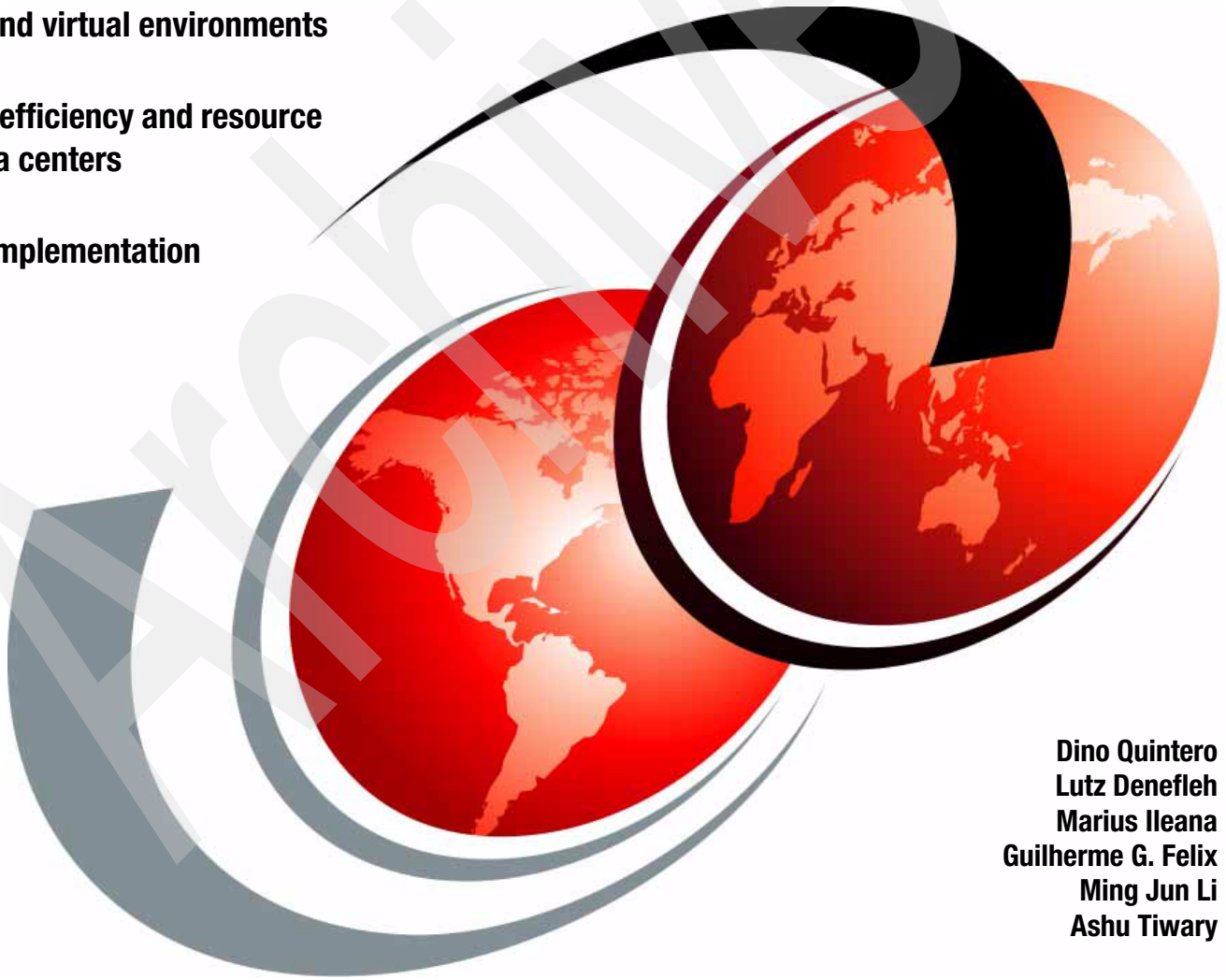
IBM

IBM Systems Director VMControl Implementation Guide on IBM Power Systems

- Optimizes management costs of physical and virtual environments
- Increases efficiency and resource use in data centers
- Includes implementation scenarios



Dino Quintero
Lutz Denefleh
Marius Ileana
Guilherme G. Felix
Ming Jun Li
Ashu Tiwary

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Note: Before using this information and the product it supports, read the information in “Notices” on page xv.

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This edition applies to IBM Systems Director Version 6.1.2.1, IBM Systems Director VMControl Version 2.2. Virtual I/O Server (VIOS) 2.1.2.10 Fix Pack 22, and AIX 6.1 TL04 on IBM Power Systems.

Contents

Figures

Tables

Examples

Notices

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Preface

This IBM® Redbooks® publication helps you install, tailor, and configure a solution with IBM Systems Director VMControl so that you can move beyond simply managing virtualization to using virtualization to better manage your IT infrastructure. This book describes how the combination of IBM Systems Director and VMControl reduces the total cost of ownership of a virtualized environment by decreasing management costs, increasing asset use, and linking infrastructure performance to business goals.

This book provides a broad understanding on how VMControl simplifies the management of virtual environments across multiple virtualization technologies and hardware platforms, freeing you from silos of virtualization and delivering enterprise-wide visibility and control. A leading multi-platform virtualization management solution, VMControl is now available in three Editions (Express, Standard, and Enterprise) to best match your virtualized environment.

In addition, this book describes the VMControl Enterprise Edition plug-in for IBM Systems Director, which uses a workload-optimized approach to decrease infrastructure costs and improve service levels. With VMControl Enterprise Edition, you can manage system pools with the simplicity of managing a single system, an essential capability for moving to cloud computing and a dynamic infrastructure.

The team who wrote this book

This book was produced by a team of specialists from around the world working at the International Technical Support Organization, Poughkeepsie Center.

Dino Quintero is a technical Project Leader and a IT generalist with the International Technical Support Organization (ITSO) in Poughkeepsie, NY. His areas of expertise include enterprise continuous availability planning and implementation, enterprise systems management, virtualization, and clustering solutions. He is currently an Open Group Master Certified IT Specialist - Server Systems. He holds a Masters Degree in Computing Information Systems, and a Bachelor of Science in Computer Science from Marist College.

Lutz Denefleh is a team leader within the PLM Technical Support EMEA Support Team. He has 21 years of experience in the Information Technology field and has worked at IBM for 20 years. His areas of expertise include design and implementation of stacked virtual environments on Power and Blade platform, such as ENOVIA, CATIA, Lotus® Notes/Domino, Tivoli® and SAN attached Storage Server as well as Internet technologies. He is now responsible for the IBM internal infrastructure used by the PLM World Wide Technical Support. He is located in Mainz, Germany. He holds a graduate Engineer degree in Fluid Dynamics and is an IBM certified professional.

Marius Ileana is a Senior IT specialist for IBM Global Services, Romania. He has worked for IBM Integrated Technology Services for six years, providing customer support for IBM Power Systems™, AIX®, HACMP™, and various WebSphere®, and DB2® products. He is an IBM Certified pSeries® AIX System Support and SCP for Java™ v1.4. His areas of expertise include AIX, PowerHA™ (HACMP), WebSphere Application Server, IBM SDK Java Technology Edition, DB2 Universal Database™, design, and development of JEE applications.

Guilherme G. Felix is an IT Specialist in IBM Brazil. He has 10 years of experience in UNIX® and Linux®, ranging from systems design and architecture to systems support. He holds a Bachelor's degree in Information Systems. His areas of expertise include AIX, Power Systems, Linux, and virtualization. He is a Certified Advanced Technical Expert for Power Systems with AIX (CATE) and a Redhat Certified Engineer (RHCE).

Ming Jun Li is a certified I/T specialist in IBM China. He works in IBM GCG advanced technical support team. He has 10 years of experience in a broad set of areas, including software development, technical support and project management. His areas of expertise include power system performance tuning, GPFS™ and PowerVM™. He is also one of the staff to provide pre-sales support of IBM Systems Director and IBM green solutions at IBM GCG. He holds a Master's degree in software engineering from Tsinghua University.

Ashu Tiwary is an IBM employee with the AIX Development Support organization, working mostly on resolving Critical Situations. He provides leadership for the global AIX Development Support mission. He has been working with AIX for more than 15 years, in various capacities: as a systems administrator, a technical support engineer, and as a developer.

