Using the Integrated Virtualization Manager with Linux on POWER

(Virtual I/O Server Version 1.3)

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July 2007

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Abstract

This white paper presents an overview of the functionality of the IBM Integrated Virtualization Manager (IVM), a new component of the Virtual I/O Server, which is included with the IBM Advanced Power Virtualization (APV) feature. With IVM, you can now manage partitions on an IBM POWER5 processor-based server without the Hardware Management Console (HMC). This white paper also lists some of the differences between the IVM and the HMC, and illustrates how to use IVM to create and manage Linux on POWER partitions.

Introduction

With IBM® POWER5™ and IBM POWER5+™ processor-based systems and the IBM Advanced POWER™ Virtualization (APV) feature, there are many opportunities for consolidation and simplification of the IT environment. It is possible to create multiple solutions that benefit from implementing virtualization. Some examples of solutions that improve by using virtualization are: server consolidation, rapid deployment, application development and testing, and support for multiple operating-system environments.

The Advanced POWER Virtualization hardware feature includes software, firmware and hardware enablement that, together, provide support for logical partitioning (LPAR), virtual LAN and virtual I/O. In addition, systems that feature the POWER5 processor can use IBM Micro-Partitioning™ technology, which provides the capability to configure up to 10 LPARs per processor.

A key component of APV is the Virtual I/O Server (VIOS), which provides sharing of physical resources between partitions — including virtual SCSI and virtual networking. This allows more efficient utilization of physical resources because they can be shared between partitions to facilitate server consolidation.

To exploit the capabilities of APV, a system-management interface is required. This function is often provided by the Hardware Management Console (HMC), which is a dedicated workstation that runs integrated system-management software. In some system installations, the HMC might not be necessary; or for other businesses, might not be a cost-effective solution.

The Integrated Virtualization Manager (IVM) is a browser-based management interface that you can use to manage a single IBM System p™ server. You can use it to create LPARs, manage the virtual storage and virtual Ethernet, and view service information that relates to the system. IVM provides the required system-management capabilities to small and midsized businesses, as well as larger businesses with distributed environments.

IVM is available as part of VIOS, starting with Version 1.2. VIOS firmware level GA6 (SF235) or later supports the functionality of IVM. When you install VIOS on a supported system that does not have an HMC present or previously installed, IVM is automatically enabled on that system. Therefore, IVM provides a simplified, cost-effective management solution for partitioning and virtualization.

This white paper illustrates how to set up and use IVM to create and work with Linux® partitions.

IVM overview

This section of the white paper provides an overview of IVM on POWER5 processor-based systems.

POWER5 processor-based system configurations

POWER5 processor-based systems are manufactured in the factory default, or unmanaged configuration. In this configuration, the system has a single predefined partition. This configuration allows you to use the system as a stand-alone server, with all of the resources allocated to the single partition.

After activating the virtualization feature, you can attach the HMC to the system's service processor to convert the unmanaged system into an HMC-managed system. An HMC-managed system can exploit virtualization and allow you to divide the system's resources across multiple LPARs.

When the system does not have an HMC, you can create an IVM-managed system that can still use the system's virtualization and LPAR capabilities. To convert the unmanaged configuration into an IVM-managed system, you install the VIOS in the first partition on the unmanaged system. This VIOS partition owns all the physical I/O resources of the system. You can then create client partitions by using the IVM interface. All the client partition I/O is virtualized through the VIOS.

IVM components

System administrators can work with LPAR configurations through the IVM Web browser or command-line interface. These interfaces help in managing and configuring the client partitions and the virtual I/O resources. The browser-based interface provides an intuitive, easy-to-use method of connecting to the VIOS partition of the managed system through standard network access. The command-line interface uses an interactive console, or a Telnet session, with the VIOS partition. Because IVM is not connected to the service processor; it uses a Virtual Management Channel (VMC) to communicate with the POWER5 Hypervisor.

Figure 1 depicts the VIOS and IVM components, along with their administration interfaces.

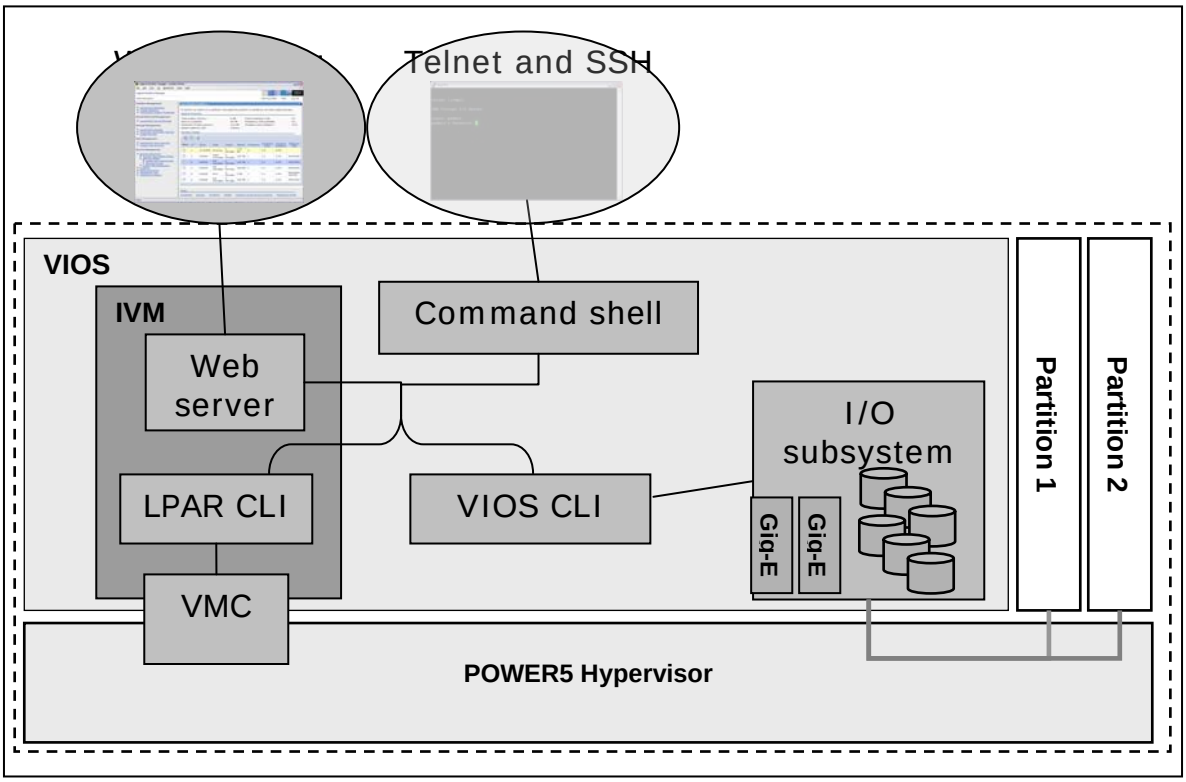

Figure 1. VIOS and IVM components

Partitions created in an IVM-managed system can use the following virtualization support:

- Shared-processor partitions or dedicated-processor partitions
- Micro-Partitioning support in shared-processor partitions, which provides shared-processor pool usage for capped and uncapped partitions
- Based on an uncapped weight, uncapped partitions can use idle processing units from a shared-processor pool
- Virtual Ethernet support, allowing LPARs to share a physical Ethernet adapter
- Virtual networks with bridges between the virtual networks and the physical Ethernet adapters
- Virtual SCSI support, allowing LPARs to share a physical SCSI adapter
- Assignment of physical disks, partial disks or external logical-unit numbers (LUNs) to client partitions
- Virtual-optical support, allowing LPARs to share a CD or DVD drive
- Virtual-console support, with virtual-terminal console access from the VIOS partition

IVM limitations

IVM provides a subset of the HMC functionality. You should carefully consider business needs when deciding whether to deploy IVM or an HMC. Using IVM includes some of the following limitations:

- Full dynamic-LPAR support is only available for the VIOS partition.
- The VIOS partition owns all the physical I/O.
- There is no support for redundant or multiple VIOS partitions.
- Client partitions can have a maximum of two virtual Ethernet adapters,
- Client partitions can have only one virtual SCSI adapter.
- There is no provision for call-home service support.

As seen by some of these limitations, there are instances where an HMC-managed system might be required or more desirable. Some examples of these instances include systems that need complex LPARs, client partitions with dynamic-LPAR support or dedicated physical-I/O adapters, redundant VIOS support and complete HMC-based service support.

Appendix A provides a table that compares IVM with HMC.

Before you begin

This white paper assumes that you have a working knowledge of the Linux operating system and POWER5 processor-based server hardware, as well as partitioning and virtualization concepts. To set up and use IVM to create a Linux solution requires the following system and software components:

1. One of the following POWER5 processor-based servers:
   - IBM System p5™ 505, 520 or 550 model
   - IBM eServer™ p5 510, 520 or 550 model
   - System microcode version SF235_160, or later
     Notes:
     a. You can download the microcode update-files CD-ROM image from http://techsupport.services.ibm.com/server/mdownload/cdimage.html
     b. If a diagnostic CD is needed to install the new firmware level, you can download the stand-alone diagnostics CD-ROM image from http://techsupport.services.ibm.com/server/mdownload/diags

2. The virtualization feature for the System p server (see Table 1):

    - The Advanced POWER Virtualization feature

System	MTM	Virtualization feature number
System p5 505 Express	9115-505	7432
eServer p5 510 and 510 Express	9110-510	7432
eServer p5 520 and 520 Express	9111-520	7940
System p5 520 Express	9131-52A	7940
eServer p5 550 and 550 Express	9113-550	7941
System p5 550 Express System p5 550Q Express	9133-55A	7941

Table 1. Virtualization feature numbers per system

3. Virtual I/O Server Version 1.2 or later installation CD
4. One of the following supported Linux distributions:

    - SUSE Linux Enterprise Server 9 for POWER (SLES9)
    - Red Hat Enterprise Linux AS 3 for POWER (RHEL3), Update 2 or later
      Note: RHEL3 is not supported on System p5 Express servers.
    - Red Hat Enterprise Linux AS 4 for POWER (RHEL4)

5. A PC with a serial-terminal application (for example, Linux Minicom or Microsoft® Windows® HyperTerminal) or a serial terminal
6. A 9-pin serial-crossover connection (null-modem) cable
7. One of the following network-connected Web browser:

    - Netscape 7.1, or later
    - Microsoft Internet Explorer 6.0, or later
    - Mozilla 1.7.x
    - Firefox 1.0, or later

Setting up and configuring an IVM-managed system

The setup and configuration of an IVM-managed system requires a serial-terminal application (for example, Minicom on Linux or HyperTerminal on Windows) running on a PC that is plugged into the system's serial port **1** by a 9-pin serial-crossover or null-modem cable. In addition, you need to connect the flexible-service processor (FSP) Link HMC1 Ethernet connection to your network. With the following steps, you can initialize the FSP and install the VIOS.

Note: The following setup steps assume that the system is in the manufacturer's default configuration or in an unmanaged system state. If necessary, you can reset the system to the manufacturer's default configuration by using the service processor's System Service Aids menu, Factory Configuration option.

Initializing the service processor

To initialize the service processor, perform the following steps:

1. Set the terminal application's connection to **19200** bits per second, **8** data bits, no parity and **1** stop bit.
2. Power on the system and press a key on the terminal to receive the service-processor prompt.
3. Log in with the user ID *admin* and the default password *admin*. When prompted to change users' passwords, change the admin password.
4. From **Network Services** -> **Network Configuration** -> **Configure interface Eth0**, set the static mode, IP address and subnet mask. Optionally, you can also set other interface settings (see Figure 2).

```
MAC address: 00:02:55:2F:FC:04
Type of IP address: Static

 1. Host name (Currently: OP710)
 2. Domain name (Currently: company.com)
 3. IP address (Currently: 10.10.10.109)
 4. Subnet mask (Currently: 255.255.255.0)
 5. Default gateway (Currently: 10.10.10.1)
 6. IP address of first DNS server
 7. IP address of second DNS server
 8. IP address of third DNS server
 9. Save settings
98. Return to previous menu
99. Log out

S1>
```

Figure 2. Configuring the interface

5. Select **Save settings** and confirm the changes to reset the service processor.
6. Open a Web browser and connect to the IP address that is set on the FSP by using the HTTPS protocol, for example, https://10.10.10.109. The Advanced Systems Management interface (ASMI) is then displayed.

   You can now access the ASMI from either the serial console or the Web interface. The following steps illustrate how to set the date and time, and how to enable system virtualization through the Web ASMI. You can perform the same tasks using the FSP menu through the serial console. It is

recommended that you use the Web interface to access the ASMI to perform FSP-related tasks for the following reasons:

- To access the FSP menus through the serial console, the system must be in power-off state while the FSP is powered on.
- To use the FSP menus, you must be physically near the system because of the requirement for a connection to a PC through a serial-connection (null-modem) cable.
- It is more convenient to use the Web interface to access the ASMI, and to use the serial console to bring up the System-Management Services (SMS) menus to install the VIOS.

7. Log in to the ASMI with user ID *admin* and the newly changed password, as shown in Figure 3.

Figure 3. ASMI login page

8. In the navigation area, select **System Configuration** -> **Time Of Day**. Enter the date and time based on the UTC time. Click **Save Settings** (see Figure 4).

   Note: You can find the current UTC time at http://tycho.usno.navy.mil/cgi-bin/timer.pl.

