

Xen-Based Virtualization Technology Preview for Red Hat Enterprise Linux 5.0 on HP Integrity servers



Introduction	2
Intended audience	2
Required reading	2
Reporting issues	2
Providing feedback	2
Acknowledgments	3
Revision information	3
HP Integrity servers and the RHEL 5 for IA-64 Virtualization Technology Preview	4
Known issues	5
Installing the HP Integrity Essentials Foundation Pack for Linux	5
System boot failure after selecting “Virtualization” during installation	5
Making the serial console work in dom0	7
Virtualization technology preview guest domains must be RHEL 5 based	8
BLKTAP driver missing in RHEL 5 for IA-64 Xen-Based Virtualization Technology Preview	8
Using virt-manager to create para-virtualized domains	9
Can’t boot domU using pygrub	10
No “boot” or “start” function for domU instances in virt-manager	11
Incorrect documentation for installing fully virtualized (HVM) domU	11
Fully virtualized (HVM) domains do not launch the installation process	13
Mouse tracking is erratic on fully virtualized (HVM) consoles	14
CD-ROM access is slow during installation	14
After installation, the fully virtualized (HVM) domU does not reboot	15
No Red Hat menu entry found in the domU (guest) EFI menu following installation	15
Known issues with no known workaround	16
X.org Server does not work in the dom0 instance	16
Occasional system panic during save/restore of para-virtualized domains	16
The swapper process panics dom0 under heavy domU (guest) loads	16
ltrace ps hangs dom0	16
domU (guest) instances require a minimum of 384 MB of RAM	17
domU (guest) instance domain migration hangs	17

Introduction

Red Hat Enterprise Linux version 5.0 (RHEL 5.0) includes a technology preview of the RHEL 5 virtualization technology for Itanium[®] 2-based systems. This technology preview is based on a snapshot of the open source version of the Xen hypervisor. Although the preview is functional on HP Integrity servers, its installation process reflects that this technology preview is a work in progress. The intent of this white paper is to provide information about how to install the Xen-Based Virtualization Technology Preview for IA-64. It further endeavors to highlight issues and workarounds for aspects of this technology preview that are not yet at a sufficient quality level for use outside of a non-production environment where development and development/testing are done.

Intended audience

This document is intended to provide system administrators of HP Integrity systems with the information necessary to successfully install the RHEL 5 for IA-64 Virtualization Technology Preview in a pure test or development environment. It further provides information about known issues and workarounds when configuring domU (guest) instances. The document does *not* represent a support statement, nor does it seek to make inferences regarding the availability of a supported configuration for the RHEL 5 Virtualization technology on HP Integrity servers.

Required reading

This document assumes an intermediate level of knowledge regarding installation and management of an HP Integrity server running the Red Hat Enterprise Linux server operating system and the Xen-based virtualization technology, as well as familiarity with the following documentation available at the Red Hat Web site¹:

- RHEL 5.0 Installation Guide
- RHEL 5.0 Virtualization Guide
- RHEL 5.0 IA-64 Release Notes

It is beneficial to read and understand the listed documentation *before* you install the Xen-based virtualization technology preview on an HP Integrity server.

Reporting issues

As the RHEL 5.0 release notes state, any bug or issue report related to the RHEL 5.0 for IA-64 Xen-Based Virtualization Technology Preview should be posted in accordance with the guidelines on the Red Hat Bugzilla Support Web page² for the Red Hat Bugzilla database. All of the Bugzilla reports related to the RHEL 5.0 Xen-Based Virtualization Technology Preview for IA-64 should be filed under the “Red Hat Enterprise Linux, Version: 5” product heading and the “kernel-xen” component heading for the IA-64 platform. In addition to sharing what could be critical information with the larger Red Hat Technology Preview community, reporting issues to the Red Hat Bugzilla database provides both Red Hat and HP with a single source from which to collect problem/issue reports.

Providing feedback

Any input, suggestions, or feedback you may have regarding the RHEL 5.0 for IA-64 Xen-Based Virtualization Technology Preview can also be submitted to the Xen-Based-Virtualization-HP-Integrity@hp.com e-mail address. Although HP cannot commit to responding directly to every message we receive through this channel, rest assured that your input, suggestions, and feedback will be read.

¹ Available for download from: <http://www.redhat.com/docs/manuals/enterprise/RHEL-5-manual/>

² Red Hat Bugzilla support page: <https://bugzilla.redhat.com/bugzilla/page.cgi?id=redhatfaq.html>

Acknowledgments

We would like to thank the following people for their assistance with the creation of this document:

Aron Griffis, primary content provider

Thomas Sjolshagen, author

Karen Scordino, Harding Marketing

Ann Silva, Harding Marketing

Diane Voelker

The Linux virtualization team at HP

Revision information

This is a new document.