Thanks to the following people for their contributions to this project:

David Bennin, Rich Conway, Ella Buslovich
International Technical Support Organization, Poughkeepsie Center

Vess Natchev, Dan Moravec, Tom Hornung, Billy Irons, Danny Acuna, Eze Cervantes, Ronald Long, Jaipaul Antony,Dave Gimpl
IBM US

Yi Rne Yuan, Hui Yang, Xiao Xin Liu
IBM China

Richard Wale
IBM UK

Octavian Lascu
IBM Romania

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1

IBM Systems Director Editions

Effective systems management is more important than ever as IT administrators are faced with new technologies, complex and heterogeneous environments, and few resources. IBM Systems Director is a platform-management foundation that streamlines the way system administrator's manage physical and virtual systems across a heterogeneous environment. By using industry standards, IBM Systems Director supports multiple operating systems and virtualization technologies across IBM and non-IBM x86 platforms. It provides the system administrator with the core capabilities required for enterprise systems management of physical and virtual resources.

This chapter provides a brief introduction to the advantages of using IBM Systems Director to exploit and manage your entire data center physical resources including the virtualization features of your IT environment.

This chapter contains the following topics:

1.1 What is IBM Systems Director Editions?

The IBM Systems Director Express, Standard and Enterprise editions each provide an integrated set of tools to help IT organizations address major concerns associated with managing both physical and virtual server infrastructures:

- Reducing operational complexity
- Improving the efficiency of IT staff and systems
- Controlling costs and meeting business requirements for service delivery

IBM Systems Director editions are packaged to make it easier and more cost-effective for you to purchase the capabilities you need to manage IBM server systems versus buying individual plug-in features separately. Each edition bundles related management features that are pre-tested and updated at one time. Software maintenance renewal for all features is aligned, reducing the administrative burden of keeping your support up to date.

The IBM Systems Director Express Edition includes a set of management tools that can reduce operational complexity by providing a clear view of the relationships and health status of IT system components.

The IBM Systems Director Express Edition provides:

- Automated discovery and topology views to simplify troubleshooting across physical and virtual server and storage resources
- Heterogeneous virtualization management across power servers running AIX, IBM i, and Linux workloads
- Simplified deployment, installation, and update processes
- Automatic reporting of hardware problems and collection of system service information for monitored systems
- Single-system, platform-level management for AIX and IBM i and through industry standards
- Launch-in-context integration with the Hardware Management Console
- Easy to learn new tasks with intuitive wizards, tutorials, and integrated help

The IBM Systems Director Standard Edition includes features that can reduce the time and effort for workload deployment, as well as optimize energy usage and capacity.

The Systems Director Standard Edition provides:

- All features of the Systems Director Express Edition.
- Capture/import, create/remove standardized virtual images.
- Deploy standard virtual images.
- Maintain virtual images in a centralized library.
- Monitoring and trend analysis of electrical energy usage and thermal characteristics.
- Monitoring of existing systems through supported facilities equipment such as uninterruptible power supplies, power distribution units, sensors and probes and interfacing with applications that monitor computer room air conditioning (CRAC) units.
- Features for setting energy usage caps across one or more servers.
- Energy saving modes that can take into account processor use and the altitude of the data center facility.
- Discovery and health monitoring for networking systems.

- The Systems Director Enterprise Edition features enable superior performance and availability management, and the automated resource balancing required for a dynamic infrastructure.

The IBM Systems Director Enterprise Edition provides:

- All features of the Systems Director Express and Standard Editions
- Creation/removal of system pools and resource management in system pools as though they were a single system
- Addition/removal of physical servers within system pools
- Creation and management of Workload Partitions (WPARs)
- Visualization of the relationships of LPARs to servers to applications
- Proactive real-time and predictive monitoring of the virtualized environment
- Predictive performance management and capacity estimation

1.2 Why IBM Systems Director?

IBM Systems Director is the single point of control to manage your data center. It integrates the IBM best-of-breed virtualization capabilities to provide new and radically improved ways to simplify the management of physical and virtual platform resources. A key feature of Systems Director is a consistent user interface focused on driving common tasks. IBM Systems Director provides a unified view of the total IT environment, including servers, storage, and network. This allows user tasks to be performed with a single tool, and, with IBM Tivoli Software, can deliver a set of unified offerings that help companies manage and align virtual systems, servers, and storage resources in the data center.

IBM Systems Director is the next generation platform management solution of IBM Director. It can improve the total cost of ownership and decrease management costs by eliminating the need to maintain multiple tools and improving the use of existing IT resources. With IBM Systems Director, you can optimize the use of the heterogeneous hardware and system software in your data center. This includes IBM Power Systems, System x®, IBM System z®, and IBM BladeCenter® to IBM Storage Systems and select non-IBM servers as well as PowerVM to VMWare to zVM, from AIX and IBM i and Linux to Microsoft® Windows® respectively.

From one access point, users can monitor system resources, inventory, events, task management, core corrective actions, distributed commands, and hardware control for both servers and storage. Systems Director also adds additional infrastructure management features, such as:

- Discovery of systems
- Monitoring and reporting
- Configuration and software update management
- Remote control and automation

Systems Director's easy-to-use GUI provides centralized cross-platform management and reduces training costs and improves administration efficiency.

1.3 What IBM Systems Director Editions offers

IBM Systems Director offers the following systems management foundation capabilities:

- Simplifies management of physical and virtual resources to help meet time-to-market business commitments:
  - Maps virtualized resources to physical servers
  - Views configurations, relationships, and changes
  - Supports across multiple industry leading hypervisors
- Efficient management of data center energy to reduce costs though advanced platform management functions:
  - Collects temperature and power consumption data
  - Throttles up or down server energy consumption
  - Records accurate accounting for the total power consumed on a single server or group of servers
- Improves availability to optimize business efficiency:
  - Takes action based on system events
  - Removes troubleshooting
- Focuses on health, status and automation of IT systems to increase business productivity:
  - Monitoring of system resources
  - Topology graph views assist troubleshooting
- Reduces administrative costs by using a single Web-based point-and-click graphical user interface when maintaining system firmware and driver currency:
  - Common toolset for managing physical and virtual resources
  - Simplifies and consolidates separate classes of information and tools
  - Intuitive graphical user interface
  - Reduces maintenance window churn by supporting currency for physical and virtual servers and operating systems
- Improves time to market with seamless integration with high-level management products from IBM and other software vendors:
  - Standards-based industry makes use of existing investments in platform management offerings
  - Complements and integrates with Tivoli and non-IBM higher-level enterprise management
  - Provides rich hardware information into higher-level management solutions
- Protects IT investments:
  - Open, standards-based design
  - Management across IBM systems (both server and storage) and non-IBM x86 servers

IBM Systems Director has been enhanced with new functions, including support for programming interfaces that provide a comprehensive service-oriented architecture (SOA) approach to manage your data center.

1.4 IBM Systems Director resources

The following sections contain links for additional information about IBM Systems Director.

1.4.1 IBM Systems Director home page

See the IBM Systems Director Web site for links to the documentation for all supported versions:

http://www.ibm.com/systems/management/director

1.4.2 IBM Systems Director documentation and resources

See the following Web site for links to product documentation, IBM Redbooks publications, white papers, and learning modules related to IBM Systems Director and IBM Systems Director plug-ins:

http://www.ibm.com/systems/management/director/resources

1.4.3 IBM Systems Director Wiki

Review and participate on the IBM Systems Director through the following Wikis:

- Redbooks Wiki for IBM Systems Director

  http://www.ibm.com/redbooks/community/display/director/IBM+Systems+Director+6.1
- DeveloperWorks (dW) Wiki for IBM Systems Director

  http://www.ibm.com/developerworks/wikis/display/WikiPtype/IBM+Systems+Director

2

Introduction to VMControl

This chapter provides an introduction to VMControl. This chapter contains the following topics:

2.1 What is VMControl?

IBM Systems Director VMControl is a plug-in for IBM Systems Director designed to simplify the management of workloads in your IT environment. The plug-in has three editions:

- IBM Systems Director VMControl Express Edition
- IBM Systems Director VMControl Standard Edition
- IBM Systems Director VMControl Enterprise Edition

Each edition provides tools to manage virtual servers, virtual appliances, workloads, and system pools across multiple hardware platforms and virtualization environments. Management access is available through a Web interface and a command-line interface (CLI) to initiate and control configuration tasks.

2.1.1 Value proposition of VMControl

System virtualization is a set of technologies that increases server use and return on investment (ROI) by saving space, power, and cooling in the data center while improving IT responsiveness to business demands.

Virtualization also brings its own challenges:

- Administrators struggle with several interfaces to manage virtual servers across systems.
- New workloads can be difficult and time-consuming to implement in a virtualized environment.
- Management costs for multiple virtual servers and physical hosts increase, though workload resiliency degrades.

VMControl automates the management of a virtualized infrastructure, improves workload resiliency (high availability), and reduces deployment time for new virtual servers. VMControl provides enterprise-wide management platform for servers, storage, networks and software. After installation, VMControl seamlessly integrates into Systems Director's browser-based interface and can be used with systems already under the Systems Director management infrastructure.

