NULL
# ERROR: No mapping for device lan0 with wwid WWID_NULL
# ERROR: No mapping for device myswitch with wwid WWID_NULL
# ERROR: No mapping for device localnet with wwid WWID_NULL
# ERROR: No mapping for device lan1 with wwid WWID_NULL
```

5.2.6 Accidental Use of `-R` Option with `hpvmmodify` Instead of `-r`

The `hpvmmodify` command supports two options related to guest memory configuration, `-r` and `-R`. Accidental confusion of one for the other might create undesired results with your guest configuration. For an explanation of these command options, see the `hpvmmodify` manpage.

The `-R` option, with the same meaning, is accepted by the `hpvmcreate` and `hpvmclone` commands, but use of the `-R` option with those commands is currently unsupported. Nevertheless, similar undesired results might occur with a similar mistaken use of `-R` for `-r` with those commands.

5.2.7 Changing Guest LAN from AVIO to VIO

When changing a guest LAN from AVIO to VIO, you must restart the vswitch that the LAN is on. Use the following commands:

```
hpvmnet -h -S switchname // for the vswitch associated with the LAN change
hpvmnet -b -S switchname
```

5.2.8 The `hpvmmodify` Command Reevaluates Guest Configurations

When you use the `hpvmmodify` command to modify a guest, the entire guest configuration is reevaluated. Any problems that might prevent the guest from starting are reported. For example, if a guest has a reference to a host device that no longer exists, and you enter an `hpvmmodify` command that modifies the guest but does not fix the bad reference, a warning message is generated.

5.2.9 The `hpvmdevmgmt` Command Truncates File Sizes

When you use the `-S` option on the `hpvmdevmgmt` command to create a file to be used as a virtual device, you can specify the file size. The file size must be specified in whole integers. Anything after the initial whole integer is ignored. For instance, both the `hpvmdevmgmt -S 1G` command and the `hpvmdevmgmt -S 1.5G` command create a 1 GB file.

5.2.10 Setting Devices to Sharable Can Lead to Device Conflicts

Integrity VM allows Virtual FileDVDs and attached devices (only *avio_stor* type) to be shared by guests. With HP Serviceguard, you can share Virtual Disks. Other types of storage devices are not supported for sharing and cannot be allocated to multiple guests. Be careful when you set a virtual device to sharable using the `hpvmdevmgmt` command. Incorrectly marking a virtual device as sharable can lead to device conflicts and data corruption if multiple guests access it concurrently. In particular, attached devices using *scsi* (as opposed to the *avio_stor*) adapter type (tape, burner, or changer) should not be made sharable.

5.2.11 Errors on Displaying Guest or Vswitch Information While that Information is Being Modified

The `hpvmstatus`, `hpvmmodify`, `hpvmcreate`, `hpvmclone`, and `hpvmremove` commands might return the following error when another command accesses the same guest's configuration files at the same time:

```
hpvm_guest_get_state:103:No Guest by that name or number
```

If you receive this error when you try to display a guest or vswitch configuration, enter the command again.

5.2.12 Do Not Attempt to Remove Busy Virtual Devices

Before removing virtual devices with the `hpvmmodify` command, make sure that the guest operating system is no longer directing I/O to the device. Unmount the device if it is mounted. If you attempt to remove a device that has I/O in progress, the `hpvmmodify` command incorrectly removes the device from the guest configuration file. The `hpvmstatus` command no longer displays the device, and the `hpvmmodify` command does not retry the device removal, but the guest operating system sees the device as available. To remove the device, restart the guest.

5.2.13 Missing `uuid` or `.vmid` Files

If you use Integrity VM commands while guests are being removed, you might receive errors about missing `uuid` or `.vmid` files. Enter the command after the guest removal has completed.

5.2.14 Maintain Minimum Entitlement

The `hpvmcreate` and `hpvmmodify` commands do not allow the minimum CPU entitlement to be set below 5%. If you force the entitlements below 5%, boot time and potential runtime failures occur.

Set entitlement percentages in integers, not fractions. Fractions are ignored.

5.2.15 Actual Running Entitlement Might Differ from Configured Entitlement

Displayed and reported guest entitlement settings can differ from values that are specified. This occurs when entitlement settings have a granularity of one percent of the VM Host CPU capacity. An entitlement specified in cycles can be rounded to an integral percentage of VM Host cycles. For example, if you specify the guest entitlement as `-E 100` on a 900 MHz host system, it is rounded to 108 MHz (12%).

5.2.16 Duplicate Messages when Modifying Running Guests

Using the `hpvmmodify` command to add zero-length files to file-backed virtual disks can result in duplicate warning messages. For example:

```
# hpvmmodify -P test_duperr -a disk:scsi::file:/tmp/zero.size.1 \
 -a disk:scsi::file:/tmp/zero.size.2
hpvmmodify: WARNING (test_duperr): File size of: 0 (bytes) for disk backing file:
 /tmp/zero.size.1 must be equal to or greater than: 512 (bytes),
 or the device may not show up in the guest when booted.
hpvmmodify: WARNING (test_duperr): File size of: 0 (bytes) for disk backing file:
 /tmp/zero.size.2 must be equal to or greater than: 512 (bytes),
 or the device may not show up in the guest when booted.
hpvmmodify: WARNING (test_duperr): File size of: 0 (bytes) for disk backing file:
 /tmp/zero.size.1 must be equal to or greater than: 512 (bytes),
 or the device may not show up in the guest when booted.
hpvmmodify: WARNING (test_duperr): File size of: 0 (bytes) for disk backing file:
 /tmp/zero.size.2 must be equal to or greater than: 512 (bytes),
 or the device may not show up in the guest when booted.
```

Remove the failing device from the guest configuration using the `hpvmmodify` command.

5.2.17 Manpages Display on Linux Guests

The `hpvmcollect` and `hpvminfo` commands are available on Linux guests after installing the Linux guest management software kit, as described in the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual. To view the command displays properly, enter the following commands on the Linux guest:

```
# export LANG=en_US.iso88591
# export TERM=vt200
```

Exporting these environment variables allows you to display the manpage content from a Linux guest console. Some minor differences in the appearance of the manpages as displayed on HP-UX and as displayed on Linux are expected.

5.2.18 Integrity VM Check Might Fail Because of Bad Switch

The Cisco switch for HP BladeSystem c-Class Server Blades has a protocol error that causes it to respond to every MAC address. Because MAC addresses are unique, Integrity VM checks that the generated guest virtual MAC address is unique. If one of these bad switches is on your network, Integrity VM's check will fail.

The `hpvmcreate` command might fail with messages like the following:

```
hpvmcreate:  WARNING (host): Failed after 3 attempts.
hpvmcreate:  WARNING (host): Unable to create Ethernet MAC Address.
```

Similarly, the `hpvmstart` command might fail with messages like the following:

```
# hpvmstart -P vm2
HPVM guest vm2 configuration problems:
Warning 1 on itme nic1: Guest MAC address for switch nic1 is in use.
```

Cisco Systems, Inc. released a fix for the Cisco Catalyst Blade Switch 3020 in December 2006, which is available from the Cisco Systems website:

http://cco.cisco.com

It is also available from the HP website:

http://www.hp.com

From the HP website, select Software & Driver downloads and search for switch cisco 3020. The minimum required firmware version is 12.2(35) SE.

6 Guest Administration

This chapter contains information about managing Integrity VM guests.

6.1 Changes and Issues in this Release

There are no new guest administration issues in the V4.2 release.

6.2 Known Issues and Information

The following sections describe known issues and information from previous releases that still apply to V4.2.

6.2.1 Specifying Maximum Entitlements

Under some conditions, when setting a guest's maximum entitlements to less than the default (100%), the guest can be erroneously restricted to a fraction of the specified maximum entitlement. When this happens, the guest receives fewer CPU cycles than it should, even when it appears there is still unused CPU capacity on the VM Host. This patch kit corrects an issue with maximum entitlements specified with the `hpvmmodify -E min:max` command and the `hpvmmodify -e min:max` command. Entitlements achieved can be checked with the `hpvmstatus -r` command.

6.2.2 gWLM and Integrity VM Incompatibility

There are apparent incompatibilities between gWLM and Integrity VM V4.0 and V4.1. HP recommends not using gWLM to manage VM environments until these incompatibilities are resolved. HP is working to correct this problem and intends to make a patch available as soon as possible through the HP IT Resource Center (ITRC) website: http://www.itrc.hp.com.

6.3 Creating Virtual Machine Administrator and Operator Accounts

In versions of Integrity VM prior to A.03.00, only `Admin` console access is available, and only one such account per guest is allowed. The administrator account name must match the guest name. The new version of Integrity VM provides proper access controls and individual accountability for these accounts. For more information, see Section 6.6 (page 62).

6.4 Administrator Account Names

Integrity VM Version 4.0 and later lifts the restriction that the virtual console administrator account names must be the same as the guest name. As a result, the virtual console administrator name can be any valid HP-UX login name. To continue accessing the virtual console, existing guest console accounts must be added to the authorization list for the associated guest with the `usermod` command. This allows multiple accounts to map to the guest, and requires the account names to be valid HP-UX login strings.

Authorization of access to the virtual console is determined by the guest configuration file (set using the `-u` and `-g` options to the `hpvmcreate`, `hpvmmodify`, and `hpvmclone` commands). This controlled access allows you to temporarily block access by using the `hpvmmodify` command to change the virtual console administrator account name.

6.5 Guest User Accounts

The configuration for captive `hpvmconsole` guest user accounts has changed in Integrity VM Version 4.0 and later to support additional access controls and configurations. This change requires that the guest user accounts have the correct home directory. It is also necessary to list the console access account in the guest configuration file.

For example, using a guest named compass1 (and therefore a user account named compass1), the home directory for user compass1 must be /var/opt/hpvm/guests/compass1. To ensure that the user continues to have administrative console access, use the following command:

```
# hpvmmodify -P compass1 -u compass1:admin
```

6.6 Creating Virtual Machine Administrator and Operator Accounts

In prior versions of Integrity VM, only admin console access is available, and only one such account per guest is allowed. The administrator account name must match the guest name. The new version of Integrity VM provides proper access controls and individual accountability for these accounts.

A captive virtual console account is a special-purpose user account created on the VM Host for each guest administrator. These types of user accounts use /opt/hpvm/bin/hpvmconsole for a shell, and the desired guest's per-guest directory for a home directory. For virtual console access, the account also requires a password, and access to its associated guest. You create this account with the hpvmcreate, hpvmclone, or hpvmmodify command. You can establish group membership of the account using the -g option to those commands, or user membership, using the -u option to those commands.

NOTE: Do not use the hpvmsys group for user accounts. This group is used for security isolation between components of Integrity VM.

The HP-UX useradd command might not work as expected. To create user accounts for virtual console access, use the useradd command before you create the virtual machine. Alternatively, specify the user account directory completely in the /etc/passwd file, ensuring the entry is unique.

In the following example, the useradd command is used to create three user accounts on the VM Host system (testme1, testme2, and testme3):

```
# useradd -r no -g users -s /opt/hpvm/bin/hpvmconsole \
 -c "Console access to guest 'testme'" \
 -d /var/opt/hpvm/guests/testme \
 testme1
# useradd -r no -g users -s /opt/hpvm/bin/hpvmconsole \
 -c "Console access to guest 'testme'" \> -d /var/opt/hpvm/guests/testme \
 testme2
# useradd -r no -g users -s /opt/hpvm/bin/hpvmconsole \
 -c "Console access to guest 'testme'" \
 -d /var/opt/hpvm/guests/testme \
 testme3
```

The following command creates the virtual machine named testme:

```
# hpvmcreate -P testme -u testme1:admin -u testme2 -u testme3:oper
```

At this point, users testme2 and testme3 both have oper level access to the virtual console, and user testme1 has admin level access. In order to make these accounts usable, set passwords for them, as follows:

```
# passwd testme1
...
# passwd testme2
...
# passwd testme3
...
```

Because of the way the useradd command works, an attempt to create an additional account might result in an error. For example, the following command attempts and fails to add the testme4 user account:

```
# useradd -r no -g users -s /opt/hpvm/bin/hpvmconsole \
> -c "Console access to guest 'testme'" \
```

```
> -d /var/opt/hpvm/guests/testme \
> testme4
'/var/opt/hpvm/guests/testme' is not a valid directory
```

To enter the command correctly, include the entire directory path. For example:

```
# useradd -r no -g users -s /opt/hpvm/bin/hpvmconsole \
> -c "Console access to guest 'testme'" \
> -d /var/opt/hpvm/guests/testme/. \
> testme4
# hpvmmodify -P testme -u testme4
# passwd testme4
```

Note the addition of the slash and period (`/.`) to the end of the argument to the `-d` option, which ensures there is no confusion with HP-UX shared home directories.

6.7 Reconfiguring VM Host CPUs

Do not reduce the physical CPU count below the virtual CPU (vCPU) count of any guest. No running guest should be allocated more vCPUs than the VM Host system has physical processors.

6.8 Monitor Logs Might Report Warnings

On rare occasions, the monitor log might report warnings such as the following:

```
Warning: VCPUn not scheduled for x ms, command 0x0.
Warning: No recorder entry on VCPUn for x ms.
```

These warnings are generally harmless, but might indicate performance problems with your virtual machines, such as system or I/O overloads.

6.9 Warning Message Might Appear When Configuring or Starting Guests

When configuring or starting Integrity VM guests, the following warning message might be displayed if storage associated with the guest appears to be performing very poorly.

```
hpvmcreate: WARNING (host): Device /dev/rdsk/c6t9d0 took 32 seconds to open.
```

If this message is appearing when configuring or starting a guest, Integrity VM does not support running that guest with the devices specified in this message. Replace the devices with different devices in the guest configuration and evaluate the Host storage configuration with respect to these devices and the adapters used to access them.

6.10 Do Not Add User Accounts to the `hpvmsys` Group

The `hpvmsys` group implements the security model for the VM Host and guests. The `hpvmsys` group is automatically added to `/etc/group` when Integrity VM is installed. Do not add user accounts to this group.

6.11 Do Not Enter Ctrl/B after Starting Guest with Virtual Console

When you use the `pc -on` command inside the Integrity VM virtual console to start the guest, do not enter **Ctrl/B**; this will interrupt the guest boot process. Wait for the guest boot to complete and the virtual console prompt to return. Then enter **Ctrl/B**.

6.12 HP-UX 11i v3 Guests Might Panic with a NaT_hndler: kernel NaT Consumption Fault

Under certain situations, an HP-UX 11i v3 guest might panic with a `NaT_hndler: kernel NaT Consumption fault` when using Logical Volume Manager (LVM) software.

To avoid this situation, install the BaseLVM (B.11.31.0712) software from the HP-UX 11i v3 0712 AR media.

6.13 How to Stop Guests

To stop a guest, HP recommends that you perform an operating system shutdown from a privileged account on the guest. If the guest is not responding, use the `hpvmstop -g` command on the VM Host. Do not stop a guest by killing the `hpvmapp` process.

6.14 The `hpvmconsole` pc –cycle Command Occasionally Does not Complete

If the guest `hpvmconsole pc -cycle` command doesn't complete and restart the guest, enter **Ctrl/B** to interrupt the command and then press **Enter** to return to the virtual console. Exit the virtual console by entering the `X` command. At the VM Host command prompt, enter the following command to start the guest:

```
# hpvmstart -P guestname
```

6.15 How to Recover from a Guest Hang

If a guest hangs, attach to the guest's virtual console using the `hpvmconsole` command, then use **Ctrl/B** to enter the virtual console. Enter the `tc` command to reset the guest. The guest captures a memory dump of the machine state, which can be used later for offline diagnosis. Do not kill the guest from the VM Host or use the virtual console to power down a hung guest. Doing so can corrupt the guest file system.

6.16 Using HP Serviceguard to Manage Guests

This section lists release notes specific to using Serviceguard in the Integrity VM environment.

Do not attempt to use guests as Serviceguard packages and guests as Serviceguard nodes at the same time on the same VM Host system.

You can install HP Serviceguard A.11.16 or 11.17 on the VM Host or on the HP-UX guest. You can install HP Serviceguard 11.18 only on guests running HP-UX 11i v3.

6.16.1 Serviceguard 11.18 No Longer Supported

Starting with HP Integrity Virtual Machines, Version 4.2, Serviceguard 11.18 is no longer supported with Integrity VM.

6.16.2 Packaging VM Guest with CFS/CVM Backing Stores as Serviceguard Packages

When creating a Serviceguard cluster with virtual machines acting as packages, the `hpvmsg_package` script correctly identifies CVM logical volumes and CFS files backing stores used by guests but requires users to verify or provide activation modes and package dependencies for the backing stores.

The `hpvmsg_package` script creates the package configuration in the package directory: `/etc/cmcluster/`*`hpvm-name`*`/`*`hpvm-name`*`.conf`. Inside the configuration file are instructions, examples, and default and assigned named-values pairs describing the resources used by the virtual machines and controlled and monitored by Serviceguard.

For information about selecting the appropriate values for these items, see the templates files in the *Managing Servicguard* manual and the *Veritas Storage Foundation 5.0 Cluster File System Administration Guide Extracts for HP Serviceguard Storage Management Suite*.

6.16.3 File Permission Errors When Checking or Applying Integrity VM Serviceguard Packages to the Cluster Configuration

Depending on the system configuration, you might see an error similar to the following when running `cmcheckconf` or `cmapplyconf` to the virtual machine packages:

```
# cmapplyconf -P /etc/cmcluster/hpvm-sg1-g4/hpvm-sg1-g4.conf
Incorrect permissions for /etc/cmcluster/hpvm-sg1-g4 (40777). Directory must be executable for owner, and not
writable by group and others on node hpvm-sg1-h1.

cmapplyconf: Error found in package file: /etc/cmcluster/hpvm-sg1-g4/hpvm-sg1-g4.conf.
```

To correct this issue, use a chmod command similar to the following to correct the permission of the package directory on each of the cluster members:

```
# chmod go-w /etc/cmcluster/hpvm-name
```

6.16.4 Status of Serviceguard Controlled Distributed Guests can Lag

When Integrity VM guests are configured as packages in a Serviceguard (SG) cluster, `hpvmstatus` displays which VM Host is running the distributed guests as an SG package. Because this information comes from SG, it can be delayed by as much as 10 seconds. This delay does not cause any risk of starting the same guest on two different Integrity VM Hosts, because SG is controlling the start of these guests and allows only a single instance to run at any one time.

6.16.5 The hpvmsg_package Does Not Add Appropriate Entries

The `hpvmsg_package` does not add appropriate entries to the package configuration and control script files. After running the `/opt/cmcluster/toolkit/hpvmsg_package` script to package a guest that contains CVM or CFS backing stores, review and modify the package configuration and control scripts for each cluster member. As part of this process, add CVM and/or CFS backing store entries to these files.

The package configuration and control scripts can be found at: `/etc/cluster/guest-name/`

6.16.6 Problem Displaying Truncated IPv6 Address for AVIO LAN with `hpvmstatus` and `hpvmnet` Commands

For a guest configured with the AVIO adapter as a network device (avio_lan) and also configured with an IPv6 address, the IPv6 address displayed by `hpvmstatus -V` and `hpvmnet -V` may be truncated.

6.16.7 Using AVIO LAN Device in a Serviceguard Configured Guest

When using AVIO networking devices for guests that are configured as Serviceguard Packages, be sure that all Serviceguard standby `lans` are configured using PPA devices supported by AVIO. Failure to do so causes network connectivity to be lost even if the standby link is up.

6.16.8 Required HP Serviceguard Patches

To use Serviceguard to manage HP-UX guests, make sure the required patches are installed. For more information, see Section 2.4 (page 28).

6.16.9 Reenter Command to Start Packages

The procedure for configuring and starting guest packages includes the `cmrunpkg` command. This command does not always work the first time you enter it. If the command does not start the package, re-enter the command.

6.16.10 Do not Use Integrity VM Commands to Manage Distributed Guests

Guests configured as Serviceguard packages should only be stopped and started using Serviceguard package control commands. Do not use the Integrity VM commands (`hpvmstart`,

hpvmstop, and hpvmconsole) to start and stop these types of guests. For more information about using Serviceguard to manage virtual machines, see the *HP Integrity Virtual Machines 4.2: Installation, Configuration, and Administration* manual.

6.16.11 Different Cluster Nodes Report Virtual Machine Status Differently

Integrity VM commands can receive different warnings and errors from guests running on different Serviceguard nodes. For example, the Serviceguard node that is starting a guest as part of a package knows that the guest is running before any other nodes know. (The delay is usually less than 10 seconds.) Commands that are run on different servers report different errors or warnings depending on whether the guest is running or not.

6.16.12 Syslog Entries for cmcld Can Be Ignored

With Serviceguard and Integrity VM running, you might see the following types of message in the syslog file:

```
Syslog entries - cmcld[XXXX]: Warning: cmcld process was unable to run for the last X.XX seconds
```

These messages can be ignored.

6.16.13 Using Integrity Virtual Machines Manager (VMMgr) to Manage Distributed Guests

The following situation might occur when you are using VSE to manage distributed guests (guests that are configured as Serviceguard packages):

- There is a guest configuration file for each guest on each VM Host. Therefore, when you modify a distributed guest you must modify the guest on each VM Host that is a cluster node.

6.17 Managing Guests using gWLM

Guests configured with processing power specified in cycles instead of percentage are incompatible with gWLM A.02.50 and earlier versions.

If gWLM/VSE produces an error message similar to the following, a guest is configured with the processing power specified in cycles:

```
A VM encountered with no size
```

This is apparent when using gWLM A.02.50 with Integrity VM A.03.00. You can correct the problem by modifying the guest and specifying processing power in percentage rather than CPU cycles. For example, to modify the guest named compass1 to use 10% of the CPU processing power, enter the following command

```
# hpvmmodify -P compass1 -e 10
```

You must boot the guest to initiate this setting for gWLM.

Alternatively, upgrade gWLM to A.03.00 for use with Integrity VM A.03.00.

7 Networking Information

This chapter contains notes about configuring networks for virtual machines.

7.1 Changes and Issues in This Release

The following sections provide new information and describe new networking issues in the V4.2 release.

7.1.1 AVIO LAN Devices Left Unclaimed by OpenVMS Guest if vswitch is Down at Boot

If you boot an OpenVMS guest while the vswitch is not UP, AVIO interfaces associated with the vswitch might not be claimed in the guest. For example, this issue might occur if the guest is booted prior to booting the vswitch, or if the corresponding network interface on the VM Host is not cabled during the guest boot time.

If you encounter this problem, perform the following steps:

1. Fix the vswitch state; that is, ensure that the hpvmnet command displays the vswitch state as UP.
2. Once the vswitch is started, reboot the OpenVMS guest to get the AVIO LAN devices recognized, which ensures that all the AVIO LAN interfaces that are configured through this vswitch are recognized by the guest.

7.1.2 Known Limitation on OpenVMS Guests and HP-UX Guests Sharing the same vswitch

If you configure an HP-UX guest and an OpenVMS guest with the same vswitch, the network communication between these guests fail. This problem will be fixed in a future version of OpenVMS.

To workaround this problem, configure the HP-UX guest and the OpenVMS guest with different vswitches.

7.1.3 OpenVMS Guests Support Only vswitch-based VLAN Configuration and Not Guest-based VLANs

AVIO LAN drivers on OpenVMS guests are VLAN tag-unaware and support only vswitch-based a VLAN configuration. Use the following command to configure VLAN for an OpenVMS guest:

```
# hpvmnet -S vswitch-name -u portid:portnum:vlanid:vlandid
```

See the *HP Integrity Virtual Machines 4.2: Installation, Configuration, and Administration* manual on the BSC website, http://www.hp.com/go/virtualization-manuals.

7.1.4 Networking Interface Support for OpenVMS Guest

The OpenVMS guest supports only the AVIO interface; however, Integrity VM commands allow you to configure either AVIO or VIO devices to a guest, and these devices might not give any apparent errors during the startup. VIO devices are not supported on OpenVMS guests.

7.1.5 AVIO Non-Physical Network vswitch (localnet) Restrictions

OpenVMS guests that are created (hpvmcreate) or modified (hpvmmodify) to add and use a non-physical vswitch must use the same vswitch by name for each OpenVMS guest. The following scenarios fail:

- Attempting to start an OpenVMS guest that is using two different localnet vswitches on the same guest
- Using a different localnet vswitch than an already active OpenVMS guest is using

7.2 Known Issues and Information

The following sections describe known issues and information from previous releases that still apply to V4.2.

7.2.1 Location of AVIO Networking Driver for Linux and Windows Guests

AVIO networking driver for Linux and Windows are available in VMGuestSW bundle of Integrity VM host software on the http://software.hp.com website. Go to this website, and search for the VMGuestSW bundle.

7.2.2 Changing Network Device Type on Linux Guest

If you change the type of network device on a Linux guest, either from VIO to AVIO or AVIO to VIO, follow these steps:

1. Specify the correct network driver associated with the device type in the `/etc/modprobe.conf` file. For example, if the eth0 network device type is changing from VIO to AVIO and the existing alias line reads `alias eth0 e1000`, change it to the following::

   ```
   alias eth0 lgssn
   ```

2. Issue the `depmod -a` command to inform the kernel of the device type change. After you issue the command, you should see the following (or similar) line in `modules.dep` file:

   ```
   /lib/modules/2.6.9-55.EL/kernel/drivers/net/lgssn/lgssn.ko:
   ```

   For example:

   ```
   # grep lgssn /lib/modules/2.6.9-42.EL/modules.dep
   /lib/modules/2.6.9-42.EL/kernel/drivers/net/lgssn/lgssn.ko:
   ```

These two steps enable automatic loading of the AVIO Linux LAN guest driver (`lgssn`) at boot time.

7.2.3 Using Network Time Protocol (NTP) in Integrity VM Environments

Using NTP in Integrity VM environments is recommended to keep time-of-day clocks in sync and correct. Use `xntpd` on HP-UX and `ntpd` on Linux to synchronize time use NTP.

NTP Configuration on a VM Host

On each VM Host, NTP should be configured just as it would be on any typical (non-virtual) system. In `/etc/ntp.conf`, specify a drift file and one or more high quality time servers:

```
driftfile /etc/ntp.drift
server <A-HIGH-QUALITY-TIME-SERVER> prefer # a preferred time source
server <ANOTHER-HIGH-QUALITY-TIME-SERVER>  # a backup time source
server <YET-ANOTHER-HIGH-QUALITY-TIME-SERVER>
```

The local clock should also be configured as a fall back if necessary:

```
server 127.127.1.0                  # use local clock as backup
fudge 127.127.1.0 stratum 10        # show poor quality
```

If you have a group of VM Hosts that you would like to synchronize, you can add "peer" references in the `/etc/ntp.conf` file for each of those associated VM Hosts, so they will do mutual synchronization:

```
peer <AN-ASSOCIATED-VM-HOST>
peer <ANOTHER-ASSOCIATED-VM-HOST>
peer <YET-ANOTHER-ASSOCIATED-VM-HOST>
```

After configuring the Host's `/etc/ntp.conf` file, assuming the NTP is already enabled, (that is, the XNTPD variable in `/etc/rc.config.d/netdaemons` is set to 1, as in export XNTPD-1), you can execute `/sbin/init.d/xntpd start` to restart `xntpd` on the HP-UX VM Host.

NTP Configuration on a VM Guest

Because NTP was not designed to run inside a virtual machine, using NTP on VM guests requires special configuration to be stable. Using a typical default NTP configuration on a VM guest might result in NTP instability and failure to synchronize, or in apparent lost time on the guest. To avoid these virtualization related NTP issues, each VM guest should get its time directly from the VM Host. Also, VM guests should not serve time to any other systems.

You can monitor NTP status by using the `ntpq -p` command and noting the *offset* and the *disp* values. Ideally both values will be well under 100. For information about how to check NTP stability, see the *HP-UX Internet Services Administrators Guide*.

You can improve time stability on VM guests by tuning NTP to poll more frequently for time corrections. The default NTP values for the *minpoll* and *maxpoll* intervals are 6 (64 seconds) and 10 (1024 seconds) respectively. NTP adjusts the current polling interval depending on network quality and delays. A VM guest uses a virtual lan that can cause NTP to set the polling value incorrectly. To help mitigate this issue use the *minpoll* and *maxpoll* directives in the `ntp.conf` file to change the polling intervals.

Start with *minpoll* at 4 (16 seconds) and `maxpoll` at 6 (64 seconds) and then reduce *maxpoll* towards 4 if necessary to force shorter polling intervals. HP recommends that a VM guest never be allowed to deliver time (allow guests only to be a time consumers). Because a VM guest never delivers time, you do not need to configure the local clock (server 127.127.1.0) or an `ntp.drift` file. So, the `ntp.conf` file on a VM guest should be as simple as the single line:

```
server <VM-HOST-SERVER-NAME> minpoll 4 maxpoll 6
```

After configuring the guest's `/etc/ntp.conf` file, assuming NTP is already enabled (that is, the XNTPD variable in `/etc/rc.config.d/netdaemons` is set to 1, as in export XNTPD=1), you can run the following commands on an HP-UX guest to sync its time with the VM Host and restart `xntpd`:

```
/sbin/init.d/xntpd stop
/usr/sbin/ntpdate -b <VM-HOST-SERVER-NAME>
/sbin/init.d/xntpd start
```

NOTE: For VM guests that are on a different subnet than the VM Host, the VM Host may not be the best source of time if there is another accurate time server available with less network latency. In the case of different subnets, measure latency from the guest to various time servers using the `ping` and `traceroute` commands to determine which potential time server has the least network latency. Using the VM Host may be the best solution, but this depends on your local network topology and the relative network distance to alternate time servers. If using an alternate (non-VM-Host) time server appears best, it may be helpful for the alternate time server and the VM Host to use each other for peer mutual time synchronization.

7.2.4 Supported Adapters

Integrity VM supports only those adapters that are of Ethernet or the IEEE 802.3 CSMA/CD network. Note that AVIO interfaces are supported by a select set of Ethernet host NICs. The following Ethernet cards are supported with AVIO on HP-UX guests:

- A6794A — Core
- A6825A — Core
- A7109A — Core
- A6847A — Add-in
- AB465A — Combo Add-in
- A9782A — Combo Add-in

- A9784A — Combo Add-in
- AB352 — Core
- AB545A — Networking Add-in
- A7011A — Networking Add-in
- A7012A — Networking Add-in
- AB290A — Combo Add-in
- AB287A — Add-in (10GbE)
- AD331A — Add-in
- AD332A — Add-in
- AD193A — Combo Add-in
- AD194A — Combo Add-in
- AD221A — Add-in
- AD222A — Add-in
- AD337A — Add-in
- AD338A — Add-in
- AD339A — Add-in
- AD385A — Add-in (10GbE)
- AD386A — Add-in (10GbE)
- NC360m — C-class Mezz card
- NC364m — C-class Mezz card

7.2.5 Calculating the Actual Utilization of the Virtual Network Card

The emulation of the virtual network I/O card is based on the Intel I8254X family. Thus, the virtual network card (vNIC) is presented to the guest operating system as PCI-X 1000Base-T with the speed of 1 Gb regardless of the physical network interface card backing the vswitch. This emulation could lead to an incorrect calculation of vNIC performance by some network performance applications on the guest. For example, on a Windows guests, the Task Manager —> Network Performance display shows 1 Gb utilization. All calculations on the Windows utilization are then based upon this value rather than the speed of the backing device on the VM Host.

To accurately calculate vNIC performance, take into consideration the speed of the backing device on the Integrity VM Host.

7.2.6 Using IP Alias Addresses in the Guest Not Supported for IPv4 or IPv6

Integrity VM Version 4.1 does not support the use of IP alias addressing in the guest for either IPv4 or IPv6.

7.2.7 Sufficient Memory for Guests with Virtual LAN Devices

If the guest is configured with a number of virtual LAN devices and the guest does not have sufficient memory, some of the devices could be missing after the guest is booted. To resolve this issue, increase the size of guest memory with the `hpvmmodify -r` command.

For more information, see Section 4.2 (page 44).

7.2.8 Vswitches Are Always in SHARED Mode

The `hpvmnet` command displays the status of the vswitches, including the mode. The vswitches are always in SHARED mode. No other modes are supported at this time.

7.2.9 Do Not Use the HP A5506B PCI 10/100Base-TX 4 Port Interface for Virtual Networking

Host to guest connectivity might not be reliable when using the HP A5506B PCI 10/100Base-TX 4 Port interface for guest networking.

7.2.10 Integrity VM V4.1 Does not Support Gelan Drivers

Gelan drivers are not supported with Integrity VM Version 4.1 and later.

7.2.11 MAC Address Validation Can Be Enhanced

When you add a virtual NIC to your guest, Integrity VM checks to make sure the MAC address is unique.

By default, Integrity VM makes three attempts (each with a one-second timeout) to determine the validity of the MAC address for the virtual NIC. This process can result in up to ten seconds of delay for each defined virtual NIC. To speed up this processing, add the following tunable to the `/etc/rc.config.d/hpvmconf` configuration file:

`HPVMMACADDRFRAMES=`*n*

Where *n* is the number of attempts (1 to 30). The default is 3. A value of 1 or 2 increases performance at the risk of missing a response from a slow NIC.

You can set the `HPVMMACADDRFRAMES` tunable to zero (0), which completely eliminates the MAC address verification. However, HP recommends that you do so only after you configure all of your guests and confirm that there are no conflicts with MAC addresses in your network environment.

To boost virtual network performance, create additional vswitches and allocate them across guests.

7.2.12 Auto Port Aggregation (APA) is Supported on the VM Host, Not on the Guest

Integrity VM does not support running APA on a guest. You can run APA on the VM Host.

APA can be configured on the VM Host to provide a highly available LAN for the vswitch (APA in active/passive mode) or to increase the bandwidth of the vswitch LAN (APA active/active mode). Before you stop APA, use the `hpvmnet -h` command to halt the vswitch. If you do not halt the vswitch first, the `hpvmnet` command reports an incorrect MAC address for the vswitch.

7.2.13 Do Not Run Applications that Set Network Devices into Promiscuous Mode

Vswitches must not be connected to network devices that are set to promiscuous mode. Do not run applications like `tcpdump` on the VM Host on interfaces that are used for virtual switches.

7.2.14 Guest and Host Communication

Checksum offloading (CKO) is not supported. On most of the physical interfaces that are not of 10 Gigabyte type, CKO is turned off by default. Consult your interface card documentation for details.

Turning on CKO can cause host-to-guest connections as well as guest-to-host communication over a VLAN to fail. If you are receiving failures with host-to-guest connections or guest-to-host communication using a VLAN, ensure that the CKO is turned off in the host interface driver. If that does not fix the problem, reboot the vswitch.

To turn off the CKO on the VM Host, identify the PPA of the network interface for the vswitch using the `hpvmnet` command. For example:

```
# hpvmnet

Name Number State Mode PPA MAC Address IP Address
======== ====== ======= ========= ====== ============== ===============
```

```
localnet 21 Up Shared N/A N/A
vmlan0 22 Up Shared lan0 0x00306ea72c0d 15.13.114.205
vmlan4 23 Up Shared lan4 0x00127942fce3 192.1.2.205
vmlan900 24 Up Shared lan900 0x00306e39815a 192.1.4.205
```

Check the status of the transmit CKO using the following command:

```
# lanadmin -x cko 4
Hardware TCP/UDP (IPv4) transmit checksum offload is currently enabled.
Hardware TCP/UDP (IPv4) receive checksum offload is currently disabled.
```

In this example, the VLANs are configured over the vswitch vmlan4. This vswitch is created on PPA 4 on the VM Host. To turn off CKO on PPA 4, enter the following command on the VM Host:

```
# lanadmin -X send_cko_off 4

Hardware TCP/UDP (IPv4) transmit checksum offload is currently disabled.
```

7.2.15 Configuring vswitches to be Backed by a VLAN Interface on the VM Host is Not Supported

Do not use the `hpvmnet` command to create a virtual switch backed by a VLAN port on the VM Host. This configuration is not supported.

7.2.16 Do Not Turn on TSO on the VM Host and on HP-UX Guests When Using VIO

TCP Segmentation Offload (TSO) is turned off by default in HP-UX. HP recommends that you leave it turned off on both the VM Host system and on HP-UX guests if you are using the VIO interface. This applies to both the virtual network interface cards in the guest and any physical network interface cards in the VM Host that are used by vswitches. When TSO is enabled, guest networks are interrupted.

To verify whether TSO is turned on, enter the following command:

```
# lanadmin -x vmtu n
```

Where *n* is the VM Host interface, as displayed by the `hpvmnet` command. For example, to verify that TSO is on for `lan0`, enter the following command:

```
# lanadmin -x vmtu 0
Driver/Hardware supports TCP Segmentation Offload, Current VMTU = 32160
```

To turn TSO off on `lan0`, use the following command:

```
# lanadmin -X vmtu  0  0
Virtual MTU is set to 0
```

Note that this restriction applies only to VIO interfaces.

7.2.17 Restarting Vswitches

It is necessary to restart the vswitch when:

- You replace the physical network card associated with the vswitch.
- You change a VM Host IP address associated with the vswitch's network interface card.
- You change the network interface characteristics on the VM Host; for example, by using the `lanadmin` command to change checksum offloading (CKO).
- You notice that there is no communication from an `avio_lan` interface to a `lan` interface after booting the guest(s) while the vswitch is down.

For information about how to restart vswitches, see the *HP Integrity Virtual Machines 4.2: Installation, Configuration, and Administration* manual.

When you restart a vswitch, it is not necessary to restart the guests using the vswitch.

7.2.18 Guest AVIO Interface Behavior

The following list describes the guest AVIO interface behavior when guest boots while vswitch is down or resetting:

- If you boot a guest while the vswitch is not up, AVIO interfaces associated with the vswitch might not be claimed in the guest. For example, this might occur if the guest is booted prior to booting the vswitch or if the corresponding network interface on the VM Host is not cabled. If you encounter this problem, first fix the vswitch state (that is, ensure that `hpvmnet` displays its state as Up), and then execute the `ioscan` command in the guest. These actions will claim the AVIO interfaces.
- After `ioscan` claims the AVIO devices in the guest, you might notice that the AVIO devices cannot communicate with another VIO guest interface configured on the same vswitch. When this occurs, invoke the `hpvmnet -r` option on the vswitch to restore connectivity.
- If the vswitch is in an unstable state while the guest is booting, guest AVIO interfaces might fail initialization and move to the DOWN state (as displayed by the`lanscan` command). When this occurs, first ensure that the vswitch enters a stable state, then reset the guest interface using `lanadmin`.

7.2.19 AVIO LAN Devices Not Claimed by Guest with DOWN vswitch at Boot Time

In addition to running `ioscan`, you must re-run the necessary network startup scripts, so that IP addresses can be reconfigured on the network interface cards (NICs). For example:

```
/sbin/rc2.d/S340net start
/sbin/rc2.d/S340net-ipv6 start
```

7.2.20 Do Not Use TCP Software Packet Reassembly in IGSSN Driver

For AVIO, there have been problems with TCP Software Packet reassembly in the igssn driver in a guest HP-UX image. For this release, do not enable it on a guest. By default, software packet reassembly (known with acronyms as drv_pr for driver packet reassembly) is enabled in igssn in the guest.

To determine if drv_pr is enabled, an administrator can execute the following command:

`lanadmin -x drv_pr` *`ppa`*

where *`ppa`* is the Card instance # (Crd in#) from `lanscan`.

To manually disable drv_pr, an administrator can execute the following command:

`lanadmin -X drv_pr_off` *`ppa`*

To manually enable `drv_pr`, an administrator can execute the following command:

`lanadmin -X drv_pr_on` *`ppa`*

NOTE: These change are not carried over to subsequent reboots of the system. To maintain the configuration over reboots of the guest, the administrator must edit the guest file, `/etc/rc.config.d/hpigssnconf`.

For each igssn device that must have `drv_pr` disabled, you must construct a block of information in the `hpigssnconf` file. For example, if your guest needed to have both lan0 and lan3 disable `drv_pr`, you might have:

```
HP_IGSSN_INTERFACE_NAME[0]=lan0
HP_IGSSN_STATION_ADDRESS[0]=
HP_IGSSN_MTU[0]=
HP_IGSSN_DRV_PR[0]=0

HP_IGSSN_INTERFACE_NAME[3]=lan3
HP_IGSSN_STATION_ADDRESS[3]=
HP_IGSSN_MTU[3]=
HP_IGSSN_DRV_PR[3]=0
```

7.2.21 Other Issues and Notes

The following list provides additional issues with the Integrity VM V4.2 release of which you should be aware :

- If you modify the MAC address of an interface in the guest, the `hpvmstatus` command in the VM Host does not display the current MAC address correctly. There is no fix or workaround for this problem at this time.
- Just as with physical devices on a network, for communication to occur uninterrupted between all stations on a LAN segment, the MTUs of all the systems on the LAN segment or VLAN must match, whether they are physical systems or guests. The VM Host does not check for MTU mismatches for its guests.
- The `lanadmin` card specific options that are supported on igssn on the guest are:
  - `-x:speed,fctrl,cko,type,card_info,stats drv,vmtu,and drv_pr.`
  - `-X:drv_pr_on,drv_pr_off,stats clear`

8 Storage Information

This chapter contains information about storage devices used as backing stores for guest virtual devices.

8.1 Changes and Issues in This Release

The following section provides new information pertaining to this release.

8.1.1 Storage Interface Support for OpenVMS Guests

The OpenVMS guest supports only the AVIO interface, however, Integrity VM commands allow you to configure both AVIO and VIO devices to a guest. These VIO devices might not give any apparent errors during the startup. VIO devices are not supported on OpenVMS guests.

8.1.2 Slow VM Host Storage Might Result in HP-UX MPT Spinlock Timeout

If the VM Host storage used by a virtual MPT adapter is slow due to hardware problems or heavy I/O loads, the following HP-UX spinlock timeout might occur inside an HP-UX guest:

```
==============  EVENT  ============================ = Event #0 is CT_PANIC on CPU #2; = p crash_event_t
0xe000000100385000 = p rpb_t 0xe0000001011e4ff0 ==============  EVENT  ============================
RR0=0x00800831  RR1=0x00000831  RR2=0x02cd0031  RR3=0x02450031
RR4=0x03450031  RR5=0x00ffff31  RR6=0x07ff8031  RR7=0x00dead31
                BSP                 SP                  IP
0xe000000200024810 0xe0000002000434f0 0xe000000001f3d7c0 panic+0x410
0xe0000002000247b8 0xe000000200043500 0xe000000001fa8320 too_much_time+0x380
                                    pdk_spinlock.c:1619 wait_for_lock_spinner(inlined)
0xe0000002000246b8 0xe000000200043500 0xe000000000de4c80 wait_for_lock+0x670 0xe0000002000246800xe000000200043570
 0xe000000000d7d820 spinlock+0xe0
0xe000000200024628 0xe000000200043570 0xe000000000c61de0 fw_lock_acq+0x70
0xe0000002000245b8 0xe000000200043570 0xe000000000c61be0 sal_proc_real+0x100
0xe000000200024588 0xe000000200043570 0xe0000000012ef860 cec_cfg_inX+0xd0 0xe000000200024560 0xe000000200043570
 0xe000000001306650 cec_cfg_in16+0x30
0xe000000200024538 0xe000000200043570 0xe00000000158d0a0 gh2p_rd_cfg_w+0x60
0xe000000200024508 0xe000000200043570 0xe0000000021d3f10 wsio_cfg_in16+0x70
                BSP                 SP                  IP
0xe000000200024460 0xe000000200043570 0xe00000012f7313a0 mpt:mpt_handle_chip_fault+0xe0
0xe0000002000243e8 0xe000000200043580 0xe00000012f730fe0 mpt:mpt_ch_task_mgmt+0x540
0xe0000002000243a8 0xe0000002000437b0 0xe00000012f7a0e20 mpt:$cold_mpt_io_active+0x540
0xe000000200024388 0xe0000002000437b0 0xe00000012f76b9b0 mpt:mpt_handle_address_reply+0x210
0xe0000002000242c8 0xe0000002000437b0 0xe00000012f76cd00 mpt:mpt_isr+0xa00
                BSP                 SP                  IP
0xe000000200024298 0xe0000002000437c0 0xe000000000eb2ca0 sapic_interrupt+0x60
0xe0000002000241b8 0xe0000002000437c0 0xe000000000eb1e20 external_interrupt+0x4b0 0xe000000200024190
0xe0000002000437f0 0xe000000001d9a780 bubbleup+0x880
+-------------  TRAP  ----------------------------
|  External Interrupt in KERNEL mode
|    IIP=0xe000000000d7d910:1
|  p struct save_state 0xdead31.0xe000000200043800
+-------------  TRAP  ----------------------------
0xe000000200024170 0xe000000200043b90 0xe000000000d7d911 spinunlock+0x51
                                       pm_swtch.c:3829 idle_drop_spu_state_locks(inlined)
0xe000000200024000 0xe000000200043b90 0xe000000000e6dc10 idle+0x1a50
```

Converting the guest's virtual MPT adapters to AVIO storage adapters prevents this spinlock timeout.

8.1.3 HostAVIOStor and GuestAVIOStor Changes

The following changes have been made to HostAVIOStor and GuestAVIOstor drivers:

- The HostAVIOStor version for HP–UX 11i v3 1003 is B.11.31.1003.
- The GuestAVIOStor version for HP–UX 11i v3 1003 is B.11.31.1003.
- The HP–UX 11i v3 1003 HostAVIOStor has a dependency on the PHKL_40383 ESCSI Services patch.
- The following fixes are included in the HostAVIOStor version HP-UX 11i v3 1003:
  - If the LV or file backing store file name is 55 characters long and the guest is a HP-UX 11i v3 guest, guest panic or disk `dsf` name change is seen on subsequent guest reboots.
  - When guest storage applications (for example, dd, diskinfo, and so on) attempt to access a device special file, an “Invalid argument” error might be returned. This problem is

seen on HP-UX 11i v2 and HP-UX 11i v3 guests with GuestAVIOStor versions earlier than 11.23.0903 and 11.31.0903 respectively. In this case, the HostAVIOStor version is 11.31.0903 or 11.31.0909.

- The following fixes are included in the GuestAVIOStor version HP–UX 11i v3 1003 driver:
  - Unload of HP-UX 11 v3 guest AVIO driver (gvsd) might cause guest to panic.
  - When HP-UX 11i v3 guest was cold installed, `DSF` name changed after HBA migration between VIO and AVIO
  - The scripts, `avio-vio` and the `gvsd-conf` were delivered incorrectly on the HP-UX 11i v3 guest.

8.2 Known Issues and Information

The following sections describe known issues and information from previous releases that still apply to V4.2.

8.2.1 GuestAVIOStor HBA Driver (gvsd) DLKM

The GuestAVIOStor HBA driver (gvsd) DLKM supports dynamic loading and unloading of the driver starting with version B.11.31.0903.01 and the B.11.31.0903 version of the HostAVIOStor HBA driver.

8.2.2 Agile DSFs Change in HP-UX 11i v3 Guest When Migrating Disks Between `scsi` and `avio_stor`

GuestAVIOStor version B.11.31.0810 or higher version fixes the change of agile device names in the guest OS when HBA is migrated between scsi (VIO) and AVIO storage. Follow these steps while changing the configuration of a guest HBA between VIO and AVIO. This is to ensure that agile disk device files under the modified HBA remain the same. If individual devices are moved between AVIO and VIO using `hpvmmodify` delete and add, the agile device name will change. The old device name can be restored using `scsimgr` or the affected applications modified to use the new device name. Perform the following steps:

- Boot the guest with the GuestAVIOStor 11.31.0810 depot. (This step is required even if you do not have any AVIO devices configured.)
- Shut down the guest gracefully using the `shutdown(1m)` command.
- Migrate the HBA from VIO to AVIO (or AVIO to VIO) using the `hpvmmodify` command.
- Boot the guest and verify that all the agile device files are as expected.

The following messages might appear on the guest console during the first boot after a `scsi hba` has been changed to `avio_stor hba`. The LVM error messages are harmless. Use the `lvlnboot -R` command to fix the boot information on the root logical volume and eliminate these boot-time messages:

```
LVM: Failure in attaching PV (dev=0x3000006) to the root volume group.
```

The physical volume does not exist, or is not configured in the kernel.

```
LVM: Activation of root volume group failed
```

Quorum not present, or some physical volume(s) are missing.

```
LVM: Scanning for Root VG PVs (VGID 0xef4fbb14 0x48acd569)
LVM: Rootvgscan detected 1 PV(s).  Will attempt root VG activation using
        the following PV(s):
        0x3000003

LVM: Root VG activated
    Swap device table:  (start & size given in 512-byte blocks)
        entry 0 - major is 64, minor is 0x2; start = 0, size = 4194304 Checking root file system.
file system is clean - log replay is not required Root check done.
Create STCP device files
:
:
GuestAVIOStor: Instance numbers for AVIO/VIO disks fixed due to HBA type changes.
GuestAVIOStor: Refer to /etc/opt/gvsd/files//gvsd.log for details.
```

8.2.3 Agile Device Name Recommendations

The Integrity VM commands supports mass storage agile device names. Use of agile device names (with the exception of attached devices using *avio_stor*, which uses the hardware path) for configuring storage devices is highly recommended as it provides VM Host multipathing benefits.

8.2.4 Configuration Limits

A guest can have up to 158 LUNs — 128 AVIO and 30 VIO. A guest can have a maximum of 30 file backing stores, including both AVIO and VIO.

8.2.5 Using USB CD/DVD Devices

With VIO (*scsi* adapter type), USB CD/DVD devices are not supported for use as attachable media. AVIO (*avio_stor* adapter type) supports USB 2.0 DVD burners. Hardware supportability requirements for Integrity VM are described in the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual.

To identify USB CD/DVD devices, use the `ioscan -fun` command.

NOTE: Because Integrity VM may do four to six calls to `open()` on a DVD when accessing it, and `hpvmcreate` or `hpvmmodify` command might take more than a minute to complete when there is no media in the drive. Example commands that could appear to hang are:

```
# hpvmcreate -P guest -a dvd:scsi::disk:/dev/rdisk/disk5
# hpvmcreate -P guest -a dvd:scsi::null:/dev/rdisk/disk5
# hpvmmodify -P guest -a dvd:scsi::disk:/dev/rdisk/disk5
# hpvmmodify -P guest -a dvd:scsi::null:/dev/rdisk/disk5
```

8.2.6 The `sam` Command might Display Incorrect Number of Disks and Paths on an HP-UX 11i v2 Guest

The number of disks displayed by the `sam` command using “Sam Areas->Disks and File Systems->Disk Devices” might be incorrect. The number of paths displayed for a device might also be incorrect. This problem exists on disks configured under both SCSI and AVIO storage adapters. `ioscan` displays all the disks correctly.

For example, the following are the `sam` output and the`ioscan` output on the same HP-UX 11i v2 guest:

```
"Disk Devices" window in sam(1M) shows the following disks and number of paths:

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
xDisk Devices                                                   0 of 8 selectedx
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
x  Hardware      Number                 Volume      Total                      x
x  Path          of Paths   Use         Group      Mbytes   Description        x
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
xx 0/0/2/0.0.0   2          VxFS/Swap   --          70007   HP      Virtual    x
xx 0/0/5/0.0.0   1          Unused      --          69504   HP      Virtual    x
xx 0/0/5/0.1.0   2          Unused      --          70007   HP      Virtual    x
xx 0/0/5/0.2.0   2          Unused      --          70007   HP      Virtual    x
xx 0/0/6/0.3.0   1          Unused      --          70007   HP      Virtual    x
xx 0/0/6/0.4.0   1          Unused      --          70007   HP      Virtual    x

 "ioscan -kfnC disk" shows the following disks:

Class      I  H/W Path     Driver  S/W State   H/W Type     Description
=====================================================================
disk     15  0/0/2/0.0.0  sdisk   CLAIMED     DEVICE       HP      Virtual Disk
                         /dev/dsk/c0t0d0     /dev/rdsk/c0t0d0
                         /dev/dsk/c0t0d0s1   /dev/rdsk/c0t0d0s1
                         /dev/dsk/c0t0d0s2   /dev/rdsk/c0t0d0s2
```

```
                        /dev/dsk/c0t0d0s3   /dev/rdsk/c0t0d0s3
disk     16  0/0/5/0.0.0  sdisk   CLAIMED     DEVICE       HP      Virtual Disk
                        /dev/dsk/c3t0d0     /dev/rdsk/c3t0d0
disk     18  0/0/5/0.1.0  sdisk   CLAIMED     DEVICE       HP      Virtual Disk
                        /dev/dsk/c3t1d0     /dev/rdsk/c3t1d0
adisk     20  0/0/5/0.2.0  sdisk   CLAIMED     DEVICE       HP      Virtual Disk
                        /dev/dsk/c3t2d0     /dev/rdsk/c3t2d0
disk     17  0/0/6/0.0.0  sdisk   CLAIMED     DEVICE       HP      Virtual Disk
                        /dev/dsk/c4t0d0   /dev/rdsk/c4t0d0
disk     19  0/0/6/0.1.0  sdisk   CLAIMED     DEVICE       HP      Virtual Disk
                        /dev/dsk/c4t1d0   /dev/rdsk/c4t1d0
disk     21  0/0/6/0.2.0  sdisk   CLAIMED     DEVICE       HP      Virtual Disk
                        /dev/dsk/c4t2d0   /dev/rdsk/c4t2d0
disk     23  0/0/6/0.3.0  sdisk   CLAIMED     DEVICE       HP      Virtual Disk
                        /dev/dsk/c4t3d0   /dev/rdsk/c4t3d0
disk     25  0/0/6/0.4.0  sdisk   CLAIMED     DEVICE       HP      Virtual Disk
                        /dev/dsk/c4t4d0   /dev/rdsk/c4t4d0
```

Workaround: Use the System Management Homepage (SMH) to configure the devices.

8.2.7 Crash Dump Collection Might Fail for HP-UX Guests with Attached I/O Devices (VIO)

HP-UX guest OS crash might fail to save a crash dump with the following console message:

```
Error: can't open first dump device /dev/dsk/c0t0d0. Dump aborted.
INIT[0]: OS_INIT ends. Resetting the system
```

This problem is caused by the HP-UX MPT dump driver in the guest waiting only 1 second for a bus reset to finish. If there is an attached tape or changer sharing the same virtual MPT adapter as the guest boot disk, the reset time of that attached tape or changer might exceed the 1 second timeout, resulting in the error message above.

To avoid this problem on HP-UX 11i v2 0505–0706 or HP-UX 11i v3 guests, make sure the guest boot disk and any attached tape or changer do not share the same virtual MPT adapter. For information about how to specify bus and device numbers to place the tapes or changers on a separate MPT adapter than the guest boot disk, see the *hpvmresources* manpage or the *HP Integrity Virtual Machines Installation, Configuration, and Administration*.

For HP-UX 11i v2 0712, HP-UX 11i v3 0803, and all later supported HP-UX guest releases, make sure the HPVM-Guest depot is installed. The HPVM-Guest depot adjusts the MPT dump reset timeout allowing for tape and changers to be placed on the same virtual MPT adapter as the boot disk.

8.2.8 DMP Files Not Supported as Backing Stores

Veritas VxVM DMP device files (files under `/dev/vx/rdmp/`) are not supported by Symantec for whole disk backing stores for virtual machines.

8.2.9 Assigning a Null Device to a Resource

When assigning a null device to a resource on a virtual machine, the file name serves as a placeholder. Therefore, if the file does not exist, you will not receive an error message. For example, the following command string will not produce an error message if the file XXXX.iso does not exist:

```
hpvmmodify -P vm1 -a disk:scsi::null:/opt/XXXX.iso
```

8.2.10 Integrity VM Does Not Honor File Permissions on Backing Stores

File permission settings do not affect the way Integrity VM accesses backing stores. Backing stores provided as virtual disks can be written to regardless of the file permission settings on the backing store. A backing store provided as a virtual DVD is always read-only. Attached devices do not consider file permissions when backing up data.

8.2.11 The `hpvmmodify` Command Fails to Change a DVD

The `hpvmmodify` command might fail to change a Virtual FileDVD if the device has already been modified by the virtual console. The `hpvmstatus` command displays the current status of the Virtual FileDVD, which might not be in its original resource state. To see the original resource statement, which is required by the `hpvmmodify` command to change a Virtual FileDVD, use the `hpvmstatus –D` command.

8.2.12 Virtual FileDVD Reverts to Original Resource Statement

A Virtual FileDVD reverts to its original resource statement when the guest shuts down or reboots. Therefore, after you install a guest from multiple CDs or DVDs, you must reload the Virtual FileDVD when the guest reboots to complete the installation. Stop the automatic EFI reboot and insert the CD/DVD using the appropriate `IN` and `EJ` commands. When the media is loaded, proceed with the installation.

8.2.13 Physical Device `null` Assigned to Nonexistent Path

Devices with physical storage type `null` might be given device path specifiers that do not exist. This problem does not prevent guests from starting. In previous versions of Integrity VM, the guest does not start if the device path for a `null` physical storage type device does not exist as a real device, file, or directory.

8.2.14 Using sam on Guest Cannot Initialize Disk

When you create a file system using the `sam` command on an HP-UX guest, do not initialize the disk. This option returns an error and the file system is not created.

8.2.15 Extending SCSI Whole Disk Backing Stores

On the VM Host, do not extend a logical volume (LVM or VxVM) used as a backing store for a guest root disk. If you do this, the guest panics on its next reboot with the following error:

```
System panic: all VFS_MOUNTROOTs failed: Need DRIVERS.
```

The guest should be able to boot if the logical volume is reverted (using lvreduce in case of LVM) to its original size. If this fails, the guest root device has been corrupted, and the guest operating system must be reinstalled.

An AVIO logical volume backing store not used as a root disk can be extended while the guest is online. For HP-UX 11i v3 guests using AVIO, the guest is notified of the increased size of the backing store for logical volumes as well as raw disks, and the guest can take the appropriate actions to use the larger size.

For a SCSI logical volume used as a backing store for a guest data disk, you can extend the volume after removing it from the guest using the `hpvmmodify` command. After extending the volume, use the `hpvmmodify` command to add the volume to the guest. Do not modify a logical volume used as a backing store without first removing it from the guest.

After you extend the logical volume, use operating system commands on the guest to extend its file system.

8.2.16 Virtual SCSI (VIO) Device Limitations

Although SCSI devices appear to a guest as Ultra320 SCSI controllers claimed by the MPT driver, this is an emulation. There are several differences from using a real device. Specifically:

- You cannot upload or download firmware for emulated devices.
- Although HP-UX commands such as *mptutil*(1M) and *mptconfig*(1M) do not fail when run in a guest, they do not always return the same information as they would when referencing a physical device.
- The EFI `drvcfg` command does not fail when run in a guest, but it returns no useful data.

8.2.17 AVIO Limitations

The following sections describe the current limitations using AVIO.

8.2.17.1 Modifying the Storage Adapter from `scsi` to `avio_stor`

If you attempt to modify a storage adapter from `scsi` to `avio_stor` on a port for a running guest, the `hpvmmodify` command allows the change, but the change lasts only until the next guest startup. In addition, the `hpvmnet` command displays incorrect port information for the currently running guest until the guest is stopped and restarted.

8.2.17.2 GuestAVIOStor Bundle not Installed but AVIO Storage Device is Configured

If the GuestAVIOStor bundle is not installed on the HP-UX guest, any configured AVIO Stor HBAs will not be claimed in the guest, and the LUNs configured under the AVIO Stor HBAs will not be accessible. If the LUN is a boot disk, boot will fail with a panic indicating missing drivers.

8.2.17.3 Longer Failure Reporting Time for AVIO Devices on 11i v2 Guests

If a backing store is not responsive due to device errors, it might take up to 30 seconds on an HP-UX 11i v2 guest to report a failure. For example, the `diskinfo` command might fail after 30 seconds:

```
# timex diskinfo /dev/rsdk/c1t14d0:
diskinfo: can't open /dev/rdsk/c1tl4d0: No such device or address
    real     0m30.26s
    user     0m0.00s
    sys      0m0.01s
```

This delay is caused by the retry of failed commands from the nonresponding backing store. There is currently no workaround.

8.2.17.4 Online Modification of AVIO Devices Might Fail

Devices configured under AVIO Stor HBA for a guest cannot be deleted (using the `hpvmmodify` command) if the guest is at EFI.

Stop the guest using the `hpvmstop` command and retry the `hpvmmodify` command.

Devices configured under AVIO Stor HBA for an HP-UX 11i v3 guest cannot be deleted (using the `hpvmmodify` command) if the guest is online.

Run `ioscan -kfNC tgtpath` or `ioscan -kfNC lunpath` from the guest to obtain the `tgtpath` or `lunpath` H/W Path for the device to be deleted. Remove the device by using `rmsf -H` of the `lunpath` or `tgtpath` H/W Path from the guest and retry the `hpvmmodify` command from the host.

8.2.17.5 Mapping AVIO Storage Devices on HP-UX Guests

This section explains how to map an AVIO storage device on an HP-UX guest to an `hpvmstatus` display on the Integrity VM Host either at the EFI console or at the HP-UX operating system.

The following example shows the output of `hpvmstatus` from the Integrity VM Host:

```
# hpvmstatus -P aviotest
[Storage Interface Details]
Guest                                    Physical
Device  Adaptor    Bus Dev Ftn Tgt Lun Storage   Device
======= ========== === === === === === ========= ========================
disk    avio_stor    0   2   0  22   0 disk      /dev/rdsk/c82t15d3
```

The following statistics are displayed in this example:

- PciBus = 0
- PciDev = 2

- PciFtn = 0
- Addr (Target Id) = 22 (0x16)
- Lun = 0

Note that Addr (Target Id) is decimal in the `hpvmstatus` display, and PciFtn and Lun are always zero (0).

The Integrity VM guest EFI device path encodes PciBus, PciDev, and Addr (Target Id) from the `hpvmstatus` display:

```
                          PciDev
                             |
                             | PCIFtn
                  PciBus     | |        Addr(Target Id)
                     |       | |          |
                     V       V V          V
blk16 : Acpi(PNP0A03,0)/Pci(2|0)/Scsi(Pun16,Lun0)
```

PciFtn (PCI function) and Lun# are always zero (0). Addr (Target Id) becomes EFI Pun# and is displayed as a hexidecimal number.

The two methods for mapping an Integrity VM HP-UX 11i v2 guest hardware path or HP-UX 11i v2 Device Special File (DSF) to an Integrity VM Host `hpvmstatus` display:

1. `-e` option of the `ioscan` utility

`ioscan -fne` displays the HP-UX hardware path/DSF and the EFI device path for the device. The HP-UX hardware path encodes the following from the `hpvmstatus` display:

- PciBus
- PciDev
- Addr (Target Id)

Addr (Target Id) is encoded as an HP-UX tgt ID and an HP-UX lun ID in the HP-UX hardware path.

HP-UX tgt ID and HP-UX lun ID are calculated from Addr (Target Id) in the `hpvmstatus` display using the following equations:

```
HP-UX tgt ID = Addr(Target Id) % 16
HP-UX lun ID = Addr(Target Id) / 16
```

Note the following example:

```
# ioscan -fne
                 PciDev
                    | PCIFtn
                    | |(Addr(Target Id) % 16) <-> HP-UX tgt ID
             PciBus | | |(Addr(Target Id) / 16) <-> HP-UX lun ID
                  | | | | |
                  V V V V V
disk       49  0/0/2/0.6.1   sdisk     CLAIMED     DEVICE       HP      Virtual Disk
                            /dev/dsk/c0t6d1   /dev/rdsk/c0t6d1
        Acpi(PNP0A03,0)/Pci(2|0)/Scsi(Pun16,Lun0)
                            ^       ^ ^          ^
                            |       | |          |
                         PciBus     | PCIFtn   Addr(Target Id)
                                    |
                               PciDev
```

In this example, exp1 / exp2 represents the quotient from exp1 divided by exp2 (integer division), and exp1 % exp2 finds modulo of exp1 divided by exp2 (that is, finds the remainder of an integer division).

2. `get_info` option of the `gvsdmgr` utility

If you are using the HP-UX DSF, the following `gvsdmgr` option can be used to get the VSD LUN ID, which is the same as the Addr (Target Id) in the `hpvmstatus` display. The `gvsdmgr` utility displays VSD LUN Id as a hexidecimal number. The first nibble of VSD LUN Id becomes HP-UX lun ID, and the second nibble becomes HP-UX tgt ID.

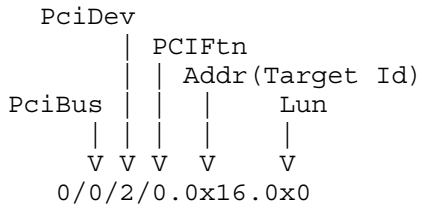
The following example shows the `get_info` option with the `gvdsmgr` utility:

```
# gvsdmgr get_info -D /dev/gvsd0 -q lun=/dev/rdsk/c0t6d1
Tue Oct  2 13:35:32 2007

Lun DSF                                                 : /dev/rdsk/c0t6d1
VSD LUN Id                                              : 0x16
Lun  Hardware path                                      : 0/0/2/0.6.1
LUN State                                               : UNOPENED
```

The following is a method for mapping an Integrity VM HP-UX 11i v3 guest hardware path or HP-UX 11i v3 DSF to an Integrity VM Host `hpvmstatus` display using the `ioscan` utility:

```
# ioscan -m dsf /dev/rdsk/c0t6d1
Persistent DSF Legacy DSF(s)
========================================
/dev/rdisk/disk22 /dev/rdsk/c0t6d1

# ioscan -m lun /dev/rdisk/disk22
Class I Lun H/W Path Driver S/W State H/W Type Health Description
======================================================================
disk 22 64000/0xfa00/0x1 esdisk CLAIMED DEVICE online HP Virtual Disk
0/0/2/0.0x16.0x0
/dev/disk/disk22 /dev/rdisk/disk22
/dev/disk/disk22_p1 /dev/rdisk/disk22_p1
/dev/disk/disk22_p2 /dev/rdisk/disk22_p2
/dev/disk/disk22_p3 /dev/rdisk/disk22_p3
```

An HP-UX 11iv3 Lun Path hardware path displayed by the `ioscan` utility can be mapped to an `hpvmstatus` utility output as follows:



8.2.18 Guest LUN Does Not Appear After a Delete and Add

If the guest operating system version is prior to HP-UX 11i v3 0809 (that is, 11i v3 0709 or 0803), a guest LUN might not appear after a delete and add. For example, this issue might occur with the following sequence of events::

1. In the guest, execute rmsf for the lun path (lunpath Class in ioscan display).
2. In the VM Host, delete the lun entry from the guest's configuration using the `hpvmmodify` command.
3. In the VM Host, add the lun entry back to the guest's configuration using the `hpvmmodify` command.
4. In the guest ioscan, the lun (which was deleted and added back) does not appear.

Perform the following workaround:

1. In the guest, rmsf the target path (tgtpath Class in ioscan display) corresponding to the lun path.
2. In the guest, perform an ioscan.

9 Migrating Virtual Machines

This chapter contains information about migrating virtual machines.

9.1 Changes and Issues in This Release

The following section provides updated information about online migration in the V4.2 release.

9.1.1 Online Migration Support Limited to System with Compatible Processors

Online migration support among Integrity servers is limited by the processor architecture. Online migration among servers with processor family 31 is supported regardless of the model number within that family. Only migration among servers with processor family 32 and model numbers 0 or 1 is supported. Otherwise, online migration is supported only among servers with identical processor family and model number.

To check if a guest can be migrated to the target VM Host, use the `-s` option to the `hpvmmigrate` command.

9.2 Known Issues and Information

The following sections describe known issues and information from previous releases that still apply to V4.2.

9.2.1 Location of Command Used to Initiate Online Migrations of Serviceguard Guest Packages not in $PATH

The `hpvmsg_move` command is used to initiate online migrations of Serviceguard guest packages. This command is located in the /opt/cmcluster/toolkit/hpvm directory, which is not added to the users PATH variable during installation. To initiate an online migration, use the full pathname to the `hpvmsg_move` command. The full pathname to the command is:

`/opt/cmcluster/toolkit/hpvm/hpvmsg_move`

9.2.2 Possible `hpvmmigrate` Command Error Messages

You might receive the following message after specifying an `hpvmmigrate` command:

```
Can't open VM /var/opt/hpvm/uuids/c0c8a8ee-ac67-11dd-ba00-00306ef3bda7/vm_dev:
(55) VMM not loaded
     Opening minor device and creating guest machine container
     Creation of VM, minor device 1
hpvmmigrate: ERROR (vmname): Remote message: Target guest exited. Status 2.
hpvmmigrate: ERROR (vmname): Remote message: Unable to start guest on target.
```

In this case, use the following workaround:

1. Enter the following:

   ```
   # swremove vmOVMMSW.OnlineMigr-SW
   ```

2. Force a reinstall of the 4.1 stack by forcing a reinstall of the T8718AC bundle:

   ```
   # swinstall -x autoreboot=true -x reinstall=true -s T8718AC
   ```

   Note, this reinstall reboots the VM Host.

You might receive the following message after specifying the `hpvmmigrate` command:

```
Host is not licensed for online migration.
```

In this case, the workaround is to install the Online VM Migration bundle, T8718AC from the AR.

9.2.3 NR Guest State

A guest is placed in the `Not Runnable` (NR) state when it is the source of a successful migration. The guest is also marked Not Modify and Not Visible. The guest can also be placed in the NR state by the administrator using the`hpvmmodify` command, for example:

```
# hpvmmodify -P guestname -x register_status=disabled
```

The NR guest state appears on the `hpvmstatus` command output as `Off (NR)`.

CAUTION: Use of the `-x register_status` option is highly discouraged and may lead to accidentally booting a VM on more than one host at once.

NOTE: The `-x register_status` option has replaced the `-x runnable_status` status on the `hpvmmodify` command line, as changing `register_status` now affects `runnable_status`, `modify_status` and `visible_status`.

9.2.4 A Guest Might be Marked Disabled After Failed Offline Migration

It is rare but possible that a guest is marked Not Runnable after a failed offline migration. If this occurs, use the following command to return the guest to the registered state:

```
# hpvmmodify -P guestname -x register_status=enabled
```

Before enabling the guest on the source, check the target to ensure that the guest was not actually migrated there.

9.2.5 Do Not Migrate Serviceguard Cluster Nodes

Online VM Migration does not support migrating guests that are Serviceguard cluster nodes. If a Serviceguard node is migrated while online, it might lose connection to other cluster members and be automatically removed from the cluster.

The Integrity VM software does not know whether you have installed Serviceguard in a guest, so it cannot automatically restrict online migration of your Serviceguard node. Therefore, you should disable online migration for all Serviceguard nodes. For example, to disable Online VM Migration for the guest `sgnode`, run the `hpvmmodify` command as follows:

```
# hpvmmodify -P sgnode -x online_migration=disabled
```

Disabling online migration for the guest ensures that you do not accidentally attempt to migrate a Serviceguard node.

9.2.6 Unpresenting SAN Devices to Integrity VM Hosts

Unpresenting SAN devices that were configured to be used by guests causes the guest to fail to start. If SAN devices must be unpresented, guests configured to use those devices should be reconfigured to no longer require them. After unpresenting a device special file, remove it from the Integrity VM Host using the following command:

```
rmsf  -a  device_special_file
```

The device special file can be derived from the wwid_string, obtained from the SAN appliance, as follows:

```
scsimgr -p get_attr -a wwid -a device_file current all_lun | grep wwid_string
```

9.2.7 Host May Participate in Only One Online Migration at a Time

A VM Host may participate in one online migration at a time, either as a source or a target. If two migrations are attempted at the same time, `hpvmmigrate` might fail quickly with an error. However, `hpvmmigrate` does not always detect that a migration is in progress.

In most cases, migrating a guest saturates a 1 GB network. Migrating more than one guest at a time on a network usually takes longer than migrating them sequentially, and the guest frozen phase is longer as well.

Do not attempt to migrate more than one guest at a time on a single VM Host or network.

9.2.8 Online Migration on the Target VM Host is the Same as Starting the Guest on the Target VM Host

Online migration on the target VM Host system is equivalent to starting the guest on the target VM Host. The same locks are required to safely start the guest on the target VM Host system. These locks assure that a starting guest can allocate all the resources if requires. Only one guest start can occur at any one time. Therefore, while an online migration is being performed on the target, no other guest starts can proceed, because it could take away resources that are required by the migrating guest.

9.2.9 Guests Using Only IPv6 Not Currently Supported for Online VM Migration

IPv6 networks are supported, so long as guests also have some IPv4 networking. Guests using only IPv6 are not currently supported for Online VM Migration.

9.2.10 Transient Network Errors Can Cause `hpvmmigrate` Connectivity Check Failures

A transient network error might cause the `hpvmmigrate` command's vswitch connectivity check to report a failure. If the connectivity check fails, retry the migration by re-issuing the `hpvmmigrate` command.

If the `hpvmmigrate` command's network connectivity check continues to fail, verify the vswitch and network configuration, and test connectivity with the `nwmgr` command as explained in Section 10.3 of the *HP Integrity Virtual Machines 4.2: Installation, Configuration, and Administration* manual.

If the vswitch connectivity required by the guest on the target VM Host is properly configured and verified, you can use the `hpvmmigrate -w` option to bypass vswitch connectivity checks.

9.2.11 Veritas Volumes Not Supported for Online VM Migration

Veritas volumes are not supported for Online VM Migration.

9.2.12 Storage for Deactivated Volume Groups not Protected by Integrity VM Storage Management

When an LVM volume group is deactivated, the storage (physical volumes) used by that storage is designated as unused by HP-UX system administration tools such as System Management Homepage (SMH). This is also true for Integrity VM storage management. As a result, these physical volumes are not automatically protected from use by virtual machines as virtual disks.

You can resolve this problem in one of two way:

- If the volume group is to remain deactivated, the VM Host administrator can manually add the physical volume as a restricted device with the `hpvmdevmgmt` command.
- Or, after activating the volume group, execute the `hpvmhostrdev` command, so that the VM Host storage management database is updated accordingly.

An HP-UX system administrator can deactivate a volume group using the `vgchange` command. It can also be deactivated, if it is a shared LVM (SLVM) volume group, whenever the associated Serviceguard cluster is reconfigured, or the VM Host system is rebooted. Take care to check that all SLVM volume groups are activated after a VM Host reboot or Serviceguard cluster reconfiguration.

10 Error Logging

This chapter contains information about the way Integrity VM logs messages.

10.1 Changes and Issues in This Release

There are no new error logging issues in the V4.2 release.

10.2 Known Issues and Information

The following sections describe known issues and information from previous releases that still apply to V4.2.

10.2.1 Old Version of `/etc/rc.config.d/hpvmconf` Not Overwritten

When you install the new version of Integrity VM, a new version of the `/etc/rc.config.d/hpvmconf` file is placed on the system. You receive the following messages:

```
A new version of /etc/rc.config.d/hpvmconf has been placed on the system. The new version is located at /opt/
hpvm/newconfig/etc/rc.config.d/hpvmconf. The existing version of /etc/rc.config.d/hpvmconf is not being
overwritten, since it appears that it has been modified by the administrator since it was delivered.
```

You might receive the following message:

```
The postinstall script for HPVM.HPVM-CORE had a warning (exit code 103). The script location was /var/tmp/
BAA008384/catalog/HPVM.1/HPVM-CORE/postinstall. This script has warnings, but the execution of this fileset
will still proceed. Check the above output from the script for
further details.
```

10.2.2 Guest Log Can Grow Unbounded

The guest monitor log file (`/var/opt/hpvm/guests/`*`vm_name`*`/log`) records guest start and stop information. These log files can grow very large. Use the `hpvmconsole` command `rec -rotate` to close the current log file, rename it, and open a new one.

10.2.3 Log Messages Written to Old Log File

Log messages might be written to the `command.log.old` file instead of the `command.log` file. If this is a problem, reboot the VM Host system. This reinitializes the log file for applications that generate Integrity VM log messages to write to the current `command.log` file.

10.2.4 Saved MCA or INIT Register State Can Be Inaccurate

Virtual machines do not support standard management processor console `errdump` commands. The virtual console's Virtual Machine menu provides the `ed` command for this purpose. The options for a virtual machine are `-mca` and `-init`. When you examine the saved guest state using the `ed -mca` or `ed -init` command, the preserved branch registers (B1-B5) do not always contain accurate data.

10.2.5 Modifying the Size of the Monitor Log File

Integrity VM includes a monitor log (`/var/opt/hpvm/common/hpvm_mon_log`), which captures the state of the VM Host. The size of the log file is determined by the VMMLOGSIZE tunable, stored in the `/etc/rc.config.d/hpvmconf` file.

When the log file reaches VMMLOGSIZE, the current timestamp is appended to the name of the log file and a new log file is opened. If you see many such files, increase the value of the VMMLOGSIZE tunable. Do not set the value of the VMMLOGSIZE tunable below its 1024 KB default.

10.2.6 Virtual Console Event Logs Different from Physical Machine Logs

The virtual console allows you to use the `sl` command to list the System Event log and the Forward Progress log. The displays from the virtual console differ from those generated on a physical machine in the following ways:

- Event numbering is inconsistent for different lines.
- Although the command menu allows you to specify a cell number, virtual machines are not cellular. Therefore, this option is not functional.

11 Integrity VM Support Policy

This chapter describes the HP Integrity Virtual Machine support policies and software version requirements for Integrity VM Host and guest operating system environments.

11.1 Integrity VM Minimum Support Life

Beginning with Integrity VM Version 3.0, releases will be supported for a minimum of three years.

Integrity VM Version	Release Date	Expected End of Support Date	Current Status
A.01.00	December 2005	December 2007	Not supported
A.01.20	March 2006	March 2008	Not supported
A.02.00	December 2006	December 2008	Not supported
A.03.00	June 2007	June 2010	Not Supported
A.03.50	December 2007	Same as HP-UX 11i v2	Supported
B.04.00	September 2008	September 2011	Supported
B.04.10	April 2009	April 2012	Supported
B.04.20	March 2010	March 2013	Supported

NOTE: Integrity VM is supported for the HP-UX 11i v2 VM Host until the end of support of HP-UX 11i v2.

11.2 Integrity VM Upgrades

- Recommendation:

  Upgrade to the current version of Integrity VM software and, for each virtual machine, upgrade the Guest Management software.

- Requirement:

  Customers must upgrade to the latest release in order to receive defect fixes.

11.2.1 Integrity VM Patch Policy

Integrity VM does not typically issue GR patches for prior releases. Defect fixes and enhancements are delivered either as patches on the latest available version or in future versions of the product.

11.3 VM Host OS and Server Support

Integrity VM Host or Server Support	Integrity VM Version A.03.50	Integrity VM Version B.04.00	Integrity VM Version B.04.10	Integrity VM Version B.04.20	Notes
VM Host OS Support	HP-UX 11i v2 December 2007	HP-UX 11i v3 September 2008	HP-UX 11i v3 March through September 2009	HP-UX 11i v3 March 2010	New Integrity VM versions support the latest HP-UX OE release at the time of the Integrity VM release. For more information about support for specific HP-UX versions, see an authorized HP representative.
VM Host Server Support	Integrity VM supports all Integrity servers. New servers are supported on the latest Integrity VM version concurrent with the shipment of that server.				Guest operating systems are supported only on VMs that are also supported on the physical server running Integrity VM.

For information about installing Integrity VM, see the *HP Integrity Virtual Machines 4.2: Installation, Configuration, and Administration* manual.

HP-UX patches might be required for proper operation. Install these patches on HP-UX operating systems as necessary. For specific patch information, see the patch tables in Chapter 2 (page 19).

11.4 HP-UX Guest Support

Type of Guest OS Support	Integrity VM Version A.03.50	Integrity VM Version B.04.00	Integrity VM Version B.04.10	Integrity VM B.04.20	Notes
HP-UX 11i v2	HP-UX 11i v2 May 2005 through December 2007	HP-UX 11i v2 September 2006 through December 2007	HP-UX 11i v2 September 2006 through December 2007	HP-UX 11i v2 December 2007	For more information about support for specific HP-UX versions, see an authorized HP representative.
HP-UX 11i v3	HP-UX 11i v3 March 2007 through September 2008	HP-UX 11i v3 March 2007 through September 2008	HP-UX 11i v3 March 2007 through September 2009	HP-UX 11i v3 September 2007 through March 2010	

Guest operating systems are supported only on virtual machines that are also supported on the physical server running Integrity VM.

HP-UX patches might be required for proper operation. Install these patches on HP-UX guest operating systems as necessary. For specific patch information, see the patch tables in Chapter 2 (page 19) .

11.5 Windows and Linux Guest Support

Type of Guest OS	Integrity VM Version A.03.50	Integrity VM Version B.04.00	Integrity VM Version B.04.10	Integrity VM Version B.04.20	Notes
Windows	Windows Server 2003 Data Center and Enterprise Editions, SP1 and SP2	Windows Server 2003 Data Center and Enterprise Editions, SP2	Windows Server 2003 Data Center and Enterprise Editions, SP2 Windows Server 2008 SP1	Window Server 2008 SP1	New major or minor guest OS versions are supported by a subsequent Integrity VM release.
Linux	Red Hat RHEL 4 Update 4 Red Hat RHEL 4 Update 5 4 Update 6 SUSE SLES10, SP1	Red Hat RHEL 4 Update 5 SUSE SLES 10 SP1	Red Hat RHEL 4 Update 5 SUSE SLES 10 SP2	Red Hat RHEL 4 Update 5 SUSE SLES 10 SP2	
Guest operating systems are supported only on VMs that are also supported natively on the physical server running Integrity VM.					

For specific information about requirements for installing any guest OS, see the product documentation.

Operating system patches might be required for proper operation. Install these patches on guest operating systems as necessary. For specific patch information, see the patch tables in Chapter 2 (page 19) .

11.6 HP Serviceguard Support

Packages or Nodes	Integrity VM Version A.03.50	Integrity VM Version B.04.00	Integrity VM Version B.04.10	Integrity VM Version B.04.20	Notes
Serviceguard – Virtual machines as packages (Serviceguard running on VM Host)	Serviceguard release • A.11.16 • A.11.17 • A.11.17 w/ SMS A.01.00 • A.11.18 • A.11.18 w/ SMS A.01.01 • A.11.18 w/ SMS A.02.00	Serviceguard release • A.11.18 • A.11.18 w/ SMS A.02.00	Serviceguard release • A.11.18 (not supported with Online VM Migration) • A.11.19	Serviceguard release A.11.19	New versions of Integrity VM support all guest OS types and versions supported by previous versions of Integrity VM (as long as the guest OS version is supported by the OS vendor). SMS is also known as CFS.
Serviceguard – HP-UX virtual machines as nodes (Serviceguard running on a guest)	Serviceguard release • A.11.16 • A.11.17 • A.11.17 w/ SMS A.01.00 • A.11.17.01 (11i v3) • A.11.18 (11i v2, 11i v3) • A.11.18 w/ SMS A.01.01 (11i v2)	Serviceguard release • A.11.18 (11i v2, 11i v3) • A.11.18 w/ SMS A.01.01 • A.11.18 w/ SMS A.02.00 (11i v3)	Serviceguard release • A.11.18 (11i v2, 11i v3) • A.11.18 w/ SMS A.01.01 • A.11.19 w/ SMS A.02.00 (11i v3)	Serviceguard release A.11.19	
Serviceguard — Linux virtual machines as nodes (Serviceguard running on a guest)	Serviceguard release • A.11.18 Guest running Red Hat Linux Release 4 Updates 4 and 5 SUSE Linux SLES10 SP1	Serviceguard release • A.11.18 (RHEL 4 Update 5 • A.11.18 (SUSE SLES 10 SP1)	Serviceguard release • A.11.19 (RHEL 4 Update 5 • A.11.19 (SUSE SLES 10 SP2)	Serviceguard release A.11.19	

The version of Serviceguard must be supported with the version of HP-UX on which the VM Host is running. For specific support information, see the Serviceguard documentation.

11.7 Storage Interface Support

Integrity VM Version A.03.50 (Both VIO and AVIO)	Integrity VM Version B.04.00 (both VIO and AVIO)	Integrity VM Version B.04.10 (both VIO and AVIO)	Integrity VM Version B.04.20 (both VIO and AVIO)	Notes
• Fibre Channel adapters supported by the FCLP (FibrChanl-02), TD or FCD driver • SCSI adapters supported by the C8*xx*, MPT, or CISS drivers • IDE adapters supported by the SIDE driver • USB support of the UsbScsiAdapter driver and USB 2.0 support of the usb_ms_scsi driver (AVIO HVSD support for USB 2.0 as of 11i v2 0810 web release) • iSCSI adapters supported by the iSCSI driver • SAS adapters supported by the SASD driver	• Fibre Channel adapters supported by FCLP (FibrChanl-02) TD or FCD driver • SCSI adapters supported by the C8xx, MPT, or CISS drivers • IDE adapters supported by the SIDE driver • USB support of the UsbScsiAdapter driver • USB 2.0 support of the usb_ms_scsi driver on VIO only • iSCSI adapters supported by the iSCSI driver • SAS adapters supported by the SASD driver	• Fibre Channel adapters supported by FCLP (FibrChanl-02) TD or FCD driver • SCSI adapters supported by the C8xx, MPT, or CISS drivers • IDE adapters supported by the SIDE driver • USB support of the UsbScsiAdapter driver and USB 2.0 support of the usb_ms_scsi driver (AVIO HVSD support for USB 2.0 as of 11i v3 0903) • iSCSI adapters supported by the iSCSI driver • SAS adapters supported by the SASD driver	• Fibre Channel adapters supported by FCLP (FibrChanl-02) TD or FCD driver • SCSI adapters supported by the C8xx, MPT, or CISS drivers • IDE adapters supported by the SIDE driver • USB support of the UsbScsiAdapter driver and USB 2.0 support of the usb_ms_scsi driver (AVIO HVSD support for USB 2.0 as of 11i v3 0903) • iSCSI adapters supported by the iSCSI driver • SAS adapters supported by the SASD driver	Virtual I/O storage interfaces are those defined using the *scsi* adapter type. Accelerated virtual I/O (AVIO) storage interfaces are defined using the *avio_stor* adapter type. (See the `hpvmresources` manpage.)

11.7.1 Guest Attached Device Support

Integrity VM Version A.03.50	Integrity VM Version B.04.00	Integrity VM Version B.04.10	Integrity VM Version B.04.20	Notes
• CD/DVD burners • Media changers • Tape devices	• CD/DVD burners • Media changers • Tape devices	• CD/DVD burners • Media changers • Tape devices	• CD/DVD burners • Media changers • Tape devices	Attached devices are supported for all types of guest operating systems that provide supported drivers for the physical device as attached to the VM Host device.

11.7.2 Multipathing Software Support

Multipathing software is supported only on the Integrity VM Host system. Unless specified otherwise, multipathing is supported for use with either legacy virtual I/O (virtual adapter type specified as *scsi*) or AVIO (virtual adapter type specified as *avio_stor*). The required version for these products is determined by the software vendor and the release of HP-UX installed on the VM Host system.

NOTE: LVM mirroring in a VM is supported with 0909 or later versions of HostAVIOStor (on the VM Host) and GuestAVIOStor (on the guest).

Backing Store	Integrity VM Version A.03.50	Integrity VM Version B.04.00	Integrity VM Version B.04.10	Integrity VM Version B.04.20
Whole Disk (or LUN)	• HP Secure Path A-A/A-P • EMC PowerPath	• HP-UX 11i v3 built-in multipathing • • EMC PowerPath with legacy DSFs	• HP-UX 11i v3 built-in multipathing • • EMC PowerPath with legacy DSFs	• HP-UX 11i v3 built-in multipathing • • EMC PowerPath with legacy DSFs
LVM Logical Volumes	• PV Links • EMC PowerPath • HP Secure Path A-A/A-P	• HP-UX 11i v3 built-in multipathing • PVLinks • EMC PowerPath with legacy whole disk DSF in a Volume Group	• HP-UX 11i v3 built-in multipathing • PVLinks • EMC PowerPath with legacy whole disk DSF in a Volume Group	• HP-UX 11i v3 built-in multipathing • PVLinks • EMC PowerPath with legacy whole disk DSF in a Volume Group
VxVM Logical Volumes	• Symantec DMP • EMC PowerPath • HP Secure Path A-A/A-P	• HP-UX 11i v3 built-in multipathing • EMC PowerPath with legacy whole disk DSF in a Disk Group • Symantec DMP	• HP-UX 11i v3 built-in multipathing • EMC PowerPath with legacy whole disk DSF in a Disk Group • Symantec DMP	• HP-UX 11i v3 built-in multipathing • EMC PowerPath with legacy whole disk DSF in a Disk Group • Symantec DMP
VxFS Files	• PV Links • Symantec DMP • EMC PowerPath • HP Secure Path A-A/A-P VxFS files are not supported backing storage with AVIO for version A.03.50	• HP-UX 11i v3 built-in multipathing • PVLinks • EMC PowerPath with legacy disk DSF in a Volume Group • Symantec DMP	• HP-UX 11i v3 built-in multipathing • PVLinks • EMC PowerPath with legacy disk DSF in a Volume Group • Symantec DMP	• HP-UX 11i v3 built-in multipathing • PVLinks • EMC PowerPath with legacy disk DSF in a Volume Group • Symantec DMP

11.7.3 EVA Series Firmware Requirement

The AVIO Storage Driver supports only Active-Active firmware types on EVA series (3000/5000 and 4000/6000/8000). Be sure that the following firmware revision levels are met before configuring AVIO backing stores on these arrays:

- On EVA 4000/6000/8000, all released firmware revisions support Active-Active configuration. Therefore, no action is necessary on these arrays.
- EVA 3000/5000 arrays need minimum firmware revisions of VCS v4.004 (Active-Active firmware).

For more information about EVA firmware upgrades, see the HP Services EVA upgrade website: http://hpswest.corp.hp.com/VCSUpgradeProgram.asp.

11.8 Network Interface Support

VM Host I/O is HP-UX based. Specific network interfaces are supported if they are supported for the version of HP-UX in use on the VM Host system. The VM Host physical network interface

card can be configured with Auto Port Aggregation (APA), with the resulting port supported as indicated in the following table:

Virtual Network Adapter Type	Integrity VM Version A.03.50	Integrity VM Version B.04.00	Integrity VM Version B.04.10	Integrity VM Version B.04.20
lan (legacy VIO)	All HP-UX supported Ethernet interfaces			
avio_lan (AVIO)	The following Ethernet drivers are supported, including Auto Port Aggregation (APA) ports: • iether • igelan • ixgbe	The following Ethernet drivers are supported, including APA ports: • iether • igelan • ixgbe • icxgbe	The following Ethernet drivers are supported, including APA ports: • iether • igelan • ixgbe • icxgbe	The following Ethernet drivers are supported, including APA ports: • iether • igelan • ixgbe • icxgbe

11.9 AVIO Support

The following table lists the support for AVIO networking drivers and AVIO storage drivers on Integrity VM V3.5, V4.0, V4.1, and V4.2 guests.

Integrity VM Host Version	HP-UX 11i v2 Guests	HP-UX 11i v3 Guests	Windows Server 2003 Guests	Windows Server 2008 SP1 Guests	Linux Guests
V3.5 VM Host	Storage and Networking	Networking	Networking	N.A.	Networking
V4.0 VM Host	Storage and Networking	Storage and Networking	Networking	N.A.	Networking
V4.1 VM Host	Storage and Networking	Storage and Networking	Networking	Networking	Networking
V4.2 VM Host	Storage and Networking	Storage and Networking	N.A.	Networking	Networking