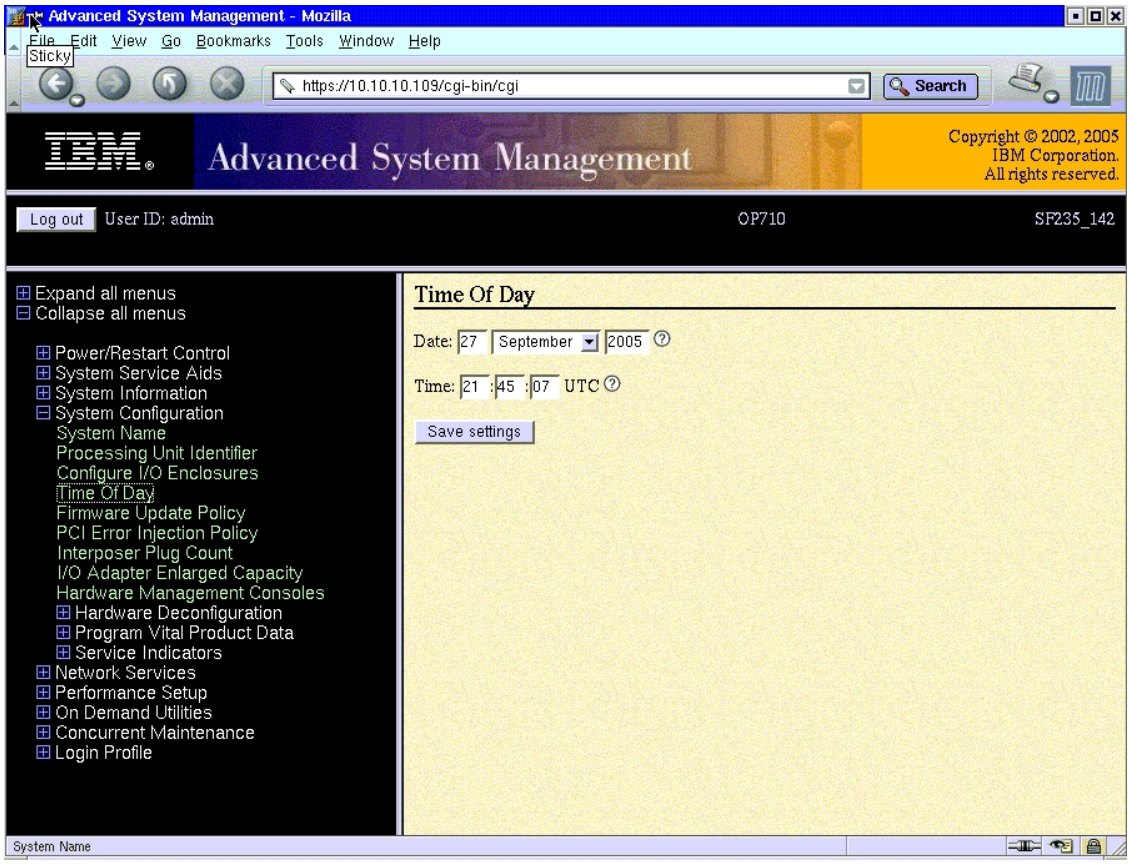

Figure 4. Setting the system configuration – time of day

9. Select **Power/Restart Control** -> **Power On/Off System**. In the **Boot to system server firmware** pull-down menu, select **Standby**, and click **Save settings and power on** (see Figure 5).

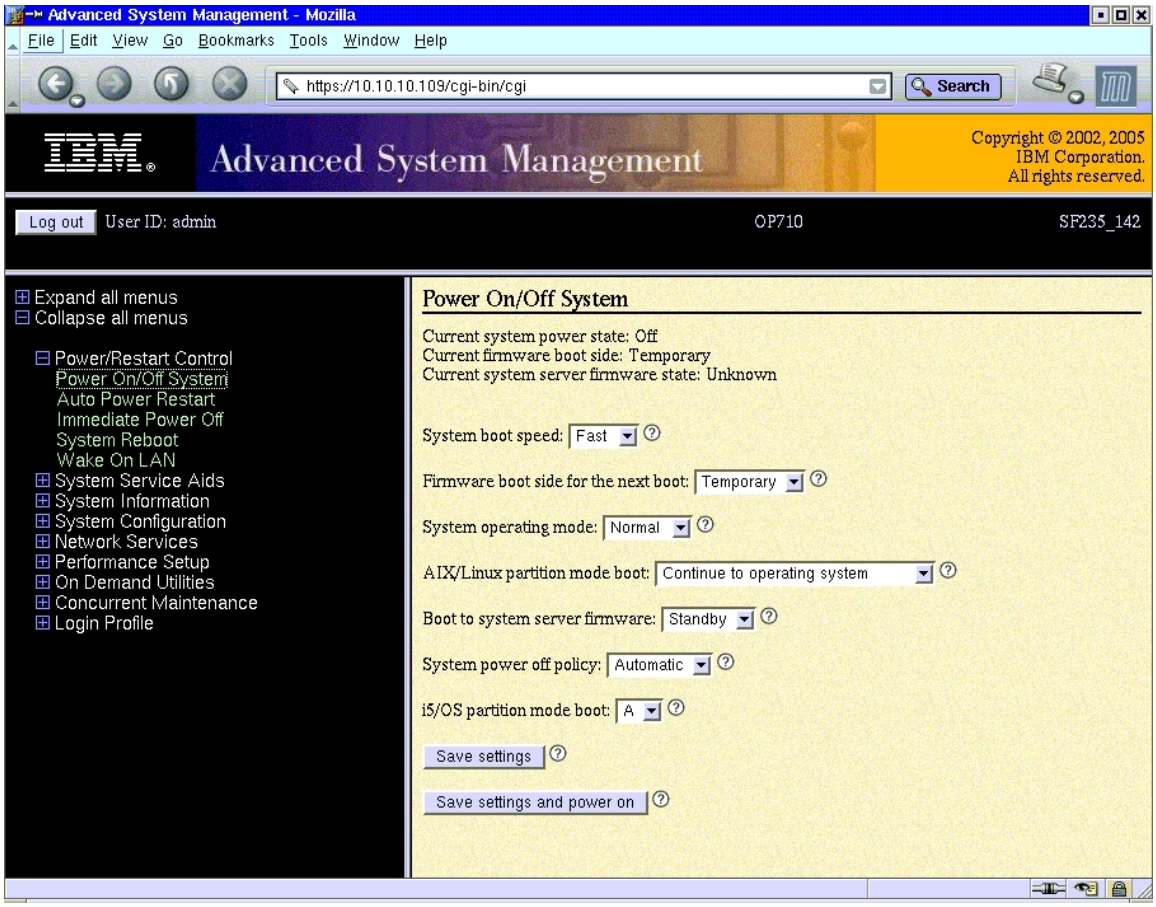

Figure 5. Powering on to boot system-server firmware in standby mode

10. Wait several minutes for the system to power on. If you redisplay the Power On/Off System page, the current system-server firmware state must be at standby. Select **On Demand Utilities** -> **CoD Activation**. Enter your CoD activation code for the Advanced Power Virtualization feature and click **Continue** (see Figure 6).

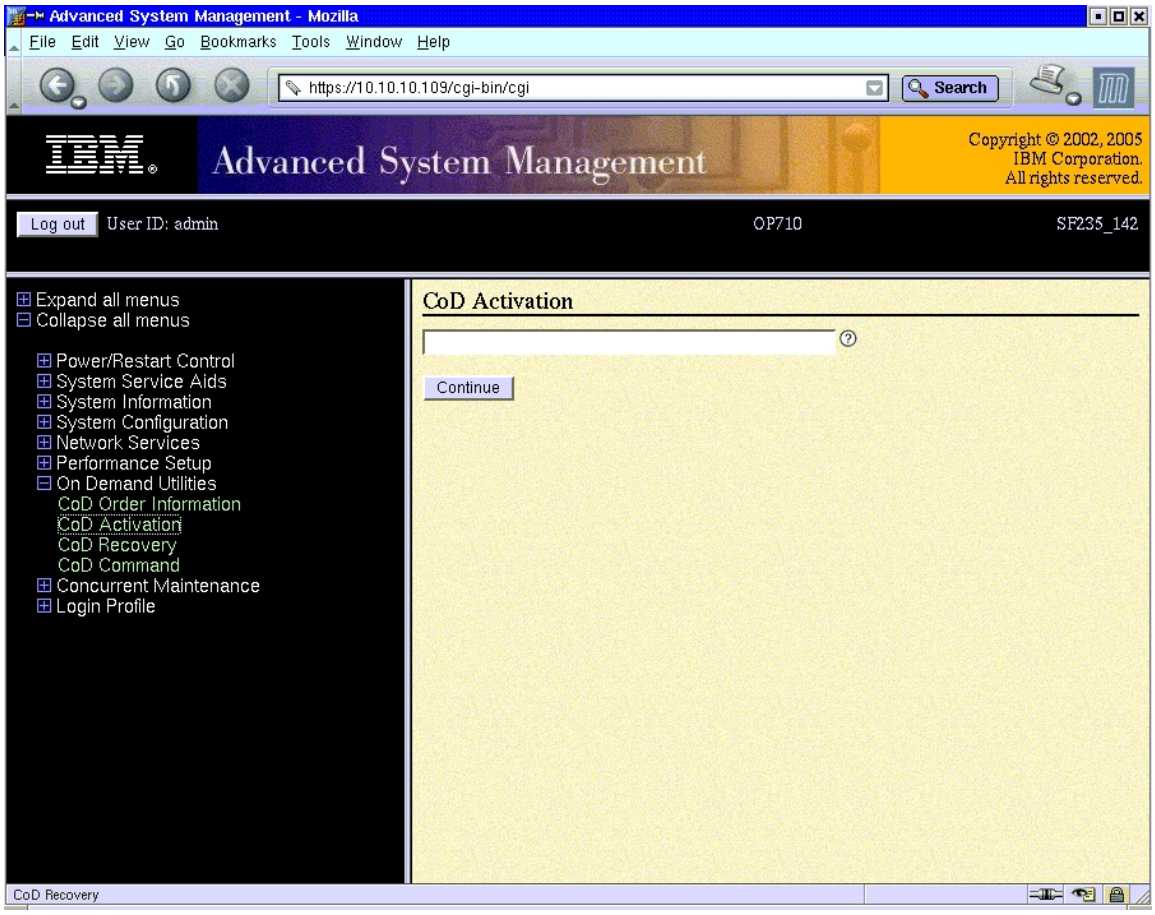

Figure 6. Entering the CoD activation code

Installing the Virtual I/O Server

Now that you have set up the FSP, you can install and configure VIOS. Again, this requires the use of the serial-terminal application on the PC that is connected to the system's serial port:

1. Insert the VIOS Version 1.2 disk into the system CD/DVD drive.
2. From the ASMI Web interface, select **Power/Restart Control -> Power On/Off System**.
3. Select **Running for Boot to system server firmware**, and click **Save settings and power on**.
4. Wait for the prompt on the serial terminal and then press 0 to select the active console.
5. Wait for the boot screen to appear on the serial console. Press 1 after the word *Keyboard* is displayed, to go to the SMS (System Management Services) menu (see Figure 7).

```
IBM IBM IBM IBM IBM IBM IBM IBM IBM IBM IBM IBM IBM IBM IBM IBM IBM IBM IBM IBM IBM IBM IBM IBM
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          1 = SMS Menu                          5 = Default Boot List
          8 = Open Firmware Prompt              6 = Stored Boot List

     Memory      Keyboard      Network      SCSI      Speaker
```

Figure 7. Selecting 1 to go to the SMS menu

6. Enter the *admin* user account's password when prompted for it.
7. After the SMS main menu is displayed, select the following SMS options: **Select Boot Options -> Select Install/Boot Device -> List all Devices -> IDE CD-ROM** (use the SCSI CD-ROM if the drive is a SCSI CD or DVD drive).
8. Select **Normal Mode Boot** and then select **Yes** to exit SMS.

9. The system begins to boot the VIOS disk image. After several minutes (possibly a longer time on some systems with many I/O devices), The Welcome to the Virtual I/O Server boot-image information is displayed. When asked to define the system console, enter the number that is displayed as directed, the number **2** in this example (see Figure 8).

```
******* Please define the System Console. *******

Type a 2 and press Enter to use this terminal as the
  system console.
Pour definir ce terminal comme console systeme, appuyez
  sur 2 puis sur Entree.
Taste 2 und anschliessend die Eingabetaste druecken, um
  diese Datenstation als Systemkonsole zu verwenden.
Premere il tasto 2 ed Invio per usare questo terminal
  come console.
Escriba 2 y pulse Intro para utilizar esta terminal como
  consola del sistema.
Escriviu 1 2 i premeu Intro per utilitzar aquest
  terminal com a consola del sistema.
Digite um 2 e pressione Enter para utilizar este terminal
  como console do sistema.
```

Figure 8. Defining the system console

10. Enter **1** to select *English* during the installation.
11. When asked for the installation preferences, enter **1** to select Start Install Now with Default Settings.
12. On the System Installation Summary screen, ensure that hdisk0 is the only disk selected and enter **1** to continue with the installation. The installation progress is displayed. (See Figure 9.)

```
                    Installing Base Operating System


       Please wait...




       Approximate     Elapsed time
    % tasks complete   (in minutes)

         57               18      67% of mksysb data restored.
```

Figure 9. Screen that shows the progress of the VIOS installation

13. After the installation has been completed, the system reboots. Log in as user *padmin* with the default password *padmin*. When prompted, change the password.
14. Enter the `license –view` command to read the VIOS license agreement. Then, enter the `license –accept` command to accept the license.
15. Create the VIOS virtual Ethernet interfaces with the `mkgencfg -o init` command.