HP Integrity servers and the RHEL 5 for IA-64 Virtualization Technology Preview

HP engineers have booted and run various component tests as part of our virtualization development and test work. We have run these tests for both para-virtualized and fully virtualized (HVM) domU (guest) instances using the RHEL 5 for IA-64 Virtualization Technology Preview.

At the time of this white paper, the following systems have been used with the technology preview:

- **HP Integrity rx2620 Server**—Itanium 2 (Madison 9M)-based system for para-virtualized domU instances only
- **HP Integrity rx3600 Server**—Dual Core Itanium 2-based system for para-virtualized and fully virtualized domU instances
- **HP Integrity rx4640 Server**—Itanium 2 (Madison 9M)-based system for para-virtualized domU instances only
- **HP Integrity rx6600 Server**—Dual Core Itanium 2-based system for para-virtualized and fully virtualized domU instances

Known issues

The following sections contain information about issues encountered by HP engineers during the installation and configuration of the RHEL 5.0 Xen-Based Virtualization Technology Preview on an HP Integrity server. Please note that this section is unlikely to contain a description of every possible issue or workaround that may be encountered. Should you encounter an issue that is not described here, please search the Red Hat Bugzilla database for previously reported cases of the issue you are experiencing and, if it has not previously been reported, file a Red Hat Bugzilla report.

Installing the HP Integrity Essentials Foundation Pack for Linux

Issue

The HP Integrity Essentials Foundation Pack for Linux does not currently support RHEL 5.0 Virtualized dom0 instances or any domU (guest) instances.

Cause

At present, because HP does not provide support for the RHEL 5 for IA-64 Virtualization Technology Preview, no formal testing or development work has been done to establish whether the HP Integrity Essentials Foundation Pack for Linux is functional or whether it causes issues on a virtualized Integrity/Linux system. As a result, HP does not recommend the installation of any HP Integrity Essentials Foundation Pack for Linux component on a system running a Virtualized Red Hat Enterprise Linux kernel (el5xen kernel) of any flavor.

Workaround

Do not attempt to install a copy of HP Integrity Essentials Foundation Pack for Linux on a system where you intend to run the RHEL 5 for IA-64 Virtualization Technology Preview.

System boot failure after selecting “Virtualization” during installation

Issue

The Red Hat RHEL 5 for IA-64 Release Notes³ state that in order to “... *install the Virtualization feature, you need to use the linux debug parameter when initializing Anaconda.*” This recommendation is incorrect for Itanium-based systems when installing RHEL 5 and its virtualization components and may result in a non-bootable system.

Cause

For Itanium-based systems, if the Virtualization feature is selected during installation following what appears to be a successful RHEL 5 installation process, the system will attempt to boot using the el5xen Linux kernel and will fail due to an incorrect elilo.conf entry for the default kernel. The elilo.conf file lacks the appropriate `vrmm=` line, which is required to boot the el5xen kernel successfully.

³ RHEL 5.0 Release Notes: <http://www.redhat.com/docs/manuals/enterprise/RHEL-5-manual/release-notes/RELEASE-NOTES-ia64-en.html>

Workaround

Do the initial installation of RHEL 5 for IA-64 on an HP Integrity server without including the virtualization feature in the Anaconda installer. Instead, install the required virtualization components manually (using either the rpm utility or the YUM management tool) from the main RHEL 5 installation media after booting the freshly installed non-virtualized RHEL 5 system. The listing below contains the required components and partial directory paths for locating the files:

```
VT/xen-3.0.3-25.el5.ia64.rpm
VT/virt-manager-0.2.6-7.el5.ia64.rpm
VT/libvirt-0.1.8-15.el5.ia64.rpm
VT/libvirt-python-0.1.8-15.el5.ia64.rpm
VT/python-virtinst-0.99.0-2.el5.noarch.rpm
Server/bridge-utils-1.1-2.ia64.rpm
Server/kernel-xen-2.6.18-8.el5.ia64.rpm
Server/xen-libs-3.0.3-25.el5.ia64.rpm
Server/gnome-python2-gnomekeyring-2.16.0-1.fc6.ia64.rpm
```

To install these .rpm packages and have a system capable of running para-virtualized guest domains (domU), you may use the rpm utility or the YUM installation tool⁴:

```
# yum install virt-manager kernel-xen
```

