Linux Integration Components Version 2 for Hyper-V (Windows Server 2008, Windows Server 2008 R2, Microsoft Hyper-V Server 2008, and Microsoft Hyper-V Server 2008 R2) Readme

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Abstract

This guide discusses the installation and functionality of the Linux Integration Components for Hyper-V™ technology when the components are installed on a virtual machine.

Copyright information

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Linux Integration Components Version 2 for Microsoft Hyper-V Features

When installed on a virtual machine that is running a supported Linux operating system, the Linux Integration Components for Hyper-V provide the following functionality:

- **Driver support for synthetic devices**: The Linux Integration Components support the synthetic network controller and the synthetic storage controller that were developed specifically for Hyper-V.

- **Fastpath Boot Support for Hyper-V**: Boot devices now take advantage of the block Virtualization Service Client (VSC) to provide enhanced performance.

Supported Host Operating Systems

This version of the Linux Integration Components supports the following versions of Hyper-V:

- Windows Server® 2008 Standard, Windows Server® 2008 Enterprise, and Windows Server® 2008 Datacenter (64-bit versions only)

- Microsoft® Hyper-V Server 2008

- Windows Server 2008 R2 Hyper-V RTM (Build 7600) Standard, Enterprise, and Datacenter

- Microsoft Hyper-V Server 2008 R2 RTM (Build 7600)

Supported Guest Operating Systems

This version of the Linux Integration Components supports the following guest operating systems and virtual CPU (vCPU) configurations:

- SUSE Linux Enterprise Server 10 SP2 x86 and x64 (1 vCPU)

- SUSE Linux Enterprise Server 11 x86 and x64 (1 vCPU)

- Red Hat Enterprise Linux 5.2, 5.3, and 5.4 x86 and x64 (1 vCPU)

Synthetic Mouse Support

Synthetic mouse support is not included in this download. However, synthetic mouse drivers for use with Linux running on Hyper-V are available. For more information, see the Citrix Project Satori Web site at http://go.microsoft.com/fwlink/?LinkId=157779.

📝 **Note**

Synthetic Mouse support is not available on SUSE Linux Enterprise Server 11 at this time.

Installing the Linux Integration Components Version 2 on SUSE Enterprise Server Linux 10 or 11

▶**To install the Linux Integration Components Version 2:**

1. Open Hyper-V Manager: Click **Start**, point to **Administrative Tools**, and then click **Hyper-V Manager**.

2. Create a new virtual machine where you will install Linux: In the **Actions** menu, click **New**, and then click **Virtual Machine**.

3. Specify the Linux installation media: Right-click the virtual machine that you created, and then click **Settings**. In **IDE Controller**, specify one of the following:

   - An image file in ISO format that contains the files required for installation

   - A physical CD/DVD drive that contains the installation media

4. Turn on the virtual machine: Right-click the virtual machine that you created, and then click **Connect**.

5. Begin installing Linux.

6. Ensure that the optional package **C/C++ Compiler and Tools** is selected during installation. It is required to build and install the Linux Integration Components.

7. When prompted, restart the virtual machine and complete any first-boot configuration tasks.

   📝 **Note**

   > Unless a legacy network adapter was added during the virtual machine's initial configuration, the virtual machine will not have any network support.

8. Log on to the virtual machine.

9. In Hyper-V Manager, configure **LinuxIC v2.ISO** (located in the directory where you extracted the downloaded files) as a physical CD/DVD drive on the virtual machine.

   📝 **Note**

   > If the virtual machine is running SUSE Linux Enterprise Server 11, complete Step 1 in the section titled Installing the Integration Services on SUSE Linux Enterprise Server 11 Virtual Machines before you continue.

10. As the root user, mount the CD in the virtual machine by issuing the following commands at a shell prompt:

```
# mkdir /mnt/cdrom

# mount /dev/cdrom /mnt/cdrom
```

11. Copy the Linux Integration Components to the virtual machine. For example:

```
# mkdir /opt/linux_ic_rtm

# cp /mnt/cdrom/* /opt/linux_ic_rtm -R
```

12. As the root user, run the following command to install the synthetic drivers. A reboot is not required.

```
# /opt/linux_ic_rtm/setup.pl drivers
```

📝 **Note**

> If the virtual machine is running SUSE Linux Enterprise Server 11, complete Steps 2-4 in the section titled <u>Installing the Integration Services on SUSE Linux Enterprise Server 11 Virtual Machines</u>.

Installing the Linux Integration Components Version 2 on Red Hat Enterprise Linux 5

▶**To install the Linux Integration Components Version 2:**

1. Open Hyper-V Manager: Click **Start**, point to **Administrative Tools**, and then click **Hyper-V Manager**.

2. Create a new virtual machine where you will install Linux: In the **Actions** menu, click **New**, and then click **Virtual Machine**.