16. Enter `lsdev | grep ent` to find the Ethernet interfaces to use for the server's external connections to the network. The two interfaces that are marked with 2-Port 10/100/1000 Base-TX PCI-X Adapter (ent0 and ent1) are the onboard Ethernet adapters. (See Figure 10.)

```
$ lsdev |grep ent
ent0            Available  2-Port 10/100/1000 Base-TX PCI-X Adapter (1410890
ent1            Available  2-Port 10/100/1000 Base-TX PCI-X Adapter (1410890
ent2            Available  Gigabit Ethernet-SX PCI-X Adapter (14106802)
ent3            Available  Gigabit Ethernet-SX PCI-X Adapter (14106802)
ent4            Available  Virtual I/O Ethernet Adapter (l-lan)
ent5            Available  Virtual I/O Ethernet Adapter (l-lan)
ent6            Available  Virtual I/O Ethernet Adapter (l-lan)
ent7            Available  Virtual I/O Ethernet Adapter (l-lan)
ibmvmc0         Available  Virtual Management Channel
$
```

Figure 10. Listing of the available Ethernet interfaces

17. Enter the *mktcpip* command to configure the network interfaces for the Ethernet adapters that the VIOS will use. In this example, the network cable plugs into the ent0 adapter and connects to the 10.10.10.0 network. The en0 interface, which is the corresponding VIOS network interface for the physical Ethernet device ent0, is configured with the IP address 10.10.10.110. (See Figure 11.)

```
$ mktcpip -hostname IBMOP_VIO -inetaddr 10.10.10.110 -interface en0 -netmask 255.255.255.0 \
-gateway 10.10.10.1 –start
```

Figure 11. Using the mktcpip command to configure network interfaces

18. Optionally, you can do further customization of the VIOS at this point. In addition, the system is now ready for use as an IVM-managed system through the IVM Web interface.

Using IVM to create a Linux partition

Now that you have installed and configured VIOS, you can use IVM to manage the system and its resources. When creating a partition, you must first allocate storage for the partition. This storage becomes a virtual disk for a Linux partition. You can then use a wizard to create a partition. Finally, you can install a Linux distribution into that partition from either a network or a CD.

Creating a default storage pool and space for a virtual disk

This section demonstrates an installation that is driven from a CD.

1. Open a Web browser that has network access to the Ethernet adapter that you configured for the VIOS and point it to the IP address for the VIOS (in this example, the IP address is http://10.10.10.110). Log in to IVM using the *padmin* user ID and the password that you created for padmin (see Figure 12).

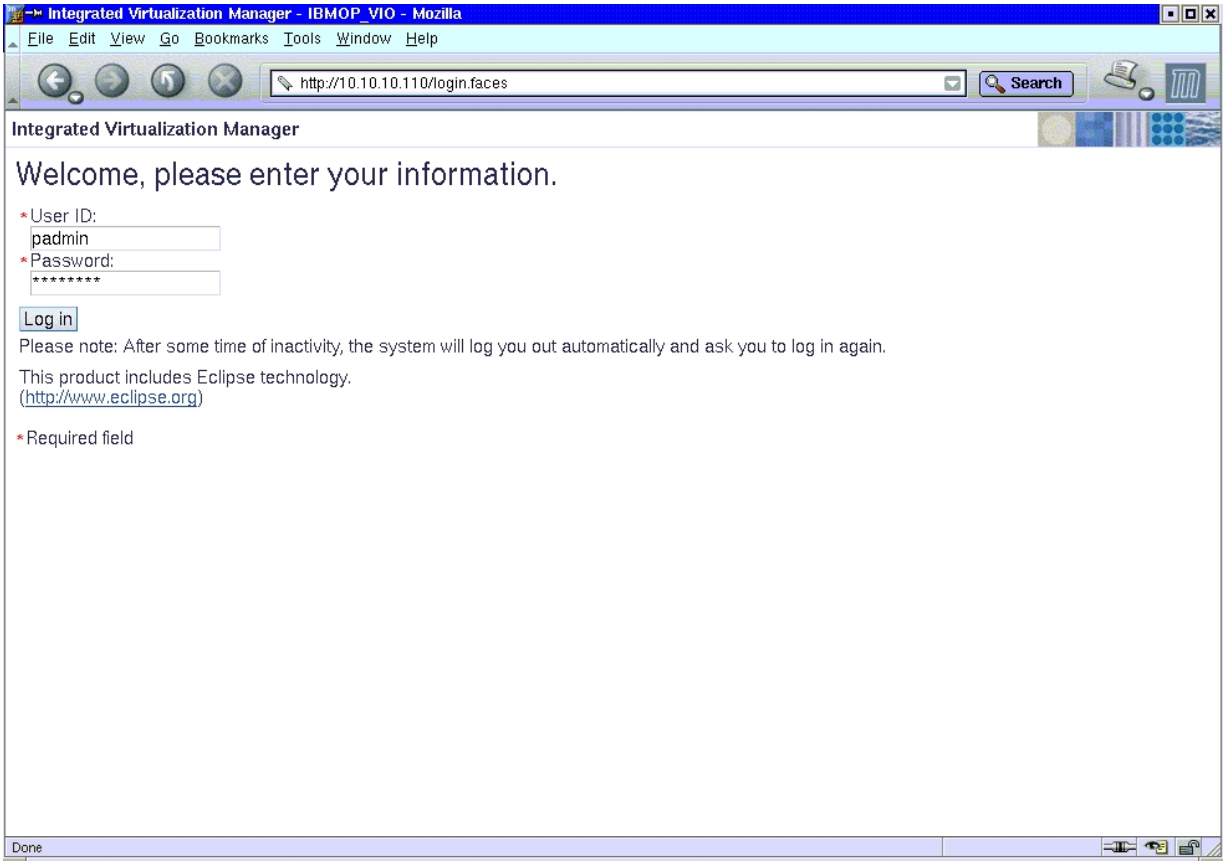

Figure 12. Entering a user ID and password for the IVM

2. The IVM View/Modify Partitions page is displayed. Examine the System Overview information and the Partition Details section of this page. Look carefully to see that the only partition currently displayed is the VIOS partition, with a default partition name that is based on the system's serial number (see Figure 13).

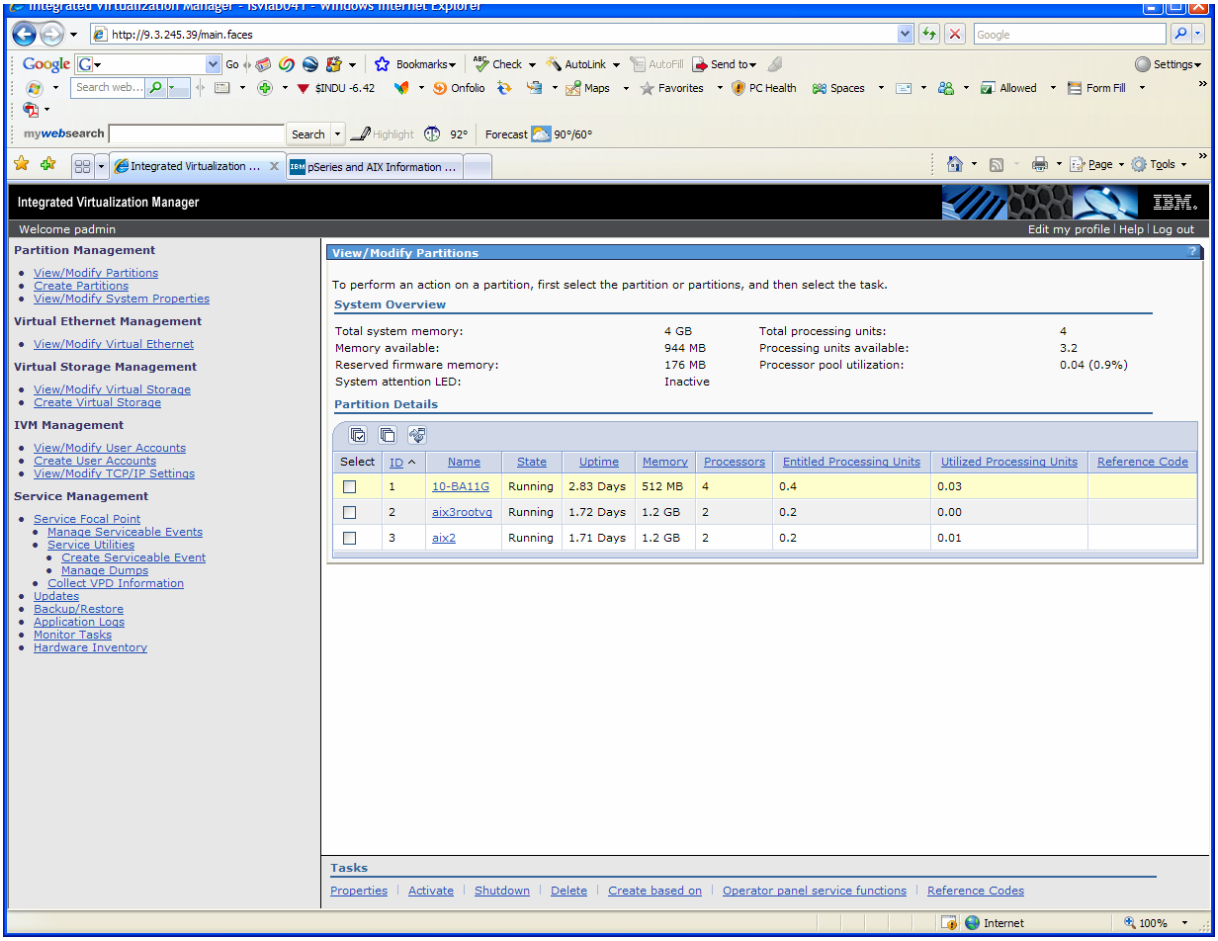

Figure 13. Viewing the IVM View/Modify Partitions page

3. When creating a partition, you must allocate storage for the partition. This storage comes from a shared storage pool, which the VIOS manages. The default storage pool is set as rootvg. When the VIOS is installed, rootvg is set to hdisk0, which is the same disk that contains the VIOS. On systems with several disks, it is a good practice to create a new storage pool and define it as the default storage pool. Refer to Appendix B for more information on the use of the storage pool and advanced storage configurations.

   To create a storage pool with other drives on the system, in the navigation area of the Virtual Storage Management menu, click **Create Virtual Storage**. Then, click **Create Storage Pool** (see Figure 14).

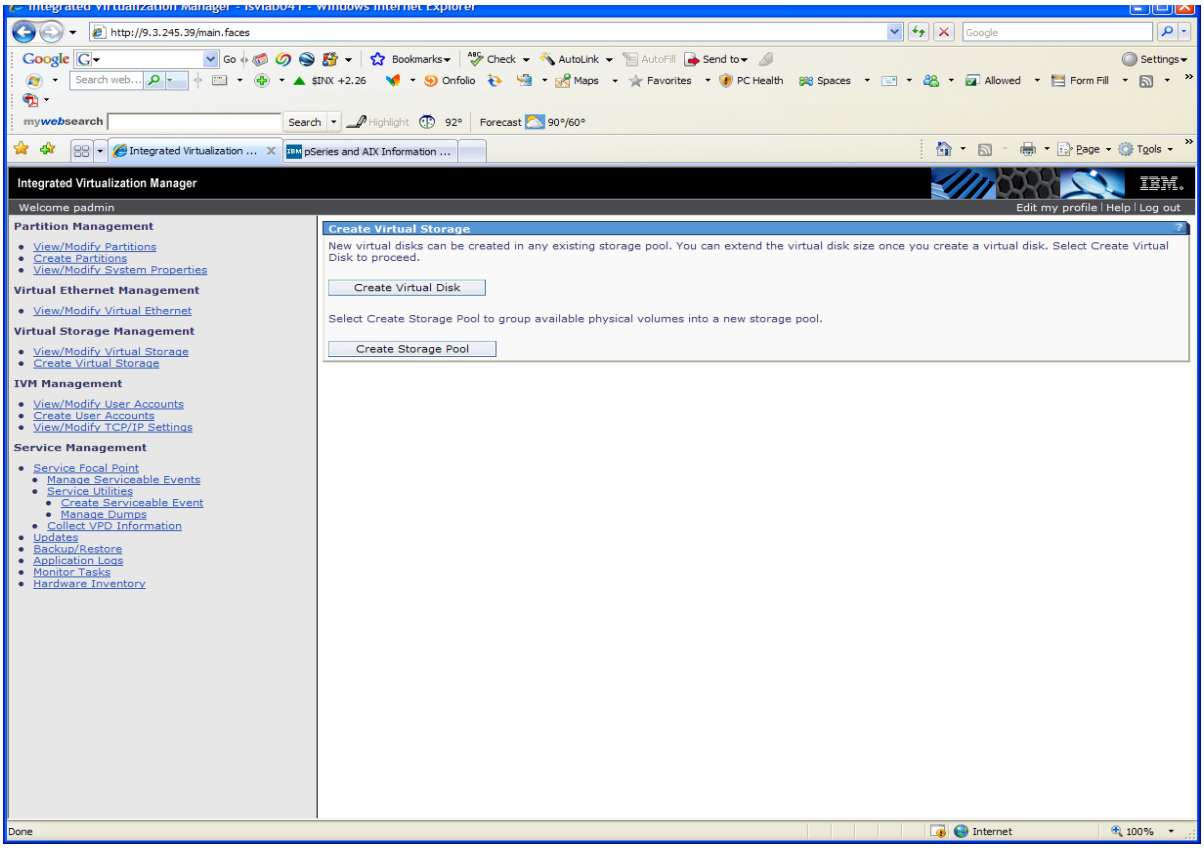

Figure 14. Creating a storage pool with other drives on the system

4. From the Create Storage Pool window, enter a storage-pool name (for example, LinuxPoolvg). Select **hdisk5** and **hdisk6** (as an example). Click **OK** to create the pool (see Figure 15).