If fully virtualized (HVM) domains are required, the IA-64 guest firmware package will also need to be installed from the Supplementary CD-ROM:

```
Supplementary/xen-ia64-guest-firmware-1.0.0-8.ia64.rpm
```

To install the required .rpm packages and have a system capable of running both para-virtualized (HVM) and fully virtualized guest domains (domU), you may use the YUM management tool:

```
# yum install virt-manager kernel-xen xen-ia64-guest-firmware
```

In order to successfully start a fully virtualized domain, you will need to be able to connect to the Red Hat Network (RHN) and upgrade to, at a minimum, the following package versions:

```
xen-3.0.3-25.0.3.el5.ia64.rpm (or newer)
xen-libs-3.0.3-25.0.3.el5.ia64.rpm (or newer)
```

Once you have verified successful access to RHN, run the following command to upgrade the system appropriately:

```
# yum update xen xen-libs
```

After installing the required packages you will need to open the /etc/elilo.conf file in a text editor and change the default kernel to the el5xen kernel. The default kernel from which elilo will boot the system is specified by the "default=" entry near the top of the /etc/elilo.conf file. The value specified to the right of the equal sign has to correspond to a "label=" entry located further down in the /etc/elilo.conf file. In order to boot the Xen-based dom0 kernel, you will have to change the "default=" entry to reflect a label for a valid el5xen kernel—for example:

```
default=2.6.18-8.el5xen
```

⁴ Use of the YUM tools assumes that the system has been registered with Red Hat Network and is able to receive updates over the network and/or that the user has created a YUM repository for the CD/DVD/.iso image prior to issuing the commands listed.

By default, the hypervisor on Itanium-based systems reserves only 512 MB of memory for the dom0 instance. This amount is normally sufficient to boot the system, but dom0 may be forced to use its swap partitions in order to support guest (domU) domains. This will negatively impact performance. HP engineers have found that reserving 1 GB of RAM for the dom0 instance works well for even a large number of guests. A larger value than 1 GB may cause system instability. Make this change by adjusting the "append=" line and add the "dom0_mem=1G" parameter, similar to this:

```
append="dom0_mem=1G -- rhgb quiet"
```

Note that the append value syntax is:

```
append="hypervisor args -- kernel args"
```

The dom0_mem parameter is a hypervisor argument, so it should go to the left of the double-dash.

Also by default, the hypervisor on Itanium-based platforms will allocate a single virtual CPU to the dom0 instance. In most cases, this will be sufficient because the dom0 instance should not be used for general application or other CPU-intensive processing tasks. However, should it be necessary to allocate more than a single CPU to the dom0 instance—perhaps to handle many HVM guests—the hypervisor argument "dom0_max_vcpus=" can be used. For example:

```
append="dom0_mem=1G dom0_max_vcpus=2 -- rhgb quiet"
```

Making the serial console work in dom0

Issue

When RHEL 5 boots into dom0 using the el5xen kernel, the system device discovery scripts may map the system console to /dev/ttyS0, and subsequently /etc/inittab and /etc/securetty could be configured incorrectly from the installation procedure. This would render the console temporarily unavailable and unable to accept logins.

Cause

In dom0, the serial console is detected by the hypervisor and is always mapped as /dev/ttyS0, regardless of where it would normally be found by a standard Linux kernel. For example, on an Integrity rx2620 system, the Management Processor console might be detected by the kernel as /dev/ttyS3—which is how the /etc/inittab and /etc/securetty expects to locate the console—but when running under the hypervisor, it will appear as ttyS0.

Workaround

To address this issue, review the contents of the /etc/inittab file before booting the el5xen kernel and its dom0 instance. If the co: (console) entry does not point to ttyS0, edit the entry from its current setting to resemble the following example:

```
s0:2345:respawn:/sbin/agetty ttyS0 9600 vt100-nav
```

In addition, add the following entry on its own line in /etc/securetty:

```
ttyS0
```

This change will permit root logins on the serial console after booting a dom0 instance. If you make the change after having booted dom0, run "/sbin/init q" to force the init process to reread the /etc/inittab file and provide a login prompt on the appropriate console device.

HP recommends that a reboot test be performed after all the necessary workarounds mentioned above have been applied. Once the system has been rebooted, log in and issue the command "uname -r" to verify that the running kernel ends with the "-e15xen" postfix. This signifies that the Xen-based hypervisor is running and that your system is running a dom0 instance. The next steps will be to install either a para-virtualized or a fully virtualized guest domain (domU).