VMControl can also enable key capabilities such as system pools. (See "System pools and Storage Area Network (SAN) provisioning" on page 11.) VMControl system pools simplify virtual server management, improves business workload resiliency, and facilitates cloud computing on Power Systems servers.

2.1.2 VMControl editions

Three editions of VMControl with separate features are available.

- VMControl Express Edition

  This edition provides virtual server management and relocation similar to those provided by the Hardware Management Console (HMC) or the Integrated Virtualization Manager (IVM).

- VMControl Standard Edition

  This edition adds the capability of importing, deploying, capturing, and maintaining customized virtual server images and stores those images in an image repository. The standard edition also enables workload creation and management. It requires a valid license after a 60-day evaluation period.

- VMControl Enterprise Edition

  This edition adds the capability of creating and managing system pools as well as managing workloads and virtual servers in a system pool. It adds the capability of automatic SAN provisioning and automatic event-based server relocation to make the environment more resilient. It requires a valid license after a 60-day evaluation period.

Each edition adds features on top of the VMControl Express Edition (free download), as shown in Table 2-1.

Table 2-1 Features of each edition of VMControl

Express edition	Standard edition	Enterprise edition
► Creates virtual server ► Edits virtual server ► Manages virtual server ► Relocates virtual server	► Discovers image repository ► Imports standards-based images ► Captures a running virtual server ► Imports virtual appliance packages ► Deploys virtual appliances ► Edits workloads ► Removes workloads ► Monitors workloads	► Creates system pools ► Deploys virtual appliances into system pools ► Manages system pools

2.1.3 Supported functions and features

VMControl lets you take advantage of the benefits of virtualization without the pain associated with managing multiple interfaces. In the following sections, we briefly describe the main functions and features available with VMControl.

Available features for Power Systems virtualization

The available features and functions of VMControl depend on which virtualization platform is being managed. Using VMControl within a Power Systems virtualization environment helps you perform the following functions:

- Create, edit, and delete virtual servers
- Import a virtual appliance package
- Capture a workload or virtual server
- Deploy images
- Group virtual servers to create a workload
- Relocate virtual servers
- Manage system pools

Virtual appliances and Image Management

The VMControl Standard Edition and its Image Manager component addresses two main challenges when working with virtualization:

- Deploying a new workload in an environment
- Capturing and reusing customized virtual server images

With VMControl Image Manager, you can create a virtual server image repository, capture a running customized virtual server, and store it as a virtual appliance in the repository:

- Capture a virtual server (LPAR or logical partition) on a Power Systems server.
- Capture an existing mksysb image file from the following locations:
  - IBM Systems Director server
  - IBM Systems Director VMControl NIM server
- Capture an existing NIM lpp_source resource.

For example, you can capture a virtual server that has the AIX OS and a database application installed and has networking, security, and users configured. When captured, the fully configured virtual server is stored in the image repository and is available for rapid deployment. To accomplish this, VMControl communicates with both the virtual server and its platform manager using the Common Interface Model (CIM). Each virtual appliance contains two types of information:

- The operating system (OS), the application, the user, the networking, and the security data
- Metadata about the virtual server itself, such as processor, memory, and hardware architecture information

The combination of the two data types lets VMControl deploy a fully operational OS and application environment on a separate Power Systems server. The virtual appliances can be stored in both mksysb format and Open Virtualization Format (OVF). A Network Installation Manager (NIM) server is required for the image repository.

In addition to capturing a virtual appliance from a running virtual server, administrators can import a virtual appliance into the repository. For example, administrators can capture a customized image in one data center and securely transfer and import it into the image repository in another data center.

After virtual appliances are available in the image repository, deploying a new workload takes minutes. You can use the VMControl deploy wizard to select the appropriate virtual appliance from the repository, select the host (physical server) on which to deploy the appliance, and customize the new virtual server network settings. A virtual appliance can be deployed in a new virtual server or in an existing virtual server.

VMControl transparently communicates with the platform manager for the selected host to create the virtual server with the correct CPU and memory resources, or to replace an existing virtual server with the new virtual appliance. VMControl collaborates with the Virtual I/O Server (VIOS) on the host to create the necessary virtual storage for the virtual server. You can select from which storage pool in the VIOS the new virtual disk is created.

With VMControl Standard Edition and Image Manager, you must have available storage in the VIOS on the selected host before a virtual appliance can be deployed. The capability to communicate transparently with a Fibre Channel storage subsystem and dynamically provision storage on the SAN for a new workload is part of VMControl Enterprise Edition.

Virtual Server Management and Relocation

The capability to create, delete, power on or off, or dynamically change virtual servers is included with the VMControl Express Edition. After IBM Systems Director has discovered and authenticated the Power Systems server management platform (HMC or IVM), all virtual servers (LPARs) on that system are available for VMControl management. Using Systems Director's launch-in-context interface, you can right-click a virtual server and perform all of the tasks that are available in the HMC or IVM. Such tasks can include changing a profile, starting

a virtual server, or performing a Dynamic LPAR (DLPAR) operation to change its processor, memory or I/O configuration. If needed, you can interact with the HMC or IVM system entry in Systems Director and launch its native browser interface in a separate window. VMControl can also use Systems Director's topology capability to show the relationships among a physical Power Systems server, its virtual servers, and their assigned resources.

VMControl's virtual server management supports all three types of Power Systems virtual servers:

- IBM i
- AIX
- Linux

VMControl's other capabilities, such as the Image Manager and the system pools, are presently supported only on AIX and Linux.

System pools and Storage Area Network (SAN) provisioning

You can create a pool of physical systems (hosts) and use their processor, memory, and I/O resources for multiple virtual servers. Instead of deploying a new virtual appliance to a specific host, the appliance is deployed to the system pool and becomes a managed workload. This enables the use of Power Systems servers as a pool of available computing resources based on business needs, instead of managing virtual servers on individual hosts.

A *system pool* is a private cloud for deploying business workloads. When deployed in a system pool, a workload's state and performance can be monitored. Management actions can be taken automatically based on a defined set of policies. For example, if a workload is under-performing because a physical host is overburdened, VMControl can transparently relocate the workload to another host within the pool.

The system pools dashboard is used to monitor workloads in a system pool and take corresponding actions. Integrated into the VMControl and Systems Director launch-in-context browser interface, the system pools dashboard provides a comprehensive view of existing system pools, the workloads deployed in them, and the state of computing resources in those pools. You can monitor the state of all workloads in a pool as well as processor, memory, and disk resource usage and availability. Based on these statistics, you can use the dashboard to add or remove hosts from a system pool and to start, stop, or relocate workloads.

To simplify the management of a virtualized environment further, VMControl Enterprise Edition also includes transparent SAN provisioning when deploying workloads in a system pool. VMControl accomplishes this by integrating with IBM Tivoli Storage Productivity Center (TPC) and using TPC's capabilities to manage SAN devices using industry-standard SMI-S (Storage Management Initiative-Specification) providers. SMI-S providers communicate with SAN devices, such as switches and storage subsystems, using a native interface. This allows TPC to manage multiple devices using a common CIM approach.

When managed by TPC, a group of SAN devices can be integrated with VMControl with a TPC Storage Resource Group (SRG). This lets you manage SAN resources as a storage farm (or storage cloud). When deploying a new workload in a system pool, VMControl communicates with a SAN switch and a storage subsystem through TPC to provision storage for the workload transparently. VMControl uses a single storage pool (or RAID array) in a managed storage subsystem to create volumes when deploying a new workload.

2.1.4 License requirements

After you install IBM Systems Director VMControl, you are granted a 60-day evaluation period for the IBM Systems Director VMControl Image Manager and the IBM Systems Director

VMControl System Pools. During the evaluation period, you can create, import, and deploy virtual appliances in your environment and create and manage system pools. When the evaluation period expires, you must purchase a license to continue using VMControl Image Manager or VMControl system pools.

The 60-day evaluation period begins the first time you use VMControl Image Manager or VMControl system pools. The number of days left in the evaluation period appears on the bottom of the VMControl summary page. The day the evaluation period expires is also displayed, as well as information about obtaining a license.

If you allow the evaluation period to expire before purchasing a license for VMControl Image Manager or VMControl system pools, your access changes, as shown in Table 2-2.