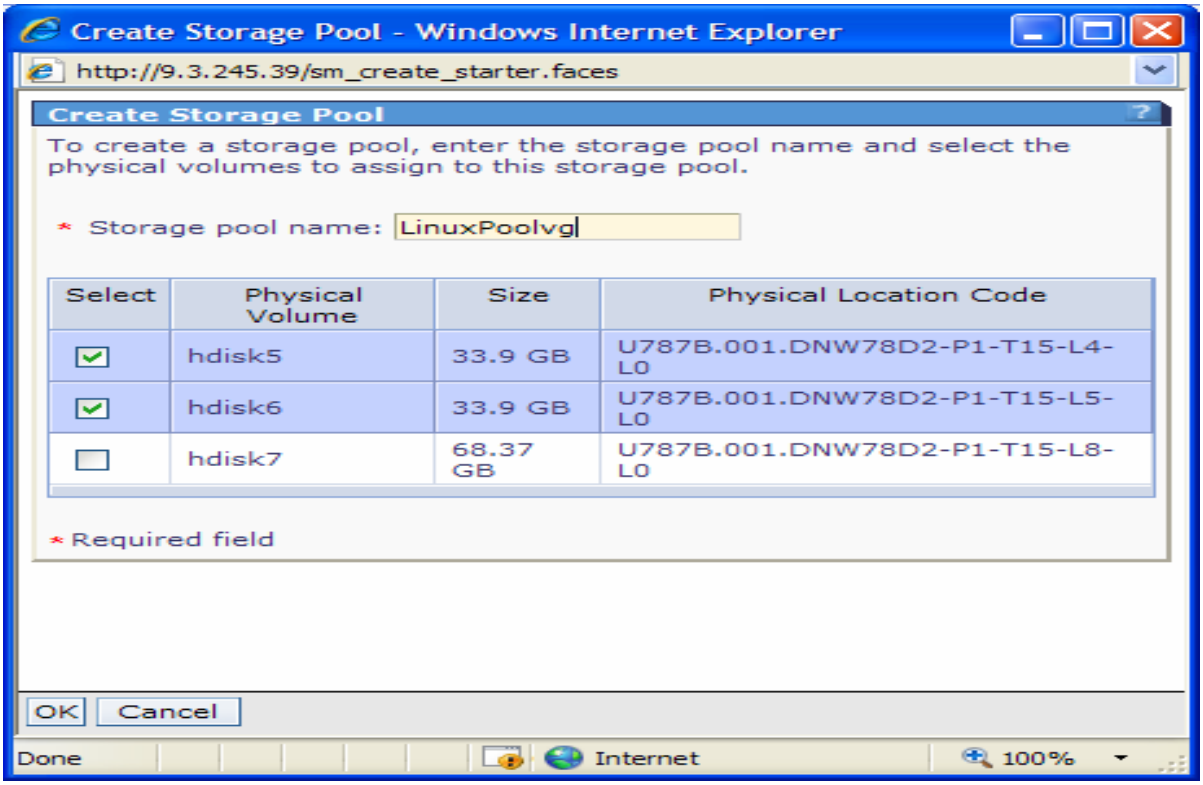

Figure 15. Entering a storage-pool name and selecting disk drives

5. From the **Virtual Storage Management** menu, click **View/Modify Virtual Storage**. Then, on the **Storage Pools** tab, select **LinuxPoolvg**. At the bottom of the page, click the **Assign as default storage pool** task (see Figure 16).

6. Click **OK** to confirm that you want to assign as this storage pool as the default storage pool.

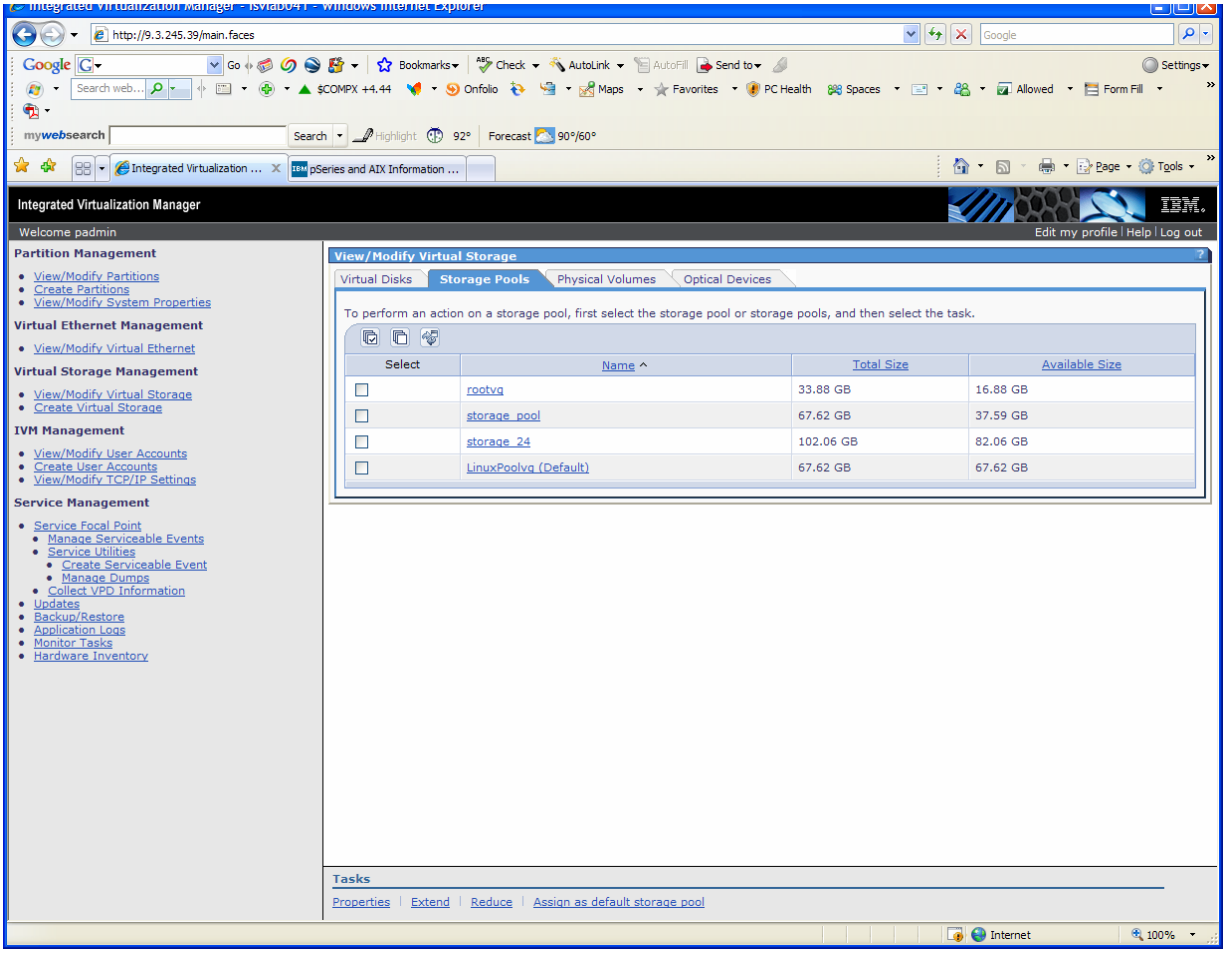

Figure 16. Assigning a default storage pool

7. From the Virtual Storage Management menu, click **Create Virtual Storage**. Then, click **Create Virtual Disk** (see Figure 17).

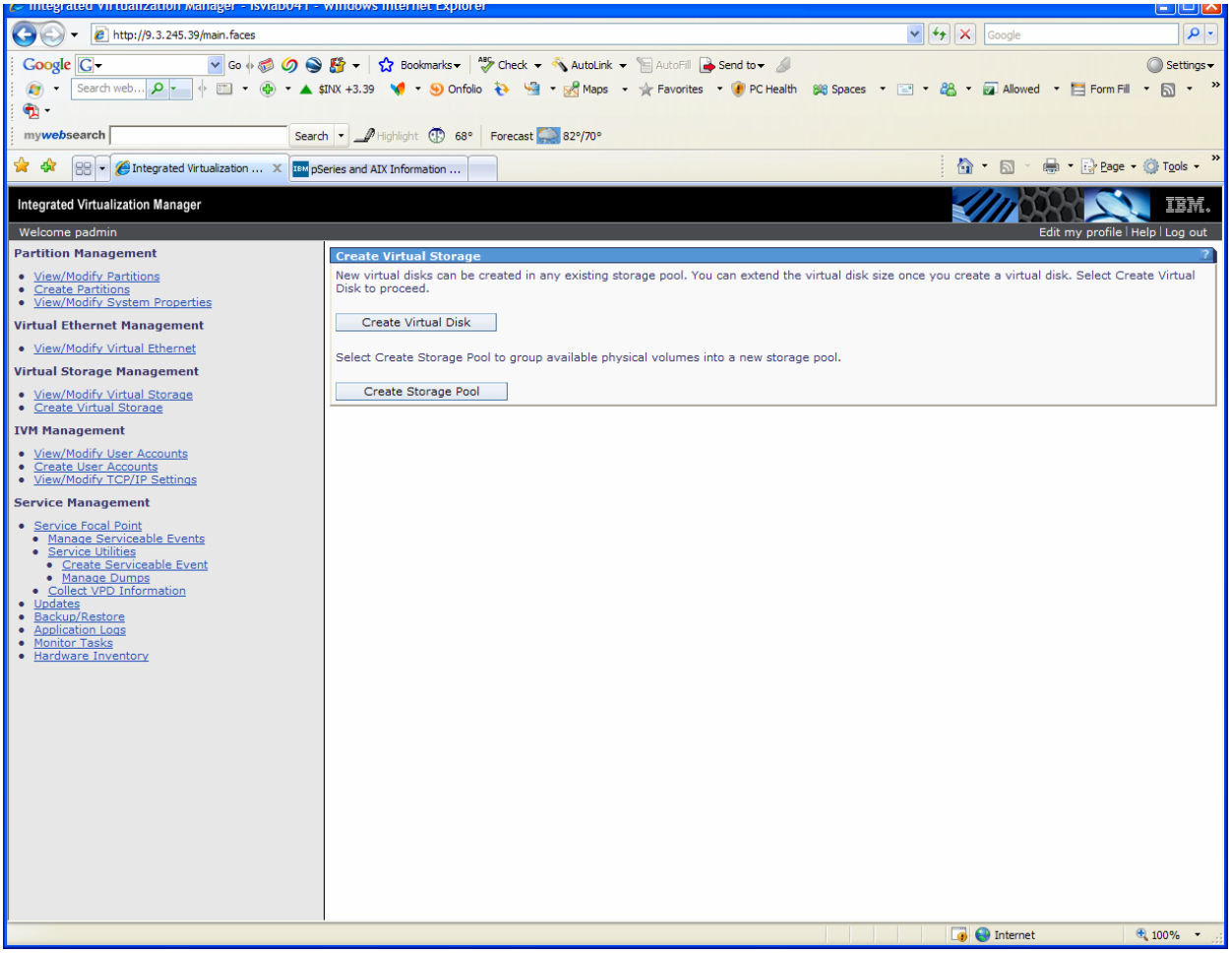

Figure 17. Creating a virtual disk

8. On the Create Virtual Disk window, enter the Virtual Disk Name **Linux01LV**, select the Storage Pool Name **LinuxPoolvg**, enter Logical Volume Size **20**, and select **GB**. Then, click **OK** (see Figure 18).