Virtualization technology preview guest domains must be RHEL 5 based

Issue

At present, only a RHEL 5 operating system instance may be installed for use as a para-virtualized domU (guest) domain.

Cause

Due to the required hypervisor/kernel compatibility, it is currently recommended to only use a RHEL 5 distribution as a para-virtualized guest domain. While it may be possible to use another Linux distribution as a para-virtualized domU (guest) domain while booting with a RHEL 5 virtualization kernel, such a discussion is beyond the scope of this document.

Workaround

Use a RHEL 5-based kernel and distribution for your para-virtualized guest (domU) domains.

BLKTAP driver missing in RHEL 5 for IA-64 Xen-Based Virtualization Technology Preview

Issue

Both fully virtualized (HVM) and para-virtualized domU (guest) domains will fail to start when you attempt to use the BLKTAP driver for file-backed disk/storage containers.

Cause

The virtualization technology preview in RHEL 5 shipped without the Xen BLKTAP driver for Intel Itanium architecture included. As a result, using the BLKTAP driver for file backed storage/disk containers in the `/etc/xen/<domainName>` configuration files (see example below) will fail.

Sample BLKTAP configuration entry:

```
disk = [ 'blktap:/path/to/file/backed/store/<name>', sda1, rw', ]
```

Workaround

HP engineers have successfully used whole disks, partitions, logical volumes (LVMs), and file images using the standard loop-back 'file' backing store drivers. To simplify storage management in an environment running on a RHEL 5 for IA-64 virtualized platform, HP recommends using either a whole disk (LUN) or a specifically created LVM volume for your domU (guest) instances. However, should you prefer to use the file backed disk/storage containers, you will need to use the older (and inferior, from a performance perspective) 'file:' Xen driver. As an example, using the loopback 'file' driver in the `/etc/xen/<name>` domU configuration file:

```
disk = [ 'file:/path/to/file/backed/store/<name>', sda1, rw', ]
```

Using virt-manager to create para-virtualized domains

Issue

If the [New] button or the File->New menu button in the virt-manager utility is used to create a framebuffer display for the para-virtualized domU (guest) domain, the guest domain will fail to initiate, and the installation process for para-virtualized domain will fail. This issue does not occur in fully virtualized (HVM) domU (guest) domains.

Cause

Using the [New] button in the virt-manager graphical user interface will fail to install the operating system and create a functioning para-virtualized domU (guest) domain instance due to a lack of the required framebuffer console support for para-virtualized domains shipping with RHEL 5 for IA-64. The framebuffer driver for para-virtualized domU instances on systems based on Intel Itanium architecture was not completed in time for inclusion in this Technology Preview.

Workaround

There are several possible ways to create and install new domU (guest) domain on a RHEL 5 virtualized system, but the only tools supplied by Red Hat are the virt-manager GUI (graphical user interface) and the virt-install command-line utility. HP currently recommends using virt-install in a terminal window to install para-virtualized domU (guest) domains on HP Integrity servers. See the virt-install command-line example below, which assumes an HTTP hosted installation repository:

```
virt-install --name=pv_rhel5 --ram=2048 --vcpus=1 \  
--file=/dev/cciss/c0d1p3 --nographics --paravirt \  
--location=http://your.server/install/rhel5-ia64
```

Using virt-install to create (install) para-virtualized domU (guest) domains

The example virt-install line above reflects some recommended parameters—i.e., parameters that have worked during development testing in HP engineering facilities:

`--ram=2048`

This parameter configures the domU (guest) instance with 2 GB of RAM. HP engineers have tried several values between 1 GB and 32 GB. Values larger than 32 GB have worked as expected in certain cases, but have also resulted in outages. As a result, HP currently recommends against creating para-virtualized domU (guest) domains with memory requirements that exceed 32 GB per domU (guest) instance during this virtualization technology preview.

`--file=/dev/cciss/c0d1p3`

This parameter specifies the target backing store (disk seen in the domU instance) onto which the system will be copied during the installation process. HP recommends specifying the whole LUN (/dev/sda), a partition of a LUN (/dev/sda1), or a LVM logical volume (/dev/VirtVG/dom1_root) for best performance. HP further recommends that, should a partition of a LUN (/dev/sda1) or a LVM logical volume (/dev/VirtVG/dom1_root) be specified here, you refrain from further partitioning or LVM configurations as part of the domU (guest) installation process.