Table 2-2 Access to product features when the evaluation period expires

When the evaluation period expires for...	You are still able to...	You are no longer able to...
VMControl Image Manager	► View virtual appliances ► Delete virtual appliances ► Discover image repositories ► Deploy agents	► Deploy virtual appliances ► Capture ► Import ► View or create workloads
VMControl system pools	► View system pools ► Delete system pools ► Remove hosts from system pools	► Deploy to system pools ► Monitor system pools ► Add hosts to system pools ► Create a system pool ► Edit an existing system pool ► Use resilience and placement features of system pools

When you purchase and install the license for VMControl Image Manager or VMControl system pools, any image repositories, virtual appliances, or system pools that you created during the evaluation period are still available for use.

2.1.5 Minimum requirements for Power Systems virtualization support

The following sections present the minimum requirements to implement VMControl in a virtualized Power Systems environment.

Minimum OS requirements

VMControl is installed on systems running IBM Systems Director Server version 6.1.2.1. The standard installation method of the VMControl plug-in requires the appropriate X11 libraries installed. If you plan to use silent mode with no graphical output, there are no additional software requirements.

IBM Power Systems (POWER5™ and POWER6®) virtual servers (logical partitions) running AIX 5.3 TL8 or higher is required if you want to capture virtual servers or create workloads.

Minimum HMC and IVM requirements

VMControl supports the same levels of the HMC and the IVM as the IBM Systems Director Server version 6.1.2.1.

If you plan to relocate virtual servers based on predicted hardware failures, VMControl requires the following levels of either the HMC or the IVM software:

- HMC Version 7.3.5 or higher
- IVM Version 2.1.2 or higher

Requirements for importing a virtual appliance package

You can import a virtual appliance package containing AIX mksysb images for IBM POWER® logical partitions. You can import this type of virtual appliance package when the following requirements are met:

- An operational and suitably configured NIM server is available and accessible by the IBM Systems Director server.
- The IBM Systems Director VMControl has recognized the NIM server as an image repository in the environment.
- There is sufficient space on the NIM server under `/export/nim/appliances` to store the AIX mksysb image file associated with the virtual appliance package to be imported.

Requirements for capturing a virtual server or workload

You can capture a virtual server or a workload when the following requirements are met:

- A NIM server is running and able to access the virtual server over the network.
- The instance of AIX running on the virtual server can resolve the NIM server host name with the DNS or the `/etc/hosts` file.
- VMControl has recognized the NIM server as an image repository in the environment.
- There is sufficient space on the NIM server under `/export/nim/appliances` to store the captured virtual server.
- The HMC or IVM that manages the virtual server is discovered by IBM Systems Director, and the access status is listed as OK.
- The virtual server that you want to capture and the operating system running on it is discovered by IBM Systems Director, and the access status is listed as OK.
- The virtual server is up and running AIX version 5.3 TL8 or higher.
- The virtual server is not a full system partition, or the only partition on the host to which all host resources are dedicated.

Requirements for deploying virtual appliances

The same basic requirements for capturing a virtual server apply. In addition, you need to take into account the following factors:

- The virtual server you want to deploy is not a full system partition, or the only partition on the host to which all host resources are dedicated.
- A supported storage configuration is available and discovered by IBM Systems Director which is either:
  - Supported SAN-based storage that is allocated from a storage pool hosted by the VIOS.
  - Local storage that is allocated from a storage pool hosted by the VIOS.

Requirements for relocating virtual servers

If you plan to relocate virtual servers, the following minimum requirements need to be taken into account:

- All the hosts in the virtualized environment must support Live Partition Mobility.

  For additional information, see *IBM PowerVM Live Partition Mobility*, SG24-7460.

- Relocation of virtual servers is only possible between hosts within the same system pool.
- Both the source and target host must have access to a shared SAN.
- Both the source and target host must have access to a shared communications network.
- The target host must have enough memory to support the virtual server.
- The target host must have enough processor resources to support the virtual server.

Requirements for managing system pools

If you plan to implement system pools, the same requirements as for relocating virtual servers apply. For the environment setup, you must take the following issues into account:

- Set up your storage environment so that all the hosts in the pool are connected to the same shared storage.
- Ensure that you are using storage devices that are supported by IBM Systems Director.
- Discover and collect inventory on your storage devices.
- Ensure that you understand Serial Attached SCSI (SAS) zone configurations.
- Familiarize yourself with IBM Advanced POWER Virtualization (PowerVM) features, Chapter 2 of the IBM Systems Director VMControl manual at:

  http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp?topic=/director_6.1/fqm0_main.html

3

Installation procedures

The following chapter provides the installation procedures to implement systems management with IBM Systems Director and Network Installation Manager (NIM) on Power Systems. You can then build onto this environment by installing the VMControl plug-in to provide automated system management capabilities.

The following sections are presented in this chapter to deploy the IBM Systems Director Server, the NIM server, and the VMControl plug-in:

3.1 Implementation environment

Two independent project environments based on Power Systems servers have been set up in the lab. For both environments, we used AIX 6.1 TL04 as the base operating system level, with IBM VIOS level 2.1.2.10-FP-22. The major differences between the two lab environments are:

- The POWER5 environment uses local storage devices.
- The POWER6 environment uses SAN attached storage.

In both environments, the following basic installation tasks have been performed:

1. Update the HMC to the latest level V7R3.5.0.0 with fix MH01197.
2. Install the VIOS server level 2.1.2.10-FP-22.
3. Install the AIX level 6100-04-0944 on a virtual server for NIM deployment.
4. Install the AIX level 6100-04-0944 on a virtual server for the IBM Systems Director Server deployment.

3.1.1 Logical layout

In this section, we describe the logical layout of both lab environments as they were used through all implementation scenarios.

IBM POWER5 Systems server environment

Figure 3-1 describes the POWER5 lab environment layout used for most of the deployment scenarios. We used two physical POWER5 servers with local storage devices, managed by one Hardware Management Console (HMC). We installed IBM Systems Director along with a NIM instance on each of the POWER5 servers.

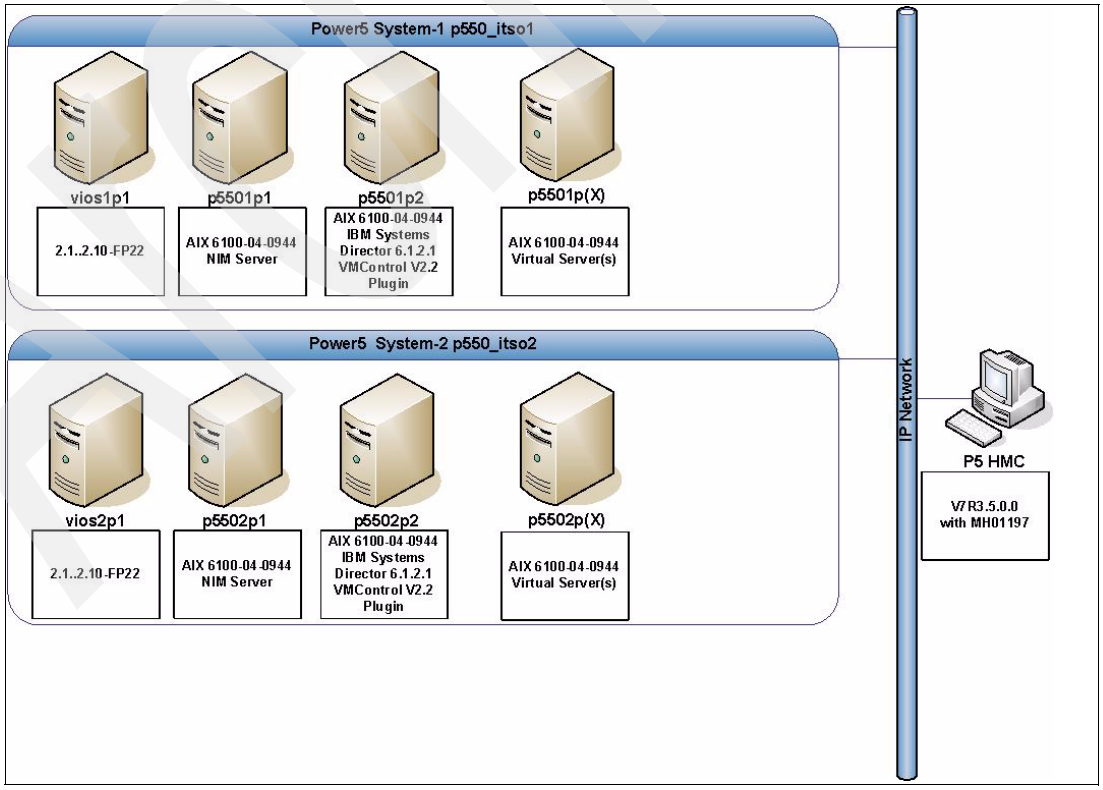

Figure 3-1 Logical layout POWER5 server lab environment

Table 3-1 describes the mapping between the physical server to the virtual servers including the IP address, as well as the Fully Qualified DNS Name (FQDN).