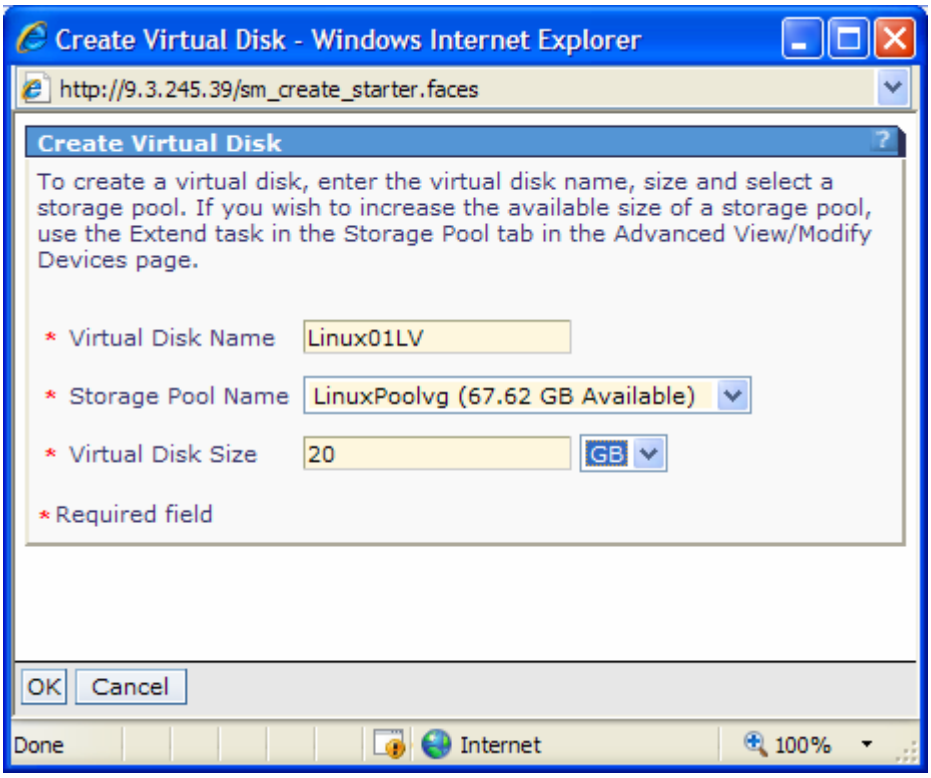

Figure 18. Defining the virtual disk

9. From the **View/Modify Virtual Storage** page, you can now see the newly created Linux01LV volume (see Figure 19)

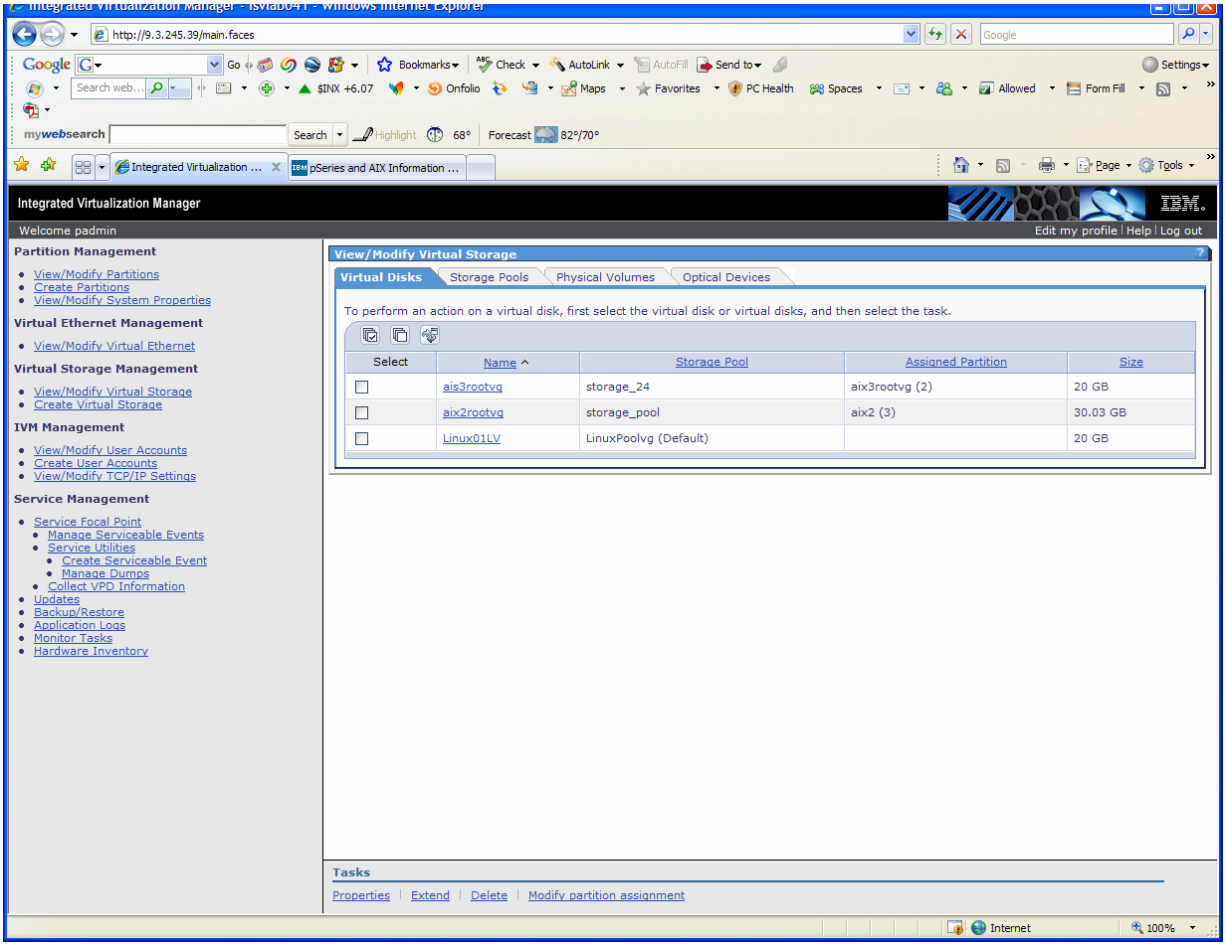

Figure 19. Verifying the creation of the new virtual-disk volume

Creating the Linux partition

Now, you can create the Linux partition that will use the newly defined virtual disk.

1. You create the Linux partition by using the Create Partition wizard. From the Partition Management menu, click **Create Partitions**. Then, click **Start Wizard** (see Figure 20).

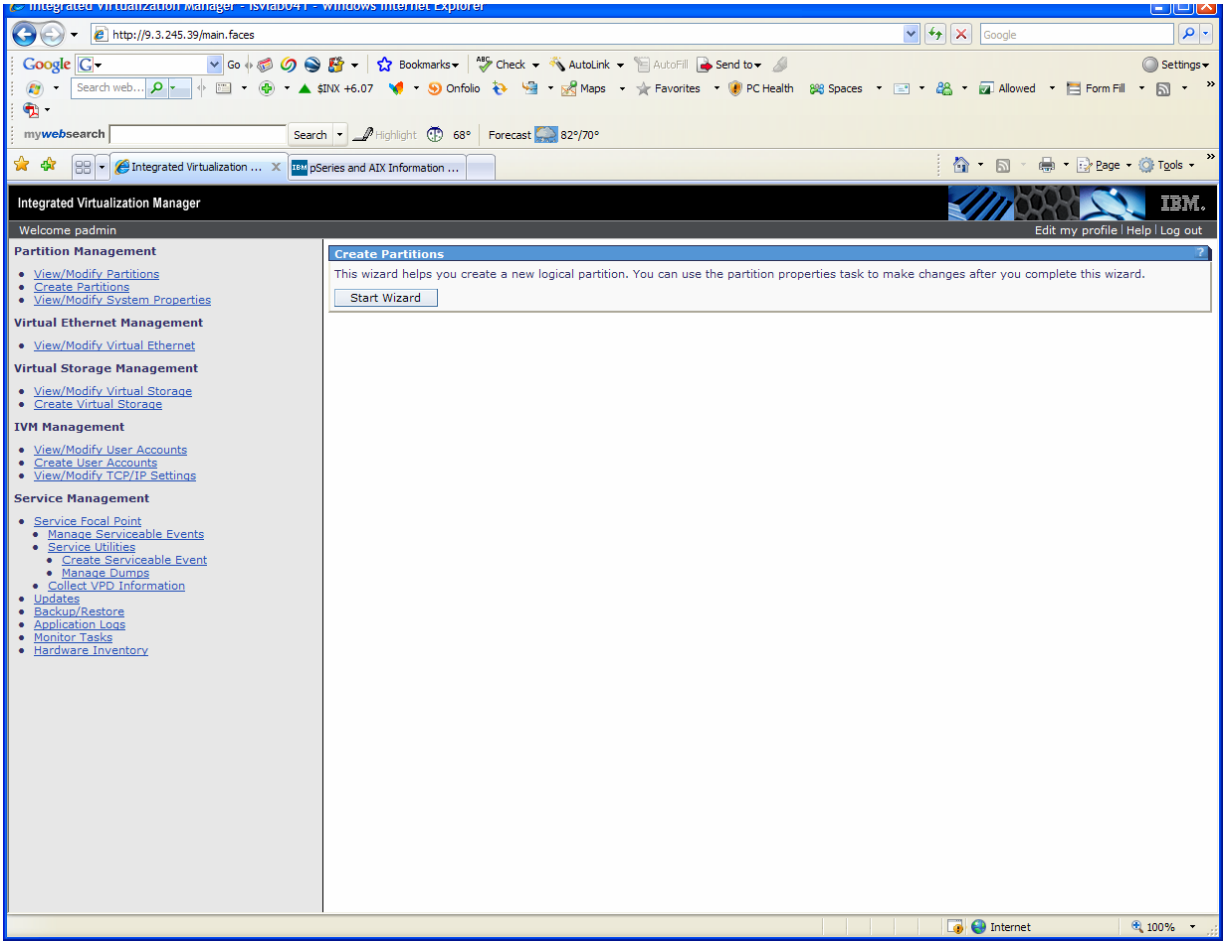

Figure 20. Starting the Create Partition wizard

2. The Create Partition Wizard window opens.

   a. On the Create Partition: Name window, enter Partition name **Linux01**. Click **Next**.

   b. On the Create Partition: Memory window, enter Assigned memory **768** and select **MB**. Click **Next**.

   c. On the Create Partition: Processors window, select Assigned processors **2** and select **Shared**. Click **Next**.

   d. On the Create Partition: Virtual Ethernet window, select Virtual Ethernet **1** for Adapter 1. Click **Next**.

   e. On the Create Partition: Storage Type window, you can either create a virtual disk from the default storage pool, or assign an existing virtual disk (or a physical volume). To use the 20 GB Linux01LV logical volume that was created in this example, select **Assign existing virtual disks and physical volumes**. Click **Next**.

   f. On the Create Partition: Storage window, select the available virtual disk **Linux01LV**. Click **Next**.

   g. On the Create Partition: Optical window, to assign the DVD drive to this partition, select **cd0**. Click **Next**.

   h. Review the Create Partition: Summary window. Then, click **Finish** (see Figure 21).