`--nographics`

Since the para-virtualized framebuffer functionality did not get included in RHEL 5 for IA-64, this parameter is required to direct any domU (guest) instance console output to a terminal window. However, the framebuffer driver for a fully virtualized (HVM) domU (guest) instance is included and can be used successfully during both installation and day-to-day console access.

`--location`

This is a required argument for building a para-virtualized guest instance. The RHEL 5 DVD image should be loopback-mounted at the URL specified immediately following this parameter. Please see the RHEL 5.0 Installation Guide for further details.

Can't boot domU using pygrub

Issue

Following successful installation of a domU (guest) instance using the `virt-install` utility, the installed domU (guest) instance will be stopped, and several attempts to boot the newly created domU (guest) instance will be made. These reboot attempts will fail.

Cause

The `pygrub` utility is unable to read GPT partition tables and the FAT file system used on the EFI partition; thus it cannot access the `initrd` image and `xen domU` kernel at the initial stages of the boot process.

Workaround

The workaround for this is to extract the domU kernel and `initrd` from the disk image and then modify the domain's configuration file to use them instead of `pygrub`. You can use the `lomount` utility to temporarily mount the EFI partition that is hosted in the newly created domU (guest) instance disk image. On a default installation, the EFI partition will be hosted on partition 1 of the image.

The following session assumes the settings from the example `virt-install` command line above (adjust the commands to reflect your installation choices):

- Mount the EFI partition from the domU's disk image.

```
lomount -diskimage /dev/cciss/c0d1p3 -partition 1 /mnt
```

- Copy the relevant Linux kernel (`vmlinux`), `initrd` and `elilo.conf` (for reference) to a writable filesystem in the dom0 instance. HP recommends using the `/var/lib/xen/boot` path to avoid access conflicts enforced by the default SELinux security configuration.

```
mkdir -p /var/lib/xen/boot/pv_rhel5
cp -v /mnt/efi/redhat/{vmlinux*,initrd*,elilo.conf} \
  /var/lib/xen/boot/pv_rhel5
```

- Unmount domU's EFI partition.

```
umount /mnt
```

The `elilo.conf` will be useful when configuring the appropriate kernel parameters for the domU domain configuration, as you will no longer be using the `pygrub` utility to boot the domU (guest) instance.

Next you will need to modify the domU (guest) domain's configuration file. This file is stored in the `/etc/xen` directory and will be named in accordance with the name supplied with `virt-install`'s `-name` parameter. As per the example above, that would be `/etc/xen/pv_rhel5`.

You will need to make the following changes to your `xen domU` configuration file:

- Remove (or comment out using `'#'`) the `pygrub` line:

```
bootloader="/usr/bin/pygrub"
```

- In its place, add lines for the kernel and initrd, for example:

```
kernel="/var/lib/xen/boot/pv_rhel5/vmlinuz-2.6.18-8.el5xen"  
ramdisk="/var/lib/xen/boot/pv_rhel5/initrd-2.6.18-8.el5xen.img"
```

- Find the `root=` line in the `elilo.conf` file you copied from the domU disk image and add the corresponding `root=` line to the domain configuration file.

For example, if `/boot/pv_rhel5/elilo.conf` contains

```
root=/dev/VolGroup00/LogVol100
```

Then you should add

```
root="/dev/VolGroup00/LogVol100"
```

to `/etc/xen/pv_rhel5`.

Note that the `root=` line in the domain configuration must be quoted. Also note that any additional kernel parameters should be specified using an `extra=` entry in the domain configuration. None of the default RHEL 5 boot parameters are necessary to successfully boot a para-virtualized domU (guest) instance on an Itanium-based system (e.g., `"console=xvc0 rhgb quiet"`).

No “boot” or “start” function for domU instances in virt-manager

Issue

There is no button or menu function in the RHEL virt-manager GUI tool that allows you to start a domU (guest) instance.

Cause

There is no way in the RHEL 5 for IA-64 Virtualization Technology Preview to start a domU (guest) instance programmatically; thus tools such as virt-manager, which relies on application programming interfaces (APIs) to manage your virtualized environment, are unable to provide this specific functionality.

Workaround

The `xm` command line utility is installed as part of the Virtualization packages. This utility is the only means for manually starting domU (guest) instances. For example, to start a para-virtualized domU instance named `pv_rhel5` from a terminal window with root privileges:

```
xm create -c pv_rhel5
```

Recommendations when installing fully virtualized (HVM) domU (guest) instances

HP recommends the use of GUI utility virt-manager to install fully virtualized (HVM) domU (guest) instances. Although the `virt-install` utility does work for installing operating systems into fully virtualized (HVM) domU (guest) instances, the virt-manager utility is a lot more user-friendly and intuitive to use. To install a fully virtualized domU (guest) instance using the virt-manager utility, select “Applications” in the GNOME menu. Then select System Tools -> Virtual Machine Manager. Connect the virt-manager to the correct host (usually the “localhost” selection) and select the “New” button to commence the domU installation wizard.