Table 3-1 POWER5 lab IP address mapping to Fully Qualified Domain Names

System	IP address	FQDN
p5 HMC	192.168.100.253	Not used
POWER5 - ITSO 1 p550_itso1	192.168.100.71	vios1p1.itso.ibm.com
	192.168.100.72	p5501p1.itso.ibm.com
	192.168.100.73	p5501p2.itso.ibm.com
	192.168.100.74	p5501p3.itso.ibm.com
	192.168.100.75	p5501p4.itso.ibm.com
	192.168.100.76	p5501p5.itso.ibm.com
	192.168.100.77	p5501p6.itso.ibm.com
	192.168.100.78	p5501p7.itso.ibm.com
	192.168.100.79	p5501p8.itso.ibm.com
POWER5 - ITSO 2 p550_itso2	192.168.100.81	vios2p1.itso.ibm.com
	192.168.100.82	p5502p1.itso.ibm.com
	192.168.100.83	p5502p2.itso.ibm.com
	192.168.100.84	p5502p3.itso.ibm.com
	192.168.100.85	p5502p4.itso.ibm.com
	192.168.100.86	p5502p5.itso.ibm.com
	192.168.100.87	p5502p6.itso.ibm.com
	192.168.100.88	p5502p7.itso.ibm.com
	192.168.100.89	p5502p8.itso.ibm.com

IBM POWER6 server environment

Figure 3-2 illustrates the lab environment implemented for the VMControl storage pools scenarios. In this case, we deployed one IBM Systems Director instance to manage both physical POWER6 servers.

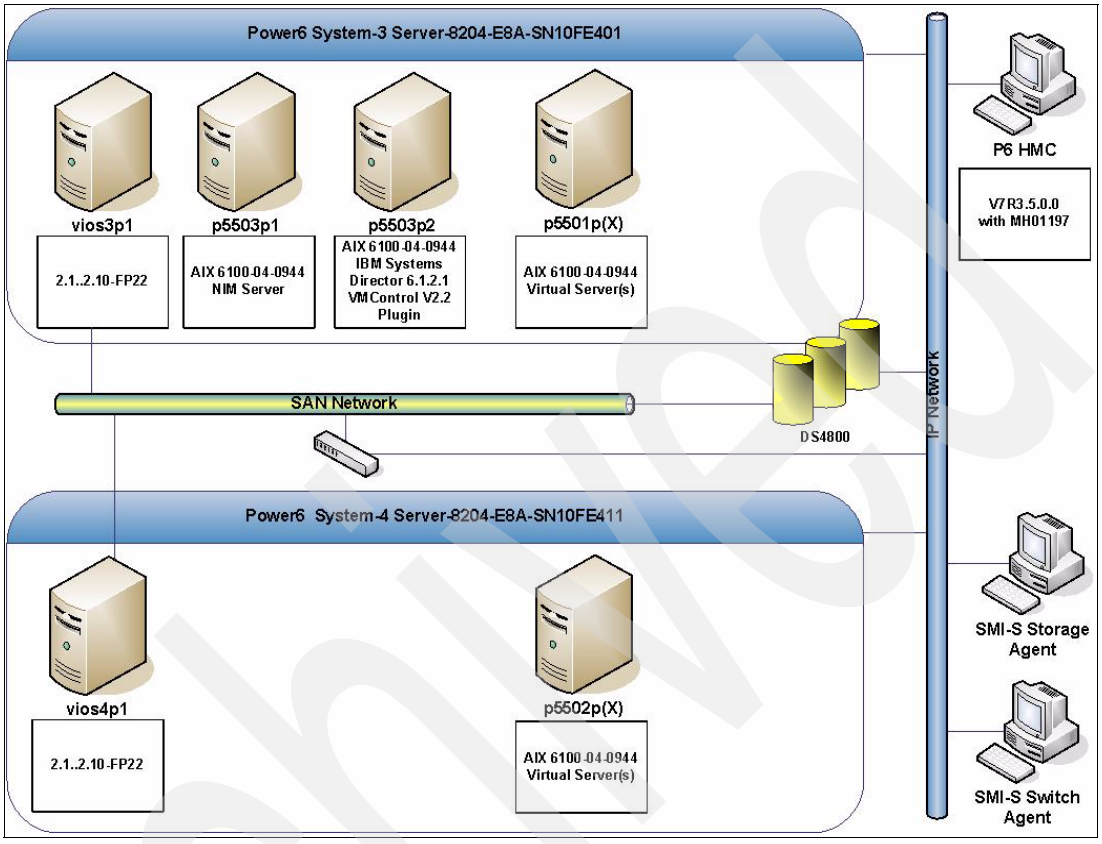

Figure 3-2 Logical layout of the POWER6 server environment

Table 3-2 shows the mapping between the physical server to the virtual server including IP address, as well as the Fully Qualified DNS Name, which we used when deploying the system pools scenarios.

Table 3-2 POWER6 lab IP address to Fully Qualified Domain Names

System	IP address	FQDN
p6 HMC	192.168.100.110	Not used
POWER6 - ITSO 3 Server-8204-E8A-SN10FE401	192.168.100.51	vios3p1.itso.ibm.com
	192.168.100.52	p5503p1.itso.ibm.com
	192.168.100.53	p5503p2.itso.ibm.com
	192.168.100.54	p5503p3.itso.ibm.com
	192.168.100.55	p5503p4.itso.ibm.com
	192.168.100.56	p5503p5.itso.ibm.com
	192.168.100.57	p5503p6.itso.ibm.com
	192.168.100.58	p5503p7.itso.ibm.com
	192.168.100.59	p5503p8.itso.ibm.com
POWER6 - ITSO 4 Server-8204-E8A-SN10FE411	192.168.100.91	vios4p1.itso.ibm.com
	192.168.100.92	p5504p1.itso.ibm.com
	192.168.100.93	p5504p2.itso.ibm.com
	192.168.100.94	p5504p3.itso.ibm.com
	192.168.100.95	p5504p4.itso.ibm.com
	192.168.100.96	p5504p5.itso.ibm.com
	192.168.100.97	p5504p6.itso.ibm.com
	192.168.100.98	p5504p7.itso.ibm.com
	192.168.100.99	p5504p8.itso.ibm.com

Special user environment

In addition to the standard users created during the IBM Systems Director installation, we created a common set of individual users for administrative access in both lab environments. These users are named `diradm1` to `diradm6` and assigned to the smadmin user group so that separate administrators can use the IBM Systems Director Web interface simultaneously. Based on user group membership, these users have administrative privileges on IBM Systems Director. As reference, see the summary of the common administrative users created (**System** → **Security** → **Users**) in Figure 3-3.

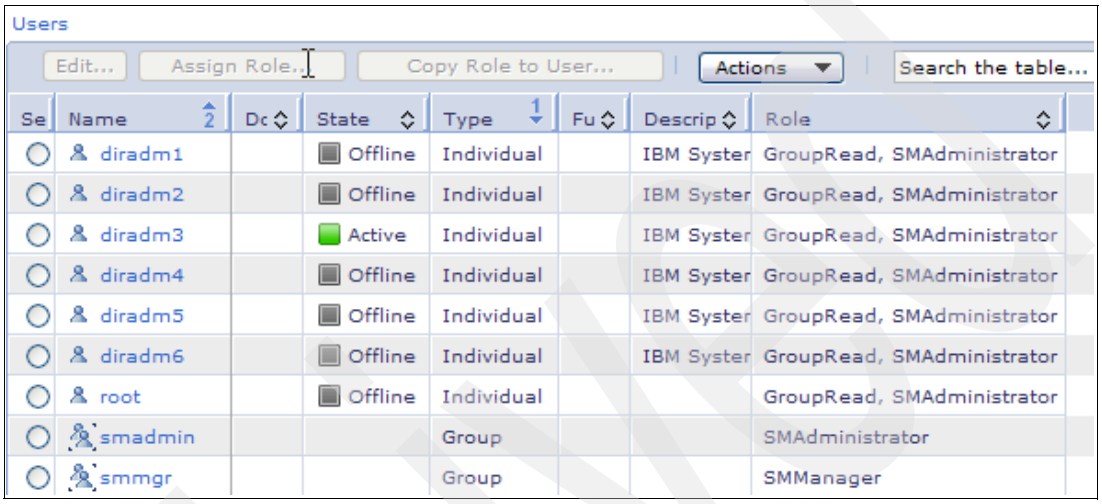

Figure 3-3 Summary of common administrative users created

The shell script in Example 3-1 has been used to create additional IBM Systems Director users.