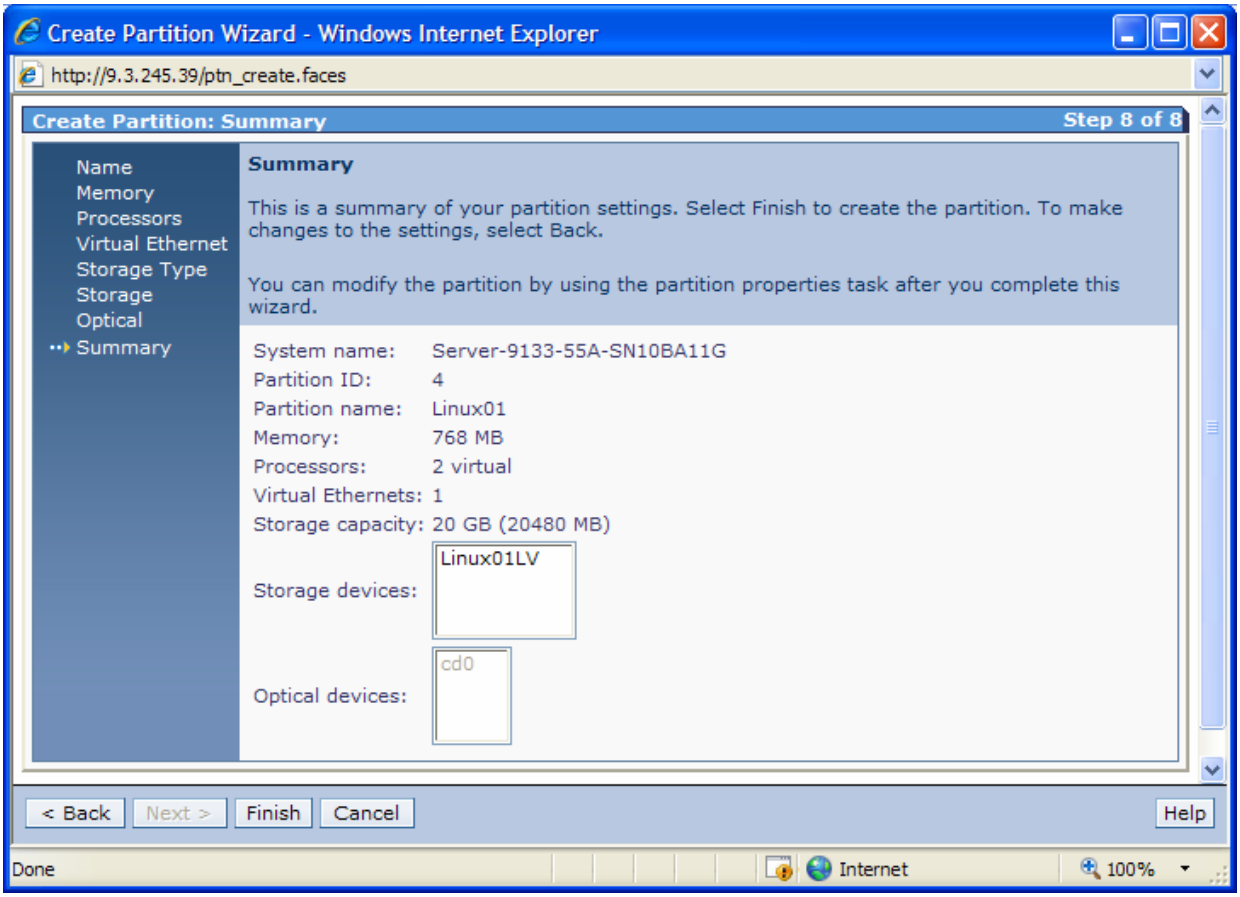

Figure 21. Completing the Create Partition wizard

3. The IVM View/Modify Partitions page now contains the Linux01 partition (see Figure 22).

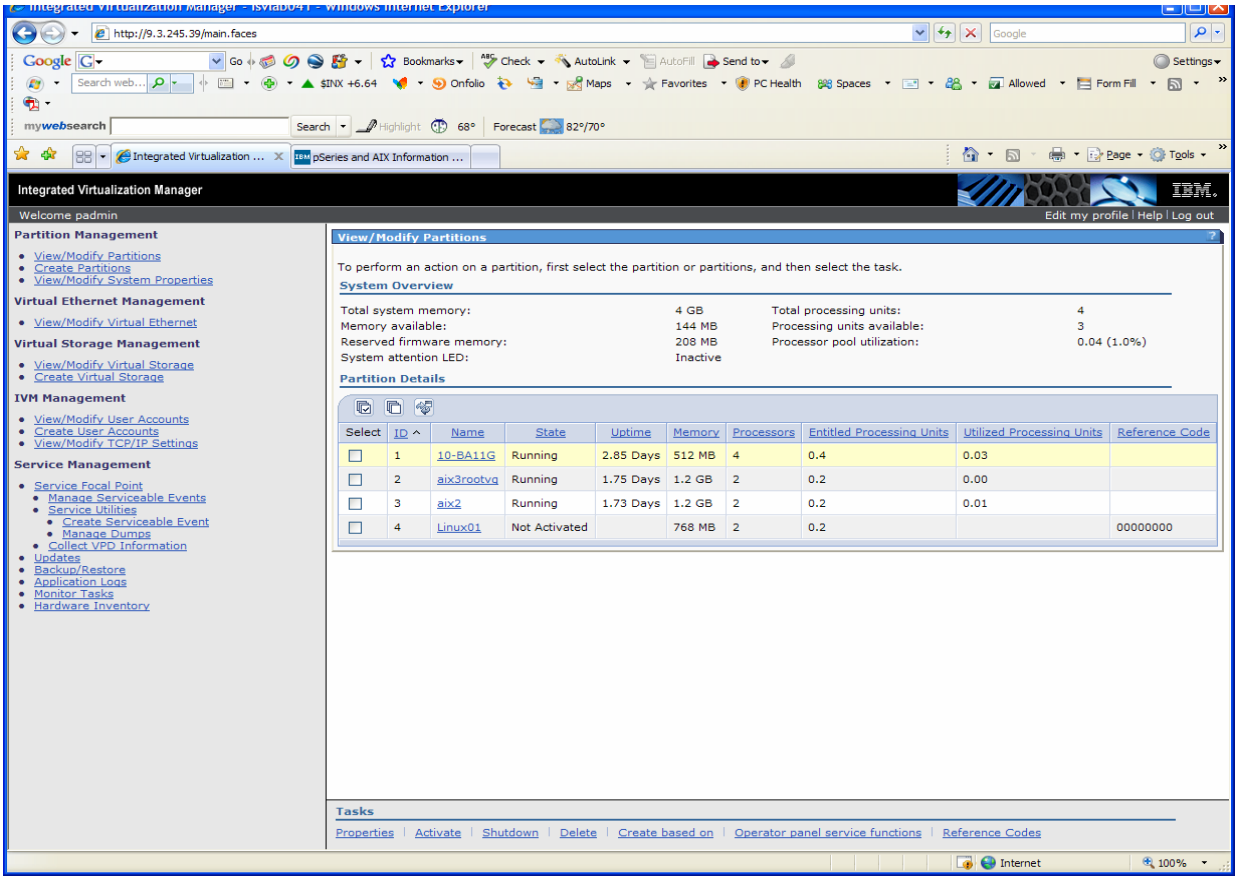

Figure 22. Verifying the creation of the new Linux01 partition

4. A virtual Ethernet bridge is required to provide access from the partition's virtual Ethernet to the external network. From the Virtual Ethernet Management menu, click **View/Modify Virtual Ethernet**. Click the **Virtual Ethernet Bridge** tab. For Virtual Ethernet ID 1, select the Physical Adapter **ent0**. Click **Apply** (see Figure 23).

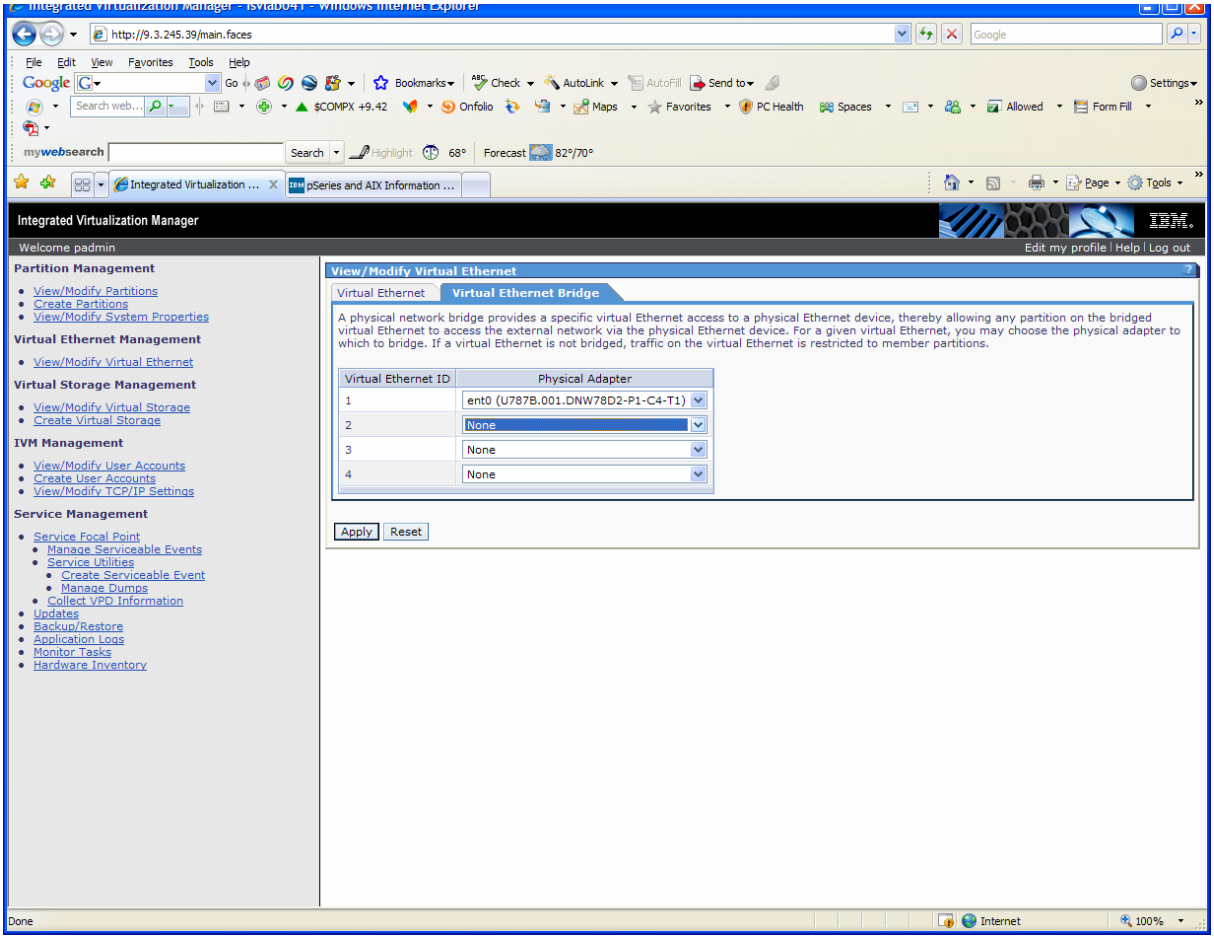

Figure 23. Creating a virtual Ethernet bridge

Installing Linux into the partition

Now, you can install the Linux distribution into the newly created Linux partition.

1. To install Linux, insert the Linux distribution installation CD in the CD/DVD drive.
2. Start a virtual console running in the VIOS.
3. Telnet to 10.10.10.110 and log in as *padmin*.
4. Enter the `mkvt –id <partition ID>` (partition ID for the Linux01 partition) command. The console then waits until the partition is activated (see Figure 24).

```
# telnet 10.10.10.110
Trying 10.10.10.110...
Connected to 10.10.10.110.
Escape character is '^]'.

telnet (IBMOP_VIO)

IBM Virtual I/O Server

login: padmin
padmin's Password:
Last login: Wed Sep 28 15:34:44 CDT 2005 on /dev/pts/0 from
10.10.10.20
$ mkvt -id 2
```

Figure 24. Starting a virtual terminal console

3. You can now install Linux by activating the partition and using SMS from the virtual console. From IVM Partition Management menu's *View/Modify Partitions*, select the partition **Linux01**. Then click **Activate** (see Figure 25).

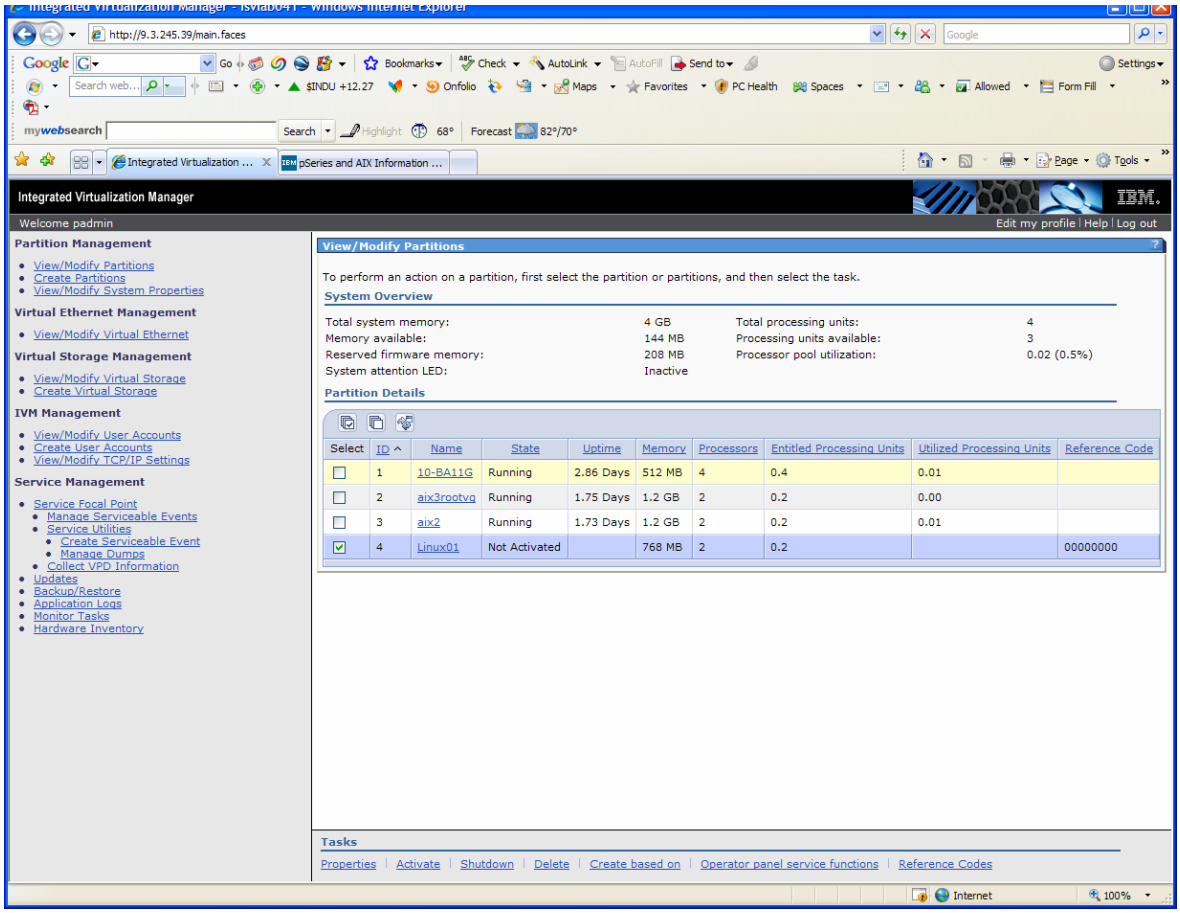

Figure 25. Activating the partition where you will install Linux

4. On the Activate Partitions page, click **OK**.
5. Switch back to the Telnet session with the virtual console. As the partition boots, press 0 to select this session as the console.
6. Wait for the boot screen to appear on the virtual console. Press 1 after the word *Keyboard* is displayed, to go to the SMS menu.
7. After the SMS main menu is displayed, select the following SMS options:

   Select Boot Options -> Select Install/Boot Device -> List all Devices -> SCSI CD-ROM

   Note: Even if the physical drive is an IDE DVD drive, the virtual optical driver reports it to SMS and Linux as a SCSI CD/DVD drive.
8. Select **Normal Mode Boot**, followed by **Yes** to exit SMS.
9. The system begins to boot the Linux installation CD. At this point, you can proceed with the standard Linux installation process.
10. After the installation has been completed, close the virtual console by entering **~.** (tilde period).

    Note: You can force a virtual console to close from the VIOS with the `rmvt –id <partition id>` command (for example, `rmvt –id 2`).
11. Now that Linux is running in the partition, the IVM View/Modify Partitions page displays a status of *Running* and will also display a *Linux ppc64* indicator as a reference code for the Linux01 partition.

    Note: The Linux ppc64 indicator is dependent on the particular Linux distribution that is installed.

Modifying partition resources

You can now use IVM to modify the system resources that are available to the partitions. You can dynamically define the memory and the processing resources for the VIOS (partition ID 1) by selecting the Partition Management menu's View/Modify Partitions page, and then selecting **Properties**. Figure 26 is an example of using the Properties task to modify the processing units' assigned setting for the VIOS partition.