Incorrect documentation for installing fully virtualized (HVM) domU

Issue

Most of the instructions in Red Hat’s Virtualization Guide⁵ apply directly to Itanium-based systems. However, some modifications must be made due to security, RAM size, and virtual CPU counts during configuration of the wizard.

⁵ <http://www.redhat.com/docs/manuals/enterprise/RHEL-5-manual/Virtualization-en-US/virt-install-wizard.html>

Cause

Not all of the recommendations in chapter 18.7 of the Red Hat Virtualization Guide are valid for the HP Integrity server running the RHEL 5 for IA-64 Virtualization Technology Preview.

Workaround

Make the following modifications to the step-by-step instructions in chapter 18.7 (“Creating a New Virtual Machine”) of the Red Hat Virtualization Guide to install fully virtualized (HVM) domU instances successfully:

- In step 5, the wizard asks for the “ISO Image Location.” If SELinux remains enabled (HP strongly recommends against disabling SELinux or placing it in “permissive” mode), the `xend` daemon will not be permitted to access the installation ISO image you have created. For successful access to the ISO image, make sure the image is stored in a sub-directory of the `/var/lib/xen` directory. To make sure that the installation wizard is able to read a valid ISO image, HP recommends creating a new sub-directory named `/var/lib/xen/iso` and storing the relevant ISO installation image there—for example, `/var/lib/xen/iso/rhel5-dvd.iso`.
- In step 6, the HVM installation wizard asks about memory and virtual CPU settings for the domU (guest) instance. HP recommends choosing a memory size of at most 1024 MB (1 GB) due to inconsistencies we’ve seen in our test environment when values greater than 1024 MB were used. The values “Max Memory” and “Startup Memory” should be set to the same number.
- Additionally, in step 6, the VCPUs setting should be set to 1. During the installation phase, the version of the `libvirt` library that shipped with the RHEL 5 for IA-64 Virtualization Technology Preview is unable to successfully initiate fully virtualized (HVM) domains with two (2) or more VCPUs on Itanium-based systems. After the installation has successfully completed, you may adjust the setting to a larger value by editing the domain’s configuration file stored in the `/etc/xen` directory.

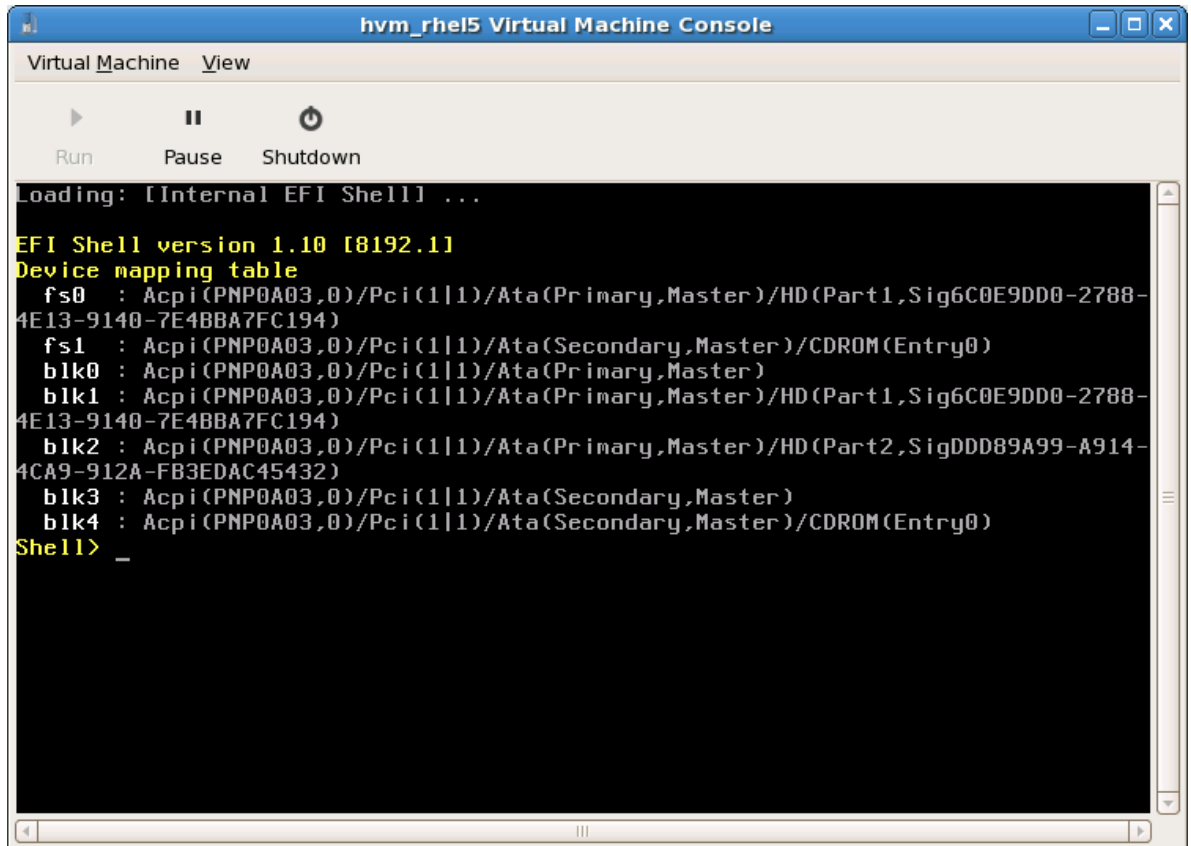
Fully virtualized (HVM) domains do not launch the installation process