Example 3-1 Sample CreateAdminuser.ksh script

```
#!/bin/ksh
for NAME in diradm1 \
            diradm2 \
            diradm3 \
            diradm4 \
            diradm5 \
            diradm6

do
echo "Creating Administrative User ${NAME}"
mkuser pgrp=smadmin groups=staff gecos="IBM Systems Director User"
home=/home/${NAME} ${NAME}
echo "setting initial passwd for user ${NAME}"
passwd ${NAME}
pwdadm -c ${NAME}
done
```

3.2 Preparing the IBM Systems Director Server installation

Before installing the IBM Systems Director Server on AIX, check that the system meets the applicable hardware and software requirements. The next two sections covers the hardware and software requirements for the IBM Systems Director Server deployment on AIX environments.

3.2.1 Hardware requirements

This section provides the recommended hardware requirements for running IBM Systems Director Server on AIX. This information covers the supported IBM Power Systems, including IBM Power Blade servers.

Because these hardware requirements can vary depending on the size of the IBM Systems Director systems-managed environment, three types of configurations with specific characteristics are provided as a guideline:

- Small configuration
  - Includes less than 500 Common Agent managed systems.
  - Uses Apache Derby as the database software.
- Medium configuration
  - Includes between 500 and 1000 Common Agent managed systems.
  - Uses IBM DB2 as the database software.
- Large configuration
  - Includes between 1000 and 5000 Common Agent managed systems.
  - Uses IBM DB2 as the database software.

Note: The Common Agent component is always installed with the IBM Systems Director Server. Therefore, remember the Common Agent requirements whenever reviewing IBM Systems Director Server requirements.

Table 3-3 includes the minimum hardware requirements for running IBM Systems Director Server on AIX based on the size of the environment to be managed.

Table 3-3 IBM Systems Director Server minimum hardware requirements for AIX platforms

Configuration	Minimum hardware requirements		
	Processor	**Memory**	**Disk space**
Small	2 processor, POWER5, POWER6, or POWER7™ For partitioned systems: ► Entitlement = 1 ► Uncapped Virtual Processors = 4 ► Weight = Default	2.5–3 GB	4 GB
Medium	2 processor, POWER5, POWER6, or POWER7 For partitioned systems: ► Entitlement = 2 ► Uncapped Virtual Processors = 4 ► Weight = Default	4 GB	6 GB
Large	4 processor, POWER5, POWER6, or POWER7 For partitioned systems: ► Entitlement = 4 ► Uncapped Virtual Processors = 8 ► Weight = Default	10 GB	8 GB

Paging space should equal or exceed the physical memory size with a minimum of 2 GB. Ensure that a minimum of 4 GB of combined memory and paging space is available. This can be particularly critical if the physical memory is close to the 2.5 GB minimum requirement.

Table 3-4 includes the disk space requirements for installing IBM Systems Director Server 6.1.2.1 on AIX platforms. These requirements include the common agent and platform agent components, which are installed with the IBM Systems Director Server.

Table 3-4 Disk space requirements for installing IBM Systems Director Server on AIX

File system	Disk space required
/	1.2 GB
/opt	4 GB
/usr	110 MB
/var	170 MB
/tmp	4.2 GB

The installation/update script provided with the IBM Systems Director Server 6.1.2 verifies if the free space on the file system is sufficient. If a file system has less free space than needed, the script tries to increase the file system size using unallocated disk space. If the script has increased a file system in size for temporary space requirements, it tries to decrease the file system size after the installation or update is completed.

Note: The disk space requirements do not include the requirements for updating the IBM Systems Director Server to later versions, or for downloading and staging updates (such as AIX, HMC, or system firmware updates) with update manager. For more information, consult the IBM Systems Director Redbooks Wiki available at the following Web page:

http://www.ibm.com/redbooks/community/display/director/IBM+Systems+Director+6.1

Example 3-2 illustrates the commands used for the verification steps of the disk space requirements.

Example 3-2 Verification of the disk space requirements

```
p5501p2(root)/> df -g / /opt /usr /var /tmp
Filesystem    GB blocks      Free %Used    Iused %Iused Mounted on
/dev/hd4           2.00      1.82    9%    14389     4% /
/dev/hd10opt       5.00      4.62    8%    10570     1% /opt
/dev/hd2           2.19      0.16   93%    50850    50% /usr
/dev/hd9var        0.38      0.24   95%    13987    63% /var
/dev/hd3           5.00      4.99    1%      664     1% /tmp
p5501p2(root)/>
```

3.2.2 Software requirements

Before installing the IBM Systems Director Server on AIX, additional verification steps must be completed.

Note: This section covers the fresh install of the IBM Systems Director Server 6.1.2 using the Web download installation package. Therefore, all the requirements apply to this installation option only. When updating an existing installation or installing from DVD media, the requirements can change.

The NIM server needs to be AIX 6.1 TL3 or later for the VMControl subagent support. This requirement is only for the NIM server.

The following list details the software requirements for installing IBM Systems Director Server 6.1.2 on AIX:

- The AIX operating system level must be 5.3 TL09 level or higher.
- The OpenSSL and OpenSSH package `openssl.base 0.9.8.4` (or higher) needs to be installed. If installed, use openssh.base.server 4.5.0.5301 or higher.

Example 3-3 illustrates the commands used for the verifications steps.

Example 3-3 Verification steps for the AIX level and the additional required packages

```
root@p5501p2 / > oslevel -s
6100-04-01-0944
root@p5501p2 / >
root@p5501p2 / > lslpp -L openssl.base openssh.base.server
  Fileset                      Level  State  Type  Description (Uninstaller)
  ----------------------------------------------------------------------------
  openssh.base.server     5.0.0.5301    C     F    Open Secure Shell Server
  openssl.base             0.9.8.801    C     F    Open Secure Socket Layer


State codes:
 A -- Applied.
 B -- Broken.
 C -- Committed.
 E -- EFIX Locked.
 O -- Obsolete.  (partially migrated to newer version)
 ? -- Inconsistent State...Run lppchk -v.

Type codes:
 F -- Installp Fileset
 P -- Product
 C -- Component
 T -- Feature
 R -- RPM Package
 E -- Interim Fix
root@p5501p2 / >
root@p5501p2 / > rpm -qa | grep openssl
root@p5501p2 / > rpm -qa | grep -i openssh
root@p5501p2 / >
```

Note: OpenSSL and OpenSSH packages are now provided as LPP filesets. Check that the software packages do not interfere with any other packages that might be already installed as RPM packages.

The OpenSSH package for AIX is delivered through the SourceForge.net Web site:

`http://sourceforge.net/projects/openssh-aix`

The OpenSSH package is required if you want to use the Agent Installation Wizard, otherwise the installation of the server component does not enforce the OpenSSH installation.

The `X11.base.lib` file set must also be installed, as this is required by the tk RPM package. This file set, with its prerequisites is found on the AIX base installation media.

The following packages are installed as part of IBM Systems Director Server installation on AIX:

- RPM files that comes with the server component:
  - bash-3.2-1
  - expect-5.42.1-1
  - tcl-8.4.7-1
  - tk-8.4.7-1
- File sets that comes with the Common Agent component:
  - sysmgt.cim.providers 1.2.8.0
  - sysmgt.cim.smisproviders 1.2.1.0
  - sysmgt.cimserver.pegasus 2.9.0.0
  - Additional components for AIX 5.3 systems:
    - ICU4C.rte 5.3.9.0
    - xlC.aix50 10.1.0.2
    - xlC.rte 10.1.0.2

For items related to the sysmgt.cim installations, Example 3-4 shows that these file sets are installed by default with the AIX 6.1 TL04 SP01 base installation.

Example 3-4 sysmgt.cim file sets that are installed by default with AIX 6.1 TL04 SP01

```
root@p5501p2 /kits > lslpp -L sysmgt.cim*
  Fileset                      Level  State  Type  Description (Uninstaller)
  ----------------------------------------------------------------------------
  sysmgt.cim.providers.metrics
                             1.2.8.0    C     F    Metrics Providers for AIX OS
  sysmgt.cim.providers.osbase
                             1.2.8.0    C     F    Base Providers for AIX OS
  sysmgt.cim.providers.smash
                             1.2.8.0    C     F    Smash Providers for AIX OS
  sysmgt.cim.smisproviders.hba_hdr
                             1.2.1.0    C     F    SMI-S HBA&HDR Providers for
                                                   AIX OS
  sysmgt.cim.smisproviders.hhr
                             1.2.1.0    C     F    SMI-S HHR Providers for AIX OS
  sysmgt.cim.smisproviders.vblksrv
                             1.2.1.0    C     F    SMI-S Storage Virtualizer
                                                   Providers for AIX OS
  sysmgt.cimserver.pegasus.rte
                             2.9.0.0    C     F    Pegasus CIM Server Runtime
                                                   Environment

State codes:

... (content omitted) ...

root@p5501p2 /kits >
```

Also, the following ports are used by the IBM Systems Director Server installation, which are required by the Common Agent:

- 9510
- 9514
- 9515

Example 3-5 includes the port verification.