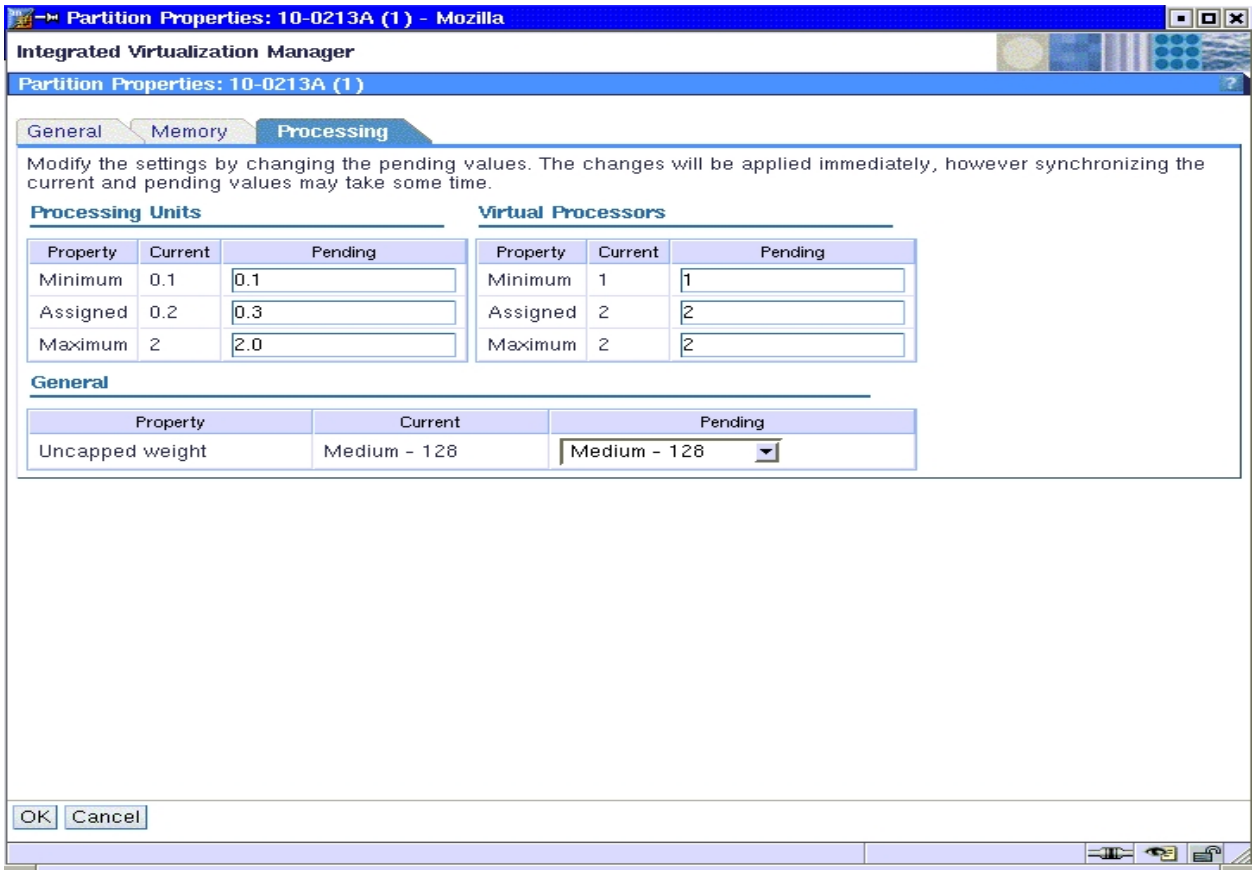

Figure 26. Using the IVM Properties task to modify the assigned processing units for the VIOS partition

You can also modify the resources for the Linux partition from the Partition Management menu's View/Modify Partitions - properties task. IVM also provides support for making dynamic LPAR changes to the partition's memory and processing capacity. However, to make virtual Ethernet changes on the Properties task, you must reboot the partition. Figure 27 is an example of changing the assigned processing units for a Linux partition.

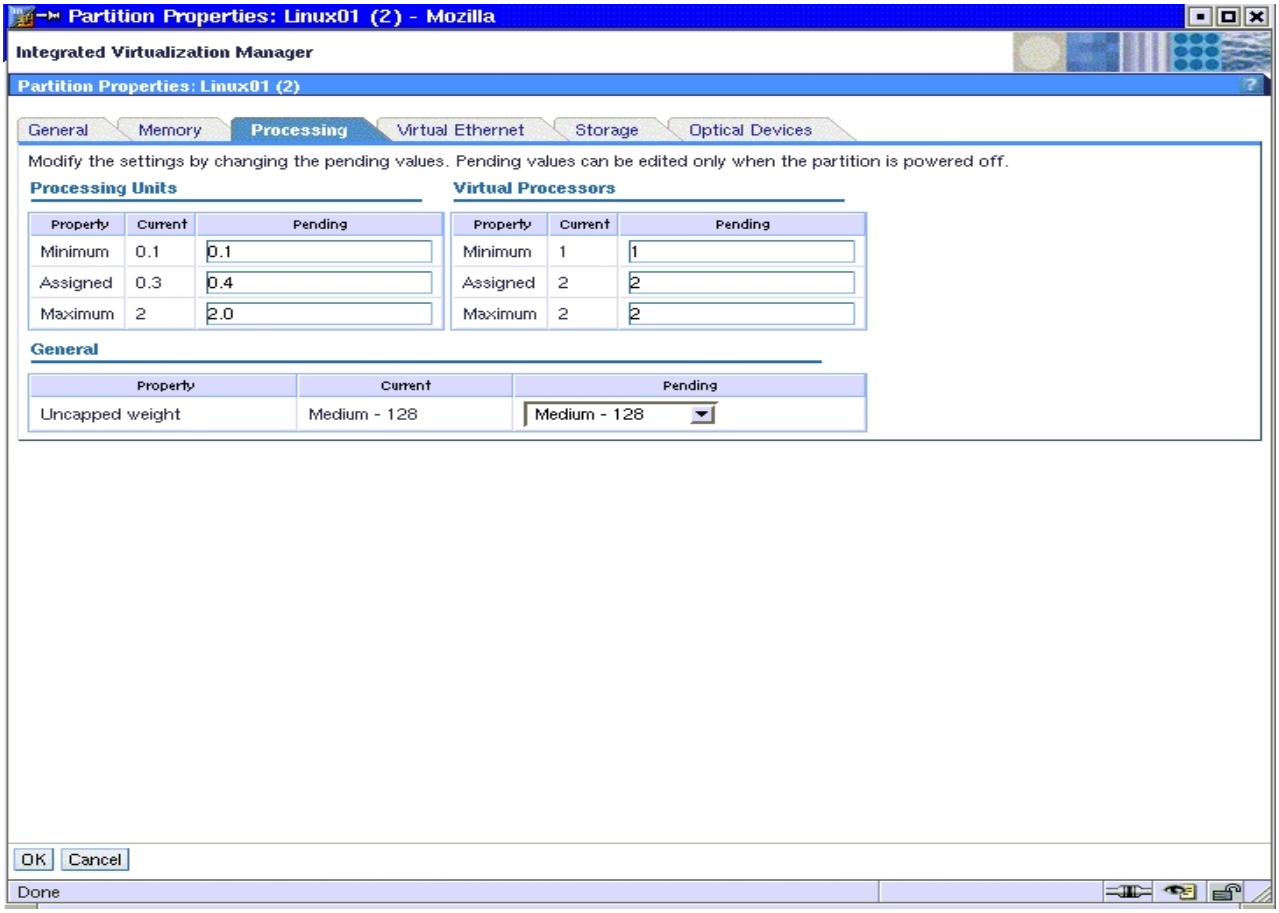

Figure 27. Changing the assigned processing units for a Linux partition

To add more storage to a Linux partition, you must first create another virtual disk from the Virtual Storage Management menu's Create Virtual Storage page (see Figure 28).

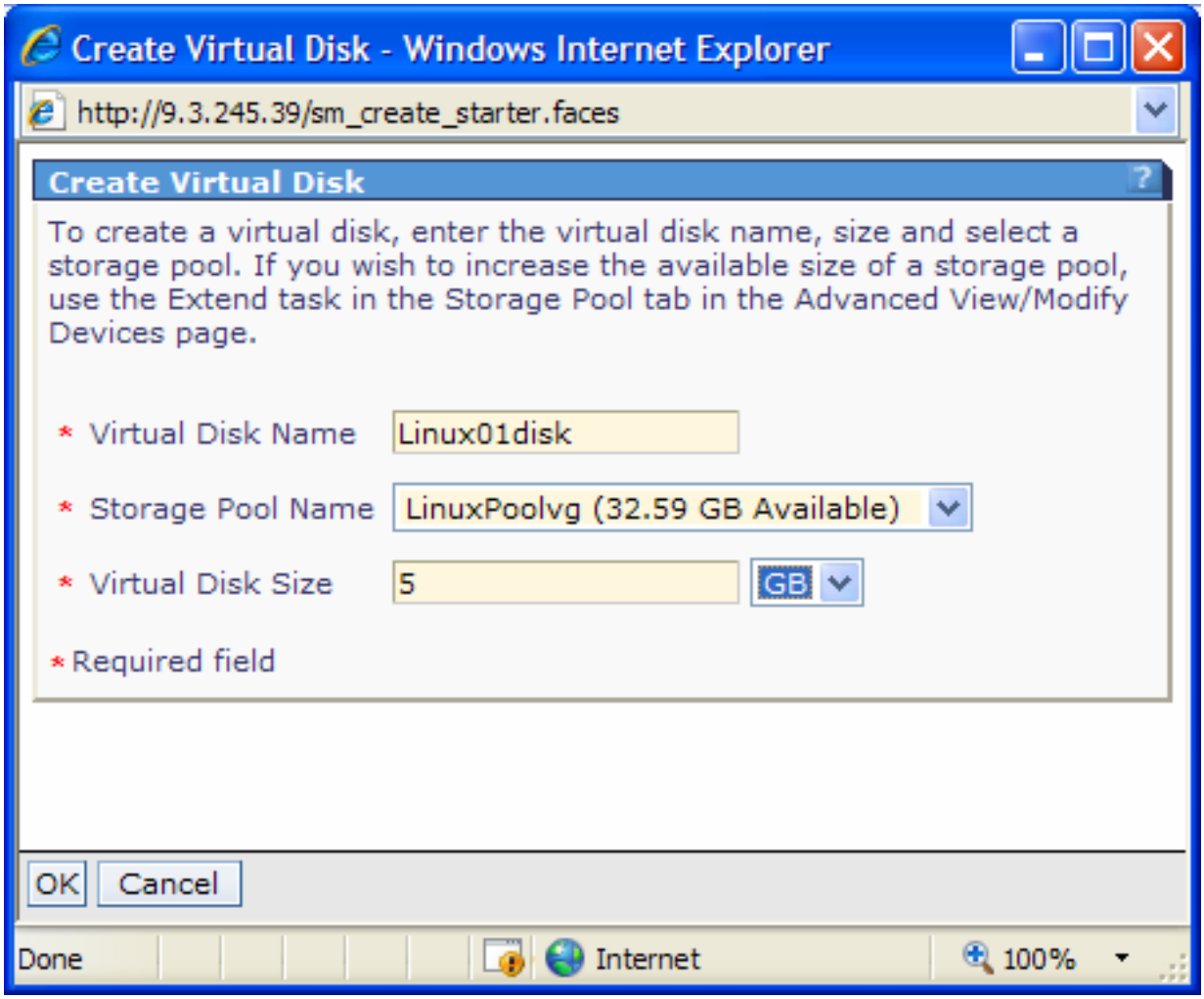

Figure 28. Creating another virtual disk to add more storage to a Linux partition

You can use the View/Modify Partitions - properties task to assign storage to a Linux partition (see Figure 29). You can make these changes to the Storage and Optical Devices properties while the partition is active. However, the storage device must not be in use by another partition.

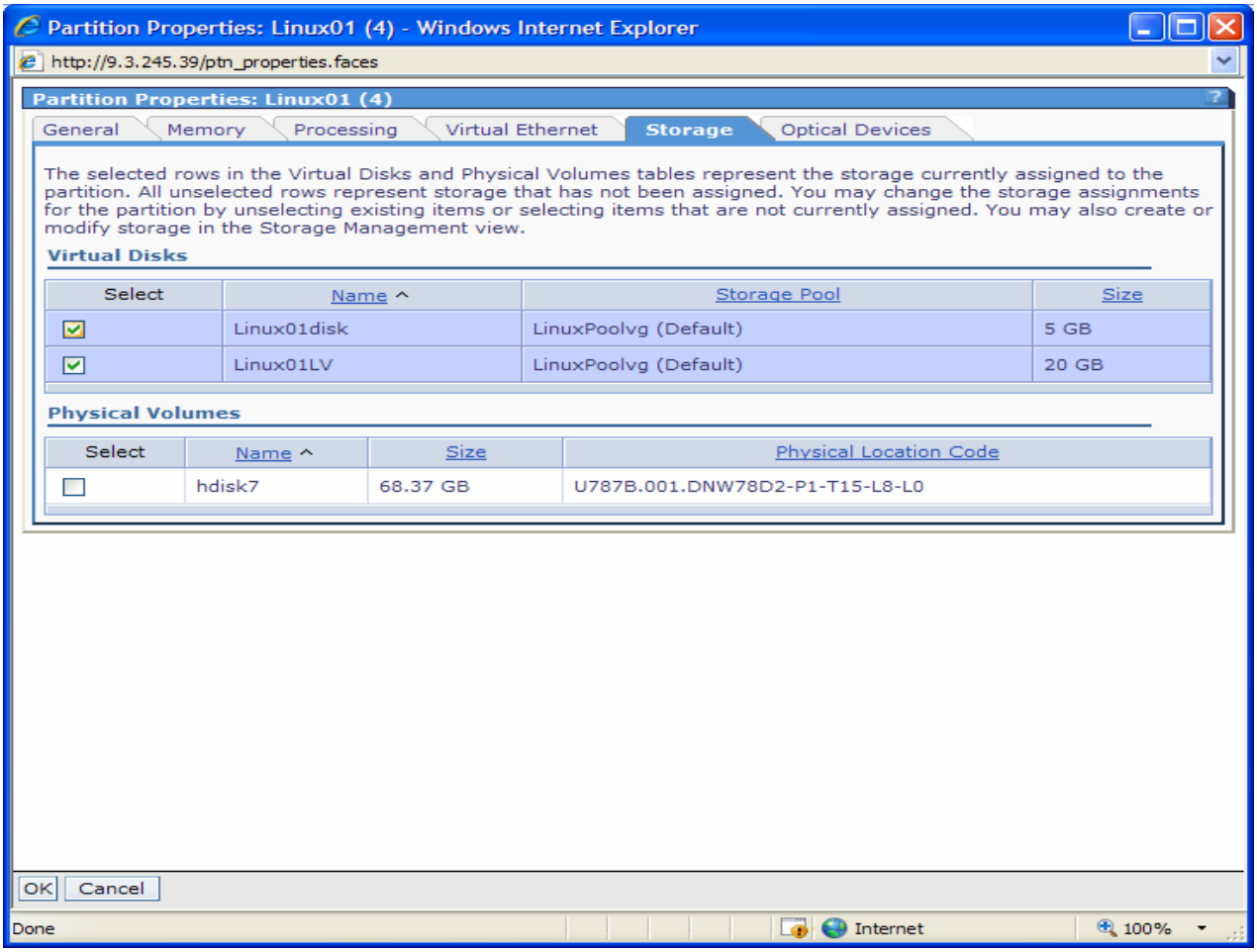

Figure 29. Using the Partitions Properties task to assign storage to a Linux partition

With SLES9 SP2, you can rescan the SCSI bus with the bash shell script /bin/rescan-scsi-bus.sh to make the virtual disk available. However, with RHEL3 and RHEL4, you must reboot the partition for the operating system to pick up the new SCSI device.