Issue

Instead of launching directly into the installation process of the domU (guest) operating system you are attempting to install, the HVM domain will stop at the EFI shell.

Cause

The default domU (guest) domain EFI software does contain an option to boot automatically from the CD-ROM/DVD player and thus presents the user with a standard EFI shell prompt.



Workaround

To start the installation process, use what appear to be “standard” DOS commands “CD EFI”, “FS1:”, etc., to choose the drive and filesystem that correspond to the configured CD-ROM/DVD player (or ISO image as defined in the wizard), and start the elilo program using the “elilo” command. For example, according to the illustration above, the CDROM is on fs1, so you would use the following commands:

```
Shell> fs1:
fs1:\> elilo
```

Before pressing <enter> at the ELILO boot prompt, please read through the next two issues.

Mouse tracking is erratic on fully virtualized (HVM) consoles

Issue

Mouse tracking on the HVM console can be difficult to use due to acceleration differences between the “virtual mouse” in the fully virtualized (HVM) console and that of the physical mouse.

Cause

The mouse driver for the fully virtualized (HVM) domain has a different acceleration and map than those of the physical mouse pointer, which is also visible.

Workaround

HP recommends, when possible, that you use one of the alternative interfaces such as “text”, “vnc”, or “ssh” when installing the fully virtualized (HVM) domU (guest) instance. For more information about these options, see the RHEL 5.0 Installation Guide⁶.

For example, to perform a VNC-based installation:

```
ELILO boot: linux vnc
```

CD-ROM access is slow during installation

Issue

The process of installing a fully virtualized (HVM) guest domain (domU) from a virtual CD-ROM device is very slow.

Cause

The RHEL 5 for IA-64 Virtualization Technology Preview shipped to customers without a *non-critical* update to the I/O-caching mechanism for virtual CD-ROM devices.

Workaround

To speed up the installation process, HP recommends creating and using a network installation source (see the RHEL 5.0 Installation Guide⁷ for details). To make sure that the Anaconda installer in RHEL 5 prompts for an installation source, add the “askmethod” parameter to the ELILO boot command line—for example:

```
ELILO boot: linux vnc askmethod
```

⁶ http://www.redhat.com/docs/manuals/enterprise/RHEL-5-manual/Installation_Guide-en-US/

⁷ http://www.redhat.com/docs/manuals/enterprise/RHEL-5-manual/Installation_Guide-en-US/s1-steps-network-installs-x86.html#id3153668

After installation, the fully virtualized (HVM) domU does not reboot

Issue

The final installation step attempts to reboot into the newly installed fully virtualized (HVM) domU (guest) instance. The domain succeeds in shutting down but does not restart.

Cause

This is due to a limitation in the Qemu component used in the RHEL 5 for IA-64 Virtualization Technology Preview when initiating and running fully virtualized (HVM) domU (guest) instances.

Workaround

To boot the domain, use the "xm create" command in a terminal window as in the example below:

```
xm create hvm_rhel5
```

Once the domain has been started, in order to gain access to the console of the domU (guest) instance, double-click the appropriate domU (guest) instance entry in either the `virt-manager` application window or the drop-down menu of the virtualization applet. A domU (guest) instance entry will not appear in `virt-manager` until the instance has been started either by the "xm create" command or as part of the `/etc/init.d/xendomains` startup script during the dom0 boot process⁸.