Example 3-5 TCP ports required by the Common Agent

```
root@p550lp2 / > netstat -an | grep -i list | egrep "951(0|4|5)"
tcp        0      0  *.9510                 *.*                    LISTEN
tcp4       0      0  127.0.0.1.9514         *.*                    LISTEN
tcp4       0      0  127.0.0.1.9515         *.*                    LISTEN
root@p550lp2 / >
```

3.3 IBM Systems Director Server installation

To install the IBM Systems Director Server V6.1.2, you can either use the IBM Systems Director for AIX V6.1.2 DVD or the installation package that can be downloaded from the IBM Systems Director downloads Web site available at:

http://www.ibm.com/systems/management/director/downloads

The IBM Systems Director V6.1.2 installation package is provided so you can install the IBM Systems Director 6.1.0, and immediately update the server to version 6.1.2, including the latest version of the Common Agent. The same installation package can be used for updating existing 6.1.0 or 6.1.1 server versions to 6.1.2, which also updates the Common Agent to the latest version if a previous version was already installed.

Note: The IBM Systems Director 6.1.2 installation package simplifies the installation. It updates processes and verifies disk space availability so that the installation does not run out of space. For more information, see the README file that is included in the 6.1.2 installation archive package.

To install the IBM Systems Director Server using the 6.1.2 installation package, log into the management server as the root user and perform the following steps:

1. Download the installation package from the IBM Systems Director Web site and extract the contents to a local directory, as shown in Example 3-6.

Example 3-6 Extract the contents of the 6.1.2 installation package

```
root@p550lp2 /kits > ls
SysDir6_1_2_Server_Inst_Upd_AIX.tar.gz
root@p550lp2 /kits>
root@p550lp2 /kits> mkdir SysDir_6_1_2_Server_AIX
root@p550lp2 /kits> cd SysDir_6_1_2_Server_AIX
root@p550lp2 /kits/SysDir_6_1_2_Server_AIX>
root@p550lp2 /kits/SysDir_6_1_2_Server_AIX> gzip -dc
../SysDir6_1_2_Server_Inst_Upd_AIX.tar.gz | tar -xf -
root@p550lp2 /kits/SysDir_6_1_2_Server_AIX>
root@p550lp2 /kits/SysDir_6_1_2_Server_AIX> ls
612-installer-readme_aix.txt  bin                            server
AIX53                         license                        update
AIX61                         plugins
root@p550lp2 /kits/SysDir_6_1_2_Server_AIX>
```

2. Start the installation using the installds script provided (Example 3-7). The script is in the bin directory and is used to do both the installation of the base IBM Systems Director Server and the update.

> **Note:** The installation and update process can take up to two hours, depending on the hardware configuration.

Example 3-7 Start the installation of IBM Systems Director Server using the installds script

```
root@p55O1p2 /kits/SysDir_6_1_2_Server_AIX> cd bin
root@p55O1p2 /kits/SysDir_6_1_2_Server_AIX/bin>
root@p55O1p2 /kits/SysDir_6_1_2_Server_AIX/bin> ./installds -i -u
Now checking the space needed for the director server installation...
[done]
bash                          ################################################

********************************************************************************
This Program is licensed under the terms of the agreement located in the license
file in the Program's installation license folder or in the license folder on
the source media.
By installing, copying, accessing, or using the Program, you agree to the terms
of this agreement. If you do not agree to the terms, do not install, copy,
access, or use the Program.
********************************************************************************

/kits/SysDir_6_1_2_Server_AIX/server
+-------------------------------------------------------------------------------+
                    Pre-installation Verification...
+-------------------------------------------------------------------------------+
Verifying selections...done
Verifying requisites...done
Results...

WARNINGS
--------
  Problems described in this section are not likely to be the source of any
  immediate or serious failures, but further actions may be necessary or
  desired.

  Already Installed
  -----------------
  The number of selected filesets that are either already installed
  or effectively installed through superseding filesets is 8.  See
  the summaries at the end of this installation for details.

  NOTE:  Base level filesets may be reinstalled using the "Force"
  option (-F flag), or they may be removed, using the deinstall or
  "Remove Software Products" facility (-u flag), and then reinstalled.

  << End of Warning Section >>

SUCCESSES
---------
  Filesets listed in this section passed pre-installation verification
  and will be installed.
```

```
  Selected Filesets
  -----------------
  DirectorCommonAgent 6.1.2.0                # All required files of Direct...
  cas.agent 1.4.1.3                          # Common Agent Services Agent

  << End of Success Section >>

+-----------------------------------------------------------------------------+
                   BUILDDATE Verification ...
+-----------------------------------------------------------------------------+
Verifying build dates...done
FILESET STATISTICS
------------------
   10  Selected to be installed, of which:
        2  Passed pre-installation verification
        8  Already installed (directly or via superseding filesets)
  ----
    2  Total to be installed

+-----------------------------------------------------------------------------+
                         Installing Software...
+-----------------------------------------------------------------------------+

installp: APPLYING software for:
        cas.agent 1.4.1.3

Stopping The LWI Nonstop Profile...
Waiting for The LWI Nonstop Profile to exit...
Stopped The LWI Nonstop Profile.

... (content omitted) ...

2004 files restored.
Starting LWI...
The LWI Server has been started.
Attempting to install features.
Feature installation complete.
Stopping the server runtime. Results:
The server runtime stopped successfully.
Performing database configuration.
Database configuration complete.
You must configure the agent manager prior to starting the server.
To configure the agent manager, run
 /opt/ibm/director/bin/configAgtMgr.sh
To start the server manually, run
 /opt/ibm/director/bin/smstart
Finished processing all filesets.  (Total time:  25 mins 26 secs).

Finished processing all filesets.  (Total time:  25 mins 41 secs).

+-----------------------------------------------------------------------------+
                                Summaries:
+-----------------------------------------------------------------------------+
```

```
Installation Summary
--------------------
Name                          Level           Part        Event       Result
-------------------------------------------------------------------------------
DirectorServer                6.1.0.0         USR         APPLY       SUCCESS
Copying agent packages.
Could not determine location of the agent packages on your system.
Installation of IBM Systems Director Server completed successfully.
Would you like to configure Agent Manager using the default database?
yes
Enter the Resource Manager user ID that you would like to set for your Agent
Manager:
resmgr
Enter the Resource Manager password to set for your Agent Manager:

Verify the Resource Manager password to set for your Agent Manager:

Enter the Agent Registration password to set for your Agent Manager:

Verify the Agent Registration password to set for your Agent Manager:

Would you like to use an existing Agent Manager (yes or no)?
no

Starting data source configuration.
Dec 1, 2009 3:57:25 PM EST  Command Line Tool initialized with log parameters:
logDir[/opt/ibm/director/lwi/runtime/agentmanager/logs]
logFilePrefix[datasourceconfig]
Dec 1, 2009 3:57:25 PM EST  Storing database configuration.
Dec 1, 2009 3:57:25 PM EST  database type: derby

Dec 1, 2009 3:57:25 PM EST  database class name:
com.ibm.lwi.database.providers.DerbyProvider
Dec 1, 2009 3:57:25 PM EST  database host name: null
Dec 1, 2009 3:57:25 PM EST  database port number: null
Dec 1, 2009 3:57:25 PM EST  database driver type: type2
Dec 1, 2009 3:57:25 PM EST  runtime user name: null
Dec 1, 2009 3:57:25 PM EST  runtime user password: *****
amlwiconfig =
/opt/ibm/director/lwi/runtime/agentmanager/conf/cas-manager-database.properties
0
Starting data store installer.
INSTALL MODE: local
ARGS:  -dbtype derby -dbname /opt/ibm/director/lwi/runtime/core/DATABASE/IBMCDB
-conntype local -driverfile
/opt/ibm/director/lwi/runtime/database/eclipse/plugins/org.apache.derby.core_10.3.
3.1/derby.jar -custom:ca_instance 35311e8d028e37bca3bddd52ab3f1675
AM_LWI_CONFIG=/opt/ibm/director/lwi/runtime/agentmanager/conf/cas-manager-database
.properties
AM_PROP_FILE=/opt/ibm/director/lwi/runtime/agentmanager/eclipse/plugins/com.ibm.ti
voli.cas.manager/WEB-INF/classes/resources/AgentManager.properties
APP_SERVER_PATH=/opt/ibm/director/lwi/runtime/agentmanager/eclipse/plugins/com.ibm
.tivoli.cas.manager/WEB-INF
ARGS='-dbtype derby -dbname /opt/ibm/director/lwi/runtime/core/DATABASE/IBMCDB
-conntype local -driverfile
```

```
/opt/ibm/director/lwi/runtime/database/eclipse/plugins/org.apache.derby.core_10.3.
3.1/derby.jar -custom:ca_instance 35311e8d028e37bca3bddd52ab3f1675'
ARG_LIST=' -dbtype derby -dbname
/opt/ibm/director/lwi/runtime/core/DATABASE/IBMCDB -conntype local -driverfile
/opt/ibm/director/lwi/runtime/database/eclipse/plugins/org.apache.derby.core_10.3.
3.1/derby.jar -custom:ca_instance 35311e8d028e37bca3bddd52ab3f1675'

... (content omitted) ...

binDir=/opt/ibm/director/lwi/runtime/agentmanager/bin
JVM bit switch:
Driver archive file:
/opt/ibm/director/lwi/runtime/database/eclipse/plugins/org.apache.derby.core_10.3.
3.1/derby.jar
JVM home directory: /opt/ibm/director/jre, args: -dbtype derby -dbname
/opt/ibm/director/lwi/runtime/core/DATABASE/IBMCDB -conntype local -driverfile
/opt/ibm/director/lwi/runtime/database/eclipse/plugins/org.apache.derby.core_10.3.
3.1/derby.jar -custom:ca_instance 35311e8d028e37bca3bddd52ab3f1675
Datastore Installer return code is 0
Generating Agent Manager certificates.

... (content omitted) ...

INFO: CTGEM1058I The database URL used to obtain database connection is
jdbc:derby:/opt/ibm/director/lwi/runtime/core/DATABASE/IBMCDB
Dec 1, 2009 3:58:13 PM EST  CA Password = *****
Dec 1, 2009 3:58:14 PM com.ibm.tivoli.cas.manager.jdbc.ConnectionFactory
getConnection
INFO: CTGEM1059I Class org.apache.derby.jdbc.EmbeddedDriver used as a JDBC driver
Dec 1, 2009 3:58:14 PM com.ibm.tivoli.cas.manager.jdbc.ConnectionFactory
getConnection
INFO: CTGEM1058I The database URL used to obtain database connection is
jdbc:derby:/opt/ibm/director/lwi/runtime/core/DATABASE/IBMCDB
Dec 1, 2009 3:58:14 PM
com.ibm.tivoli.cas.manager.data.transaction.TransactionContextProvider pushContext
INFO: [TRANSACTION STACK SIZE] stack size before pushing new context: 0
Dec 1, 2009 3:58:15 PM EST  [
[
  Version: V3
  Subject: CN=TivoliAgentManagerCA, DC=nodomainname
  Signature Algorithm: MD5withRSA, OID = 1.2.840.113549.1.1.4

  Key:  IBMJCE RSA Public Key:
modulus:
112534066572771133438362150500071532448575095409230930203152185875167598803856509
372047254331851332623256163731702549596052522072574679462989023670753823058972607 79
867893408471257563754612916358375057238314832678716298565093456126461403790958065 4
507903650915190954047727650006797334115718657335663015462561777
public exponent:
65537

  Validity: [From: Mon Nov 30 16:58:12 EST 2009,
              To: Thu Nov 28 16:58:12 EST 2019]
  Issuer: CN=TivoliAgentManagerCA, DC=nodomainname
  SerialNumber: [2]
```

```
Certificate Extensions: 1
[1]: ObjectId: 2.5.29.19 Criticality=true
BasicConstraints:[
CA:true
PathLen:2
]

]
  Algorithm: [MD5withRSA]
  Signature:
0000: 86 0f a9 09 89 94 44 ba  98 ef c9 8c ab 4a 6c de  ......D......Jl.
0010: 6f 88 28 ea 88 5f 85 69  75 80 6f 8b b7 a2 05 94  o......iu.o.....
0020: a2 ed 22 cc da d4 82 ef  4a 04 c6 d0 2e 06 e0 ca  ........J.......
0030: e9 c4 c8 02 86 69 e1 66  e0 e5 74 18 30 9a 40 a3  .....i.f..t.0...
0040: 71 12 49 25 a1 7b 24 85  22 cf 80 b4 36 77 d6 1f  q.I.........6w..
0050: 60 d7 7a f3 0b 39 3a c7  79 95 c6 0c 7e 91 3d 65  ..z..9..y......e
0060: 03 f3 dc fc 68 90 01 e1  ad f8 73 27 8c 06 ac c7  ....h.....s.....
0070: c9 68 8e 14 5d a2 bd ed  53 ba 61 25 85 a7 98 fc  .h......S.a.....

]
Dec 1, 2009 3:58:16 PM com.ibm.tivoli.cas.manager.jdbc.ConnectionFactory
getConnection
INFO: CTGEM1059I Class org.apache.derby.jdbc.EmbeddedDriver used as a JDBC driver
Dec 1, 2009 3:58:16 PM com.ibm.tivoli.cas.manager.jdbc.ConnectionFactory
getConnection
INFO: CTGEM1058I The database URL used to obtain database connection is
jdbc:derby:/opt/ibm/director/lwi/runtime/core/DATABASE/IBMCDB
Dec 1, 2009 3:58:16 PM EST  Agent Manager Name:        CN=nodomainname,
CN=/opt/ibm/director/lwi/runtime/agentmanager/eclipse/plugins/com.ibm.tivoli.cas.m
anager, CN=04706FA4DE0E11DEB95146DA900030D3, CN=Agent Manager, CN=CTGEM,
DC=nodomainname
Dec 1, 2009 3:58:16 PM EST  Agent Manager Key Ring:
/opt/ibm/director/lwi/runtime/agentmanager/eclipse/plugins/com.ibm.tivoli.cas.mana
ger/certs/agentManagerKeys.jks
Dec 1, 2009 3:58:16 PM EST  Agent Manager Trust store:
/opt/ibm/director/lwi/runtime/agentmanager/eclipse/plugins/com.ibm.tivoli.cas.mana
ger/certs/agentManagerTrust.jks
Dec 1, 2009 3:58:16 PM EST  Agent Manager password:    *****
Dec 1, 2009 3:58:16 PM EST  Agent Trust Store:
/opt/ibm/director/lwi/runtime/agentmanager/eclipse/plugins/com.ibm.tivoli.cas.mana
ger/certs/agentTrust.jks
Dec 1, 2009 3:58:16 PM EST  Agent password:         *****
0
Encrypting Agent Manager properties.
Dec 1, 2009 3:58:19 PM EST  Ryx7Km9dcG42BOFqUBPplo3ylgw=
0
Performing web configuration of Agent Manager.
Dec 1, 2009 3:58:20 PM EST  Command Line Tool initialized with log parameters:
logDir[/opt/ibm/director/lwi/runtime/agentmanager/logs]
logFilePrefix[webcontainer]
Dec 1, 2009 3:58:20 PM EST  Port declarations successfully stored.
Dec 1, 2009 3:58:20 PM EST  lwiEncryptPwForWCT output: [xor] 78Kq7WLK+f3u1A==
Dec 1, 2009 3:58:20 PM EST  Secure ports configuration successfully stored.
```

```
Dec 1, 2009 3:58:20 PM EST  Virtual host configuration file found. file name:
/opt/ibm/director/lwi/conf/virtualhost.properties
Dec 1, 2009 3:58:20 PM EST  Virtual hosts configuration properties successfully
stored.
0
Configuring Resource Manager and Common Agent.
Starting Agent Manager...
Retrieving Agent Manager Instance ID... OK
Registering Agent Manager toolkit... OK
Removing Agent Manager user manager... OK
Adding Agent Manager user resmgr... OK
Configuring Common Agent... OK
Waiting for Common Agent certificates... OK
Waiting for Common Agent SLP advertisement... OK
Waiting for Common Agent status report... OK
Stopping Agent Manager... OK
Agent Manager configuration completed successfully.
In post validation...
Stopping The LWI Nonstop Profile...
Waiting for The LWI Nonstop Profile to exit...
Waiting for The LWI Nonstop Profile to exit...
Waiting for The LWI Nonstop Profile to exit...
Stopped The LWI Nonstop Profile.
Starting The LWI Nonstop Profile...
The LWI Nonstop Profile succesfully started. Please refer to logs to check the LWI
status.
Starting IBM Director...
The starting process may take a while. Please use smstatus to check if the server
is active.

Waiting for IBM Systems Director