In SLES9 SP2, you can use the `lsscsi` command to list all SCSI devices and to find the new SCSI device. In SLES or RHEL, you can use the `fdisk -l` command to display information about the virtual disks. You can then partition the new virtual disk with the `fdisk` command. You can use the `mkfs` command to build a Linux file system, after which, you can then mount the disk partition by using the `mount` command.

An alternative method of adding more storage to a Linux partition is to extend a current virtual disk by using the Storage Management menu's View/Modify Virtual Storage option, and then selecting **Extend**. Figure 30 shows an example of using the Extend Virtual Disk task to increase the Linux01LV storage space by 10 GB. After extending the disk, you must reboot the Linux partition. After rebooting the Linux partition, the drive is larger because of the extended storage. You can then use the `fdisk` command to allocate the disk partitions.

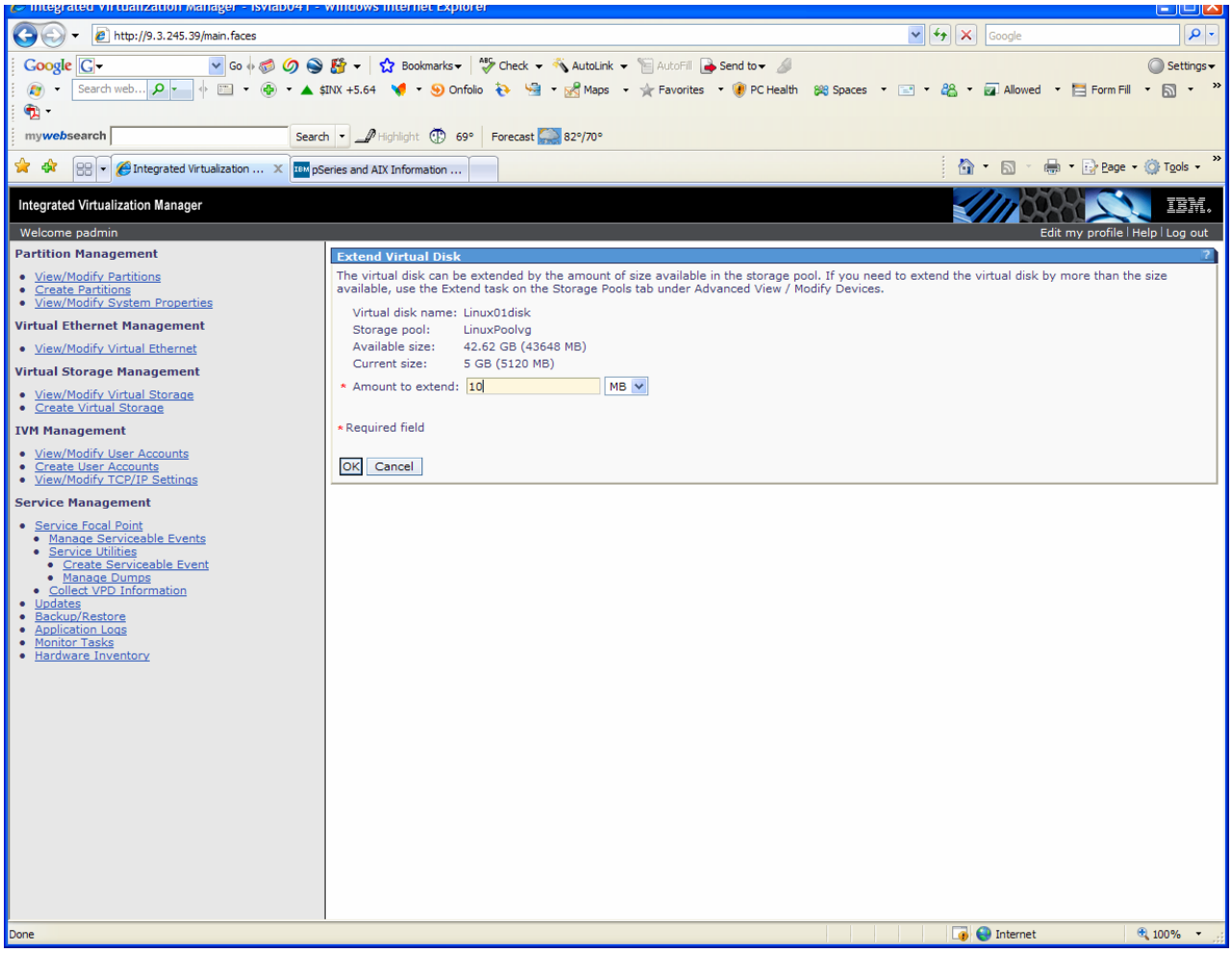

Figure 30. Increasing the Linux01LV storage space by 10 GB

Figure 31. shows that, now, the Linux01 partition has two virtual disks assigned. One virtual disk has the size of 15 GB, instead of the original 5 GB.

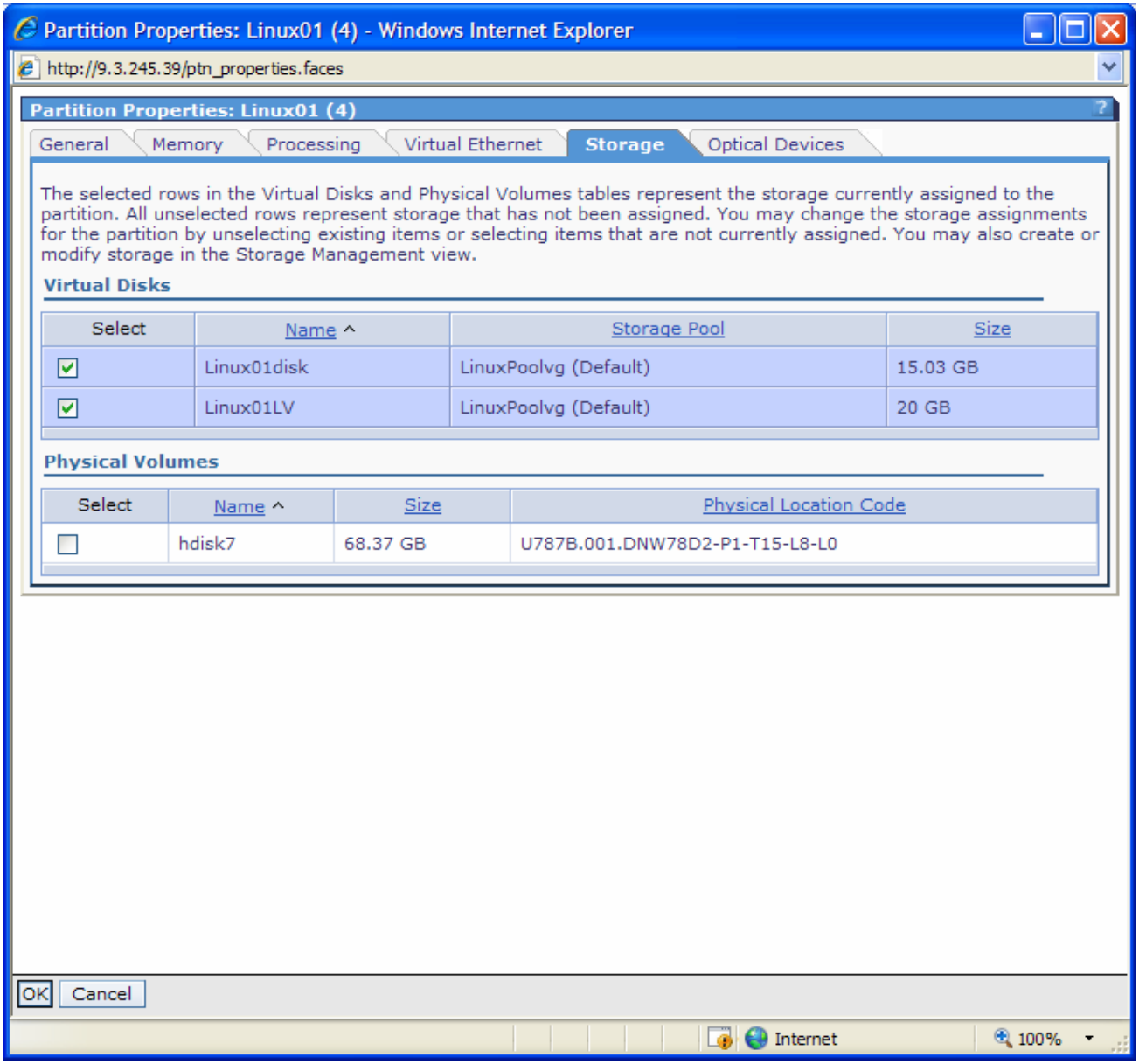

Figure 31. Observing the newly assigned 15-GB size for Linux01disk

Summary

Logical partitioning (LPAR) can be an integral component of a successful server-consolidation strategy. With the Integrated Virtualization Manager (IVM), coupled with the performance of POWER5 processor-based systems, enterprises can leverage an easy-to-use, intuitive and cost-effective solution for creating partitions and working with virtualization resources. IVM provides a system-management solution that is especially suited for small and midsized businesses, as well as larger businesses with distributed environments. This white paper discussed some of the capabilities and limitations of IVM, as well as how it can be used to work with Linux partitions.

For more information about using IVM for system management, refer to Appendix B.

Appendix 1: Comparison of IVM and HMC

Table2 provides a comparative listing of the management features and functions for IVM and the HMC.

	Integrated Virtualization Manager	Hardware Management Console
Physical footprint	Integrated into the system	A desktop or rack-mounted appliance
Installation	Installed with the VIOS (optical or network); preinstallation option available on some systems	Appliance is preinstalled; support for reinstallation through optical media or network
Managed operating systems supported	IBM AIX® and Linux	IBM i5/OS™, Linux and AIX
Virtual-console support	AIX and Linux virtual-console support	i5/OS, Linux and AIX virtual-console support
User security	Password authentication with support for either full or read-only authorities	Password authentication with granular control of task-based authorities and object-based authorities
Network security	-No integrated firewall support -Web-server SSL support	-Integrated firewall -Secure Sockets Layer (SSL) support for clients and for communications with managed systems
Supported hardware	p5-505, p5-510, p5-51A, p5-520, p5-52A, p5-550, p5-55A, p5-561,	All POWER5 processor-based IBM System i™ and IBM System pi™ models
Multiple-system support	One IVM per system	One HMC can manage multiple systems
Redundancy	One IVM per system	Multiple HMCs can manage the same system for HMC redundancy
Maximum number of partitions supported	Firmware maximum	Firmware maximum
Uncapped-partition support	Yes	Yes
Dynamic-resource movement (dynamic LPAR)	Yes (memory and processing units)	Yes - full support
I/O support for AIX and Linux	Virtual optical, disk, Ethernet and console	Virtual and direct
I/O support for i5/OS	None	Virtual and direct
Maximum number of virtual LANs	four	4096
Fix and update process for manager	VIOS fixes and updates	HMC efixes and release updates
Adapter-microcode updates	Inventory scout	Inventory scout
Firmware updates	VIOS firmware-update tools	Service focal point with concurrent firmware updates
I/O concurrent maintenance	VIOS support for slot- and device- level concurrent maintenance through the diagnostics hot-plug support	Guided support in the Repair and Verify function on the HMC
Scripting and automation	VIOS CLI and HMC-compatible CLI	HMC command-line interface
Capacity on Demand	None	Full support
User interface	Web browser (no local graphical display)	WebSM (local or remote)
Workload-management (WLM) groups supported	1	254
LPAR configuration for data backup and restore	Yes	Yes
Support for multiple profiles per partition	No	Yes
Serviceable-event management	Service focal-point light - Consolidated management of firmware and management-partition-detected errors.	Service focal-point support for consolidated management of operating-system and firmware-detected errors
Hypervisor and service-processor dump support	Dump collection with support to do manual-dump downloads	Dump-collection and call-home support
Remote support	No remote-support connectivity	Full remote support for HMC and connectivity for firmware-based remote support

Table2. Comparison of IVM and HMC

Appendix B: Resources

These Web sites provide useful reference materials to supplement the information contained in this document.

- IBM System p Information Center
  http://publib.boulder.ibm.com/infocenter/pseries/index.jsp
- IBM Publications Center
  www.elink.ibmlink.ibm.com/public/applications/publications/cgibin/pbi.cgi?CTY=US
- IBM Redbooks®
  www.redbooks.ibm.com/
- Redpaper: *Virtual I/O Server – Integrated Virtualization Manager*
  www.redbooks.ibm.com/redpieces/pdfs/redp4061.pdf
- White paper: *IBM Integrated Virtualization Manager – Lowering the cost of entry into POWER5* virtualization (requires filling out an information form)
  ibm.com/servers/systems/p/hardware/meetp5/contact.html
- IBM Systems Hardware Information Center: Partitioning with the Integrated Virtualization Manager
  publib.boulder.ibm.com/infocenter/eserver/v1r3s/topic/iphch/iphchkickoff.htm
- IBM Systems Hardware Information Center: Concepts for partitioning the server
  publib.boulder.ibm.com/infocenter/iseries/v1r2s/en_US/html_nav/info/iphat/iphatlparconceptskickoff.htm
- Linux on POWER ISV Resource Center
  ibm.com/servers/enable/linux/power
- Linux on POWER Architecture developer's corner
  ibm.com/developerworks/linux/power

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