No Red Hat menu entry found in the domU (guest) EFI menu following installation

Issue

As part of the installation of RHEL 5 on a "bare iron" HP Integrity server, the installation process creates a menu entry for Red Hat Enterprise Linux version 5.0 in the EFI menu system. This does not happen in the domU (guest) instance copy of the EFI interface.

Cause

The current incarnation of the Integrity server's guest firmware does not support saving menu entries to NVRAM.

Workaround

Each time the fully virtualized (HVM) domU instance is started, you must manually start ELILO from the EFI Shell prompt by running:

```
fs0:\efi\redhat\elilo.efi
```

⁸ To automatically start a domU instance during the dom0 boot process, a soft-link of the `/etc/xen/<configfile>` must be created in the `/etc/xen/auto` directory.

Known issues with no known workaround

The following section details some additional RHEL 5 for IA-64 Virtualization Technology Preview issues encountered by HP that have not been mentioned previously and/or for which no known workaround or resolution has been found as of the writing of this document.

Specifically, the items listed below may represent cases where functionality in the shipping RHEL5 virtualization capability for IA-32/EM64T and x86_64 processors differ from those on non-virtualized Linux on Intel Itanium architecture, both virtualized and non-virtualized, as well as cases of unexpected behavior on Itanium-based platforms.

X.org Server does not work in the dom0 instance

Issue

The X.org X Server does not start in the dom0 instance.

Diagnosis or cause

There is a problem in the virtualized device file `/dev/mem` in dom0. This is addressed in an upstream Xen kernel and should be included in RHEL 5.1 when it becomes available. You can follow the developments of this issue in the Red Hat Bugzilla database at:

http://bugzilla.redhat.com/bugzilla/show_bug.cgi?id=215536

Occasional system panic during save/restore of para-virtualized domains

Issue

HP engineers have observed occasional dom0 system panics—`oops()`—when saving and restoring para-virtualized domU (guest) instances multiple times in succession.

Diagnosis or cause

The issue is being tracked in the Red Hat Bugzilla database at:

http://bugzilla.redhat.com/bugzilla/show_bug.cgi?id=219433

The swapper process panics dom0 under heavy domU (guest) loads

Issue

Heavy application loads in the domU (guest) instance may cause a dom0 system panic—`oops()`.

Diagnosis or cause

The root cause of this issue is currently unknown, but its footprint indicates that the panic—`oops()` is caused by the dom0 swapper process. The issue is being tracked in the Red Hat Bugzilla database at: http://bugzilla.redhat.com/bugzilla/show_bug.cgi?id=233983

ltrace ps hangs dom0

Issue

When running the `ltrace` command with a `ps` argument (e.g. `ltrace ps`) in the dom0 instance, the system may hang.

Diagnosis or cause

This issue has been addressed in a more recent version of the upstream Linux kernel and is being tracked in the Red Hat Bugzilla database at:

http://bugzilla.redhat.com/bugzilla/show_bug.cgi?id=218692

domU (guest) instances require a minimum of 384 MB of RAM

Issue

The RHEL 5 para-virtualized domU (guest) kernel memory requirements are such that booting with less than 384 MB of RAM assigned to a RHEL 5 para-virtualized domU (guest) instance will fail.

Cause

RHEL 5 kernels for the Intel Itanium architecture are configured with `NR_CPUS=1024`. This parameter is much higher than for kernels running on IA-32/EM64T and x86_64-based systems and increases the memory requirements of both a para-virtualized and fully virtualized RHEL 5-based domU (guest) instances.

Solution

Make sure that the RHEL 5 domU (guest) instance has at least 384 MB of RAM allocated at boot. To use the domain effectively for application loads, it will likely be necessary to configure the domU (guest) instance with 512 MB RAM or more. You can set the amount of memory allocated to a domU (guest) instance by adjusting the "memory = " parameter found in the domain's configuration file. The configuration information is stored in `/etc/xen/<domain name>`.

domU (guest) instance domain migration hangs

Issue

Migration of domU (guest) instances running on Itanium-based systems is not functional in the RHEL 5 for IA-64 Virtualization Technology Preview.

Diagnosis or cause

The issue is being tracked at: https://bugzilla.redhat.com/bugzilla/show_bug.cgi?id=222885
The domU migration functionality is currently functional in upstream versions of Xen.