3. Specify the Linux installation media: Right-click the virtual machine that you created, and then click **Settings**. In **IDE Controller**, specify one of the following:

   - An image file in ISO format that contains the files required for installation

   - A physical CD/DVD drive that contains the installation media

4. Turn on the virtual machine: Right-click the virtual machine that you created, and then click **Connect**.

5. Begin installing Linux.

6. Ensure that the optional package **Software Development** is selected during installation. It is required to build and install the Linux Integration Components.

7. When prompted, restart the virtual machine and complete any first-boot configuration tasks.

   📝 **Note**

   > Unless a legacy network adapter was added during the virtual machine's

initial configuration, the virtual machine will not have any network support.

8. Log on to the virtual machine.

9. In Hyper-V Manager, configure **LinuxIC v2.ISO** (located in the directory where you extracted the downloaded files) as a physical CD/DVD drive on the virtual machine.

10. As the root user, mount the CD in the virtual machine by issuing the following commands at a shell prompt:

```
# mkdir /mnt/cdrom

# mount /dev/cdrom /mnt/cdrom
```

11. Copy the Linux Integration Components to the virtual machine. For example:

```
# mkdir /opt/linux_ic_rtm

# cp /mnt/cdrom/* /opt/linux_ic_rtm –R
```

12. As the root user, run the following command to install the synthetic drivers. A reboot is not required.

```
# /opt/linux_ic_rtm/setup.pl drivers
```

Upgrading the Linux Integration Components from Version 1 to Version 2

▶**To upgrade the Linux Integration Components:**

1. Shut down all Linux virtual machines on the host.

2. Turn on the Linux virtual machine, and boot into the "stock" (not Xen) kernel.

3. Follow the instructions in the section titled Installing the Linux Integration Components Version 2 on SUSE Enterprise Server Linux 10 or 11, starting with Step 8.

4. When you are finished installing the Linux Integration Components, remove the entry for the Xen-enabled kernel with Hypercall adapter from **menu.lst** using the following procedure:

   a. As the root user, edit **/boot/grub/menu.lst**.

   b. Find the entry that uses the Xen-enabled Linux kernel and delete it. For example, the following entry uses the Xen-enabled kernel:

```
title Xen – SUSE Linux Enterprise Server 10 SP2 – 2.6.16.60-0.21

root (hd0,1)

kernel /boot/x2v-32.gz

module /boot/vmlinuz-2.6.16.60-0.21-xen root=/dev/hda2 resume=/dev/hda1

splash=silent showopts
```

```
module /boot/initrd-2.6.16-60-0.21-xen
```

c. Set the "default" value to match the entry that uses the native Linux kernel. In most cases, this will remain 0.

Installing the Integration Services on SUSE Linux Enterprise Server 11 Virtual Machines

▶ **To install the Integration Services:**

1. Modify **/etc/modprobe.d/unsupported-modules** so that the option `allow_unsupported_modules` reads as follows:

   ```
   allow_unsupported_modules 1
   ```

   Save the changes to the file, and then restart the virtual machine and continue from Step 10 in the section titled Installing the Linux Integration Components Version 2 on SUSE Enterprise Server Linux 10 or 11.

2. As the root user, edit **/etc/fstab** and make the following changes:

   a. Sections that begin with **/dev/disk/*** should be replaced by their **/dev/hd*** equivalents, so that **/etc/fstab** looks similar to the following example:

   ```
   /dev/hda1 swap              swap        defaults            0 0

   /dev/hda2 /                 ext3        acl,user_xattr      1 1
   ```

   b. Save the changes to **/etc/fstab**.

3. As the root user, edit **/boot/grub/menu.lst** and modify the kernel options as follows:

   ```
   root=/dev/hda2 resume=/dev/hda1
   ```

4. Modify **/etc/modprobe.d/unsupported-modules** so that the option `allow_unsupported_modules` reads as follows:

   ```
   allow_unsupported_modules 0
   ```

Verifying Linux Integration Components Version 2 Functionality

To verify that the installation of each subcomponent succeeded, as the root user, issue the following command at a shell prompt:

```
# /sbin/lsmod | grep vsc
```

The output should include lines similar to the following example:

```
netvsc 57832 0

storvsc 50288 0

blkvsc 54032 3

vmbus 70120 3 netvsc,storvsc,blkvsc
```

📝 **Note**

Your file system type or other local factors might result in different file sizes in your deployment.

- "netvsc" provides support for the synthetic network card.
- "storvsc" provides support for the synthetic SCSI controller and disks.
- "blkvsc" provides support for synthetic IDE disks and fastpath boot.
- "vmbus" is the fast communication channel between the Hyper-V host and the virtual machine.

Configuring the Synthetic Network Card in SUSE Linux

From YaST, use the Network Card applet to configure the newly installed synthetic network adapter. Configure the Virtual Ethernet Card, which is a synthetic network card with enhanced performance. After successful configuration, **seth0** should appear in the output of the ifconfig command, similar to the following example:

```
$/sbin/ifconfig

seth0        Link encap:Ethernet HWaddr 00:15:5D:01:08:77
```

Configuring the Synthetic Network Card in Red Hat Enterprise Linux

Use the Network configuration tool (in System/Administration/Network) to configure the newly installed synthetic network adapter. Configure the Virtual Ethernet Card, which is a synthetic network card with enhanced performance. After successful configuration, **seth0** should appear in the output of the ifconfig command, similar to the following example:

```
$/sbin/ifconfig

seth0        Link encap:Ethernet HWaddr 00:15:5D:01:08:77
```

Configuring the Storage Virtualization Service Client in SUSE Linux

▶ **To configure the Storage VSC:**

1. If you have a SCSI disk attached, as the root user, execute the following command at a shell prompt:

    ```
    # cat /proc/scsi/scsi
    ```

    This displays the information for the synthetic SCSI controller.

    ```
    Attached devices:

    Host: scsi0 Channel: 00 Id: 00 Lun: 00 Vendor: Msft Model: Virtual Disk Rev:
    1.0 Type: Direct-Access ANSI SCSI Revision: 04
    ```

    This indicates that the synthetic SCSI controller has been enumerated correctly.

2. Next, as the root user, execute the following command at a shell prompt to verify that there are disk(s) attached to the SCSI controller:

    ```
    # ls /dev/sd*

    brw-r----- 1 root disk 8,0 Nov 27 17:25 /dev/sda
    ```

3. After you confirm the presence of the disk(s), use the **Partitioner** tool in YaST to create a partition on the disk.

Configuring the Storage Virtualization Service Client in Red Hat Enterprise Linux

▶ **To configure the Storage VSC:**

1. If you have a SCSI disk attached, as the root user, execute the following command at a shell prompt:

    ```
    # cat /proc/scsi/scsi
    ```

    This displays the information for the synthetic SCSI controller.

    ```
    Attached devices:

    Host: scsi0 Channel: 00 Id: 00 Lun: 00 Vendor: Msft Model: Virtual Disk Rev:
    1.0 Type: Direct-Access ANSI SCSI Revision: 04
    ```

    This indicates that the synthetic SCSI controller has been enumerated correctly.

2. Next, as the root user, execute the following command at a shell prompt to verify that

there are disk(s) attached to the SCSI controller:

```
# ls /dev/sd*

brw-r----- 1 root disk 8,0 Nov 27 17:25 /dev/sda
```

3. After you confirm the presence of the disk(s), use the **fdisk** tool (as the root user) to create a partition on the disk.

Additional Information about the Linux Integration Components Version 2

Release Notes

- This version of the integration components no longer includes the Hypercall adapter that was present in earlier versions.

- Support for this version of the Linux Integration Components is provided via e-mail using the address linuxic@microsoft.com.

Unsupported Features

The following features are not supported in this version of the Linux Integration Components:

- Integration Services: Operating System Shutdown, Time Synchronization, Data Exchange, Heartbeat, Volume Snapshot Backup

- Networking: Jumbo Frames and TCP Offload

- Storage: Hot Add/Remove (VHD's and Passthrough Disks)

Enabling blkVSC (Fastpath boot)

To enable enlightened mode on the IDE hard disk and support fastpath boot and enhanced disk speed, **noprobe** options are applied to IDE hard disks. Due to a known issue, this option might impact CDROM usage inside the virtual machine. To enable enlightened IDE hard disks and use CDROM at the same time, the kernel options **(hda=noprobe hdb=noprobe)** are applied automatically during installation. This setting works for the default virtual machine configuration: the hard disk is on virtual IDE Controller 0, and CDROM is on virtual IDE Controller 1 of the virtual machine. This setting assumes the hard disk is **/dev/hda**, and the CDROM drive is **/dev/hdc**. If the hard disk or CDROM are in different locations, the kernel parameters should be updated accordingly in **/boot/grub/menu.lst** (for SUSE Linux Enterprise distributions) or **/boot/grub/grub.conf** (for Red Hat Enterprise Linux distributions). This change requires a reboot of the virtual machine to take effect.

Important Considerations for Making Linux Virtual Machines Highly Available in Failover Clustering and Hyper-V

Linux virtual machines that will be deployed in a highly-available scenario (utilizing failover clustering) should be configured with static MAC addresses for each virtual network adapter. Because of the way Linux configures the network adapter, in certain versions of Linux, there is a possibility that the networking configuration will be lost after failover because a new MAC address is assigned to the virtual network adapter. To work around this issue, ensure that each virtual network adapter has a static MAC address. This can be configured by editing the settings of the virtual machine in Hyper-V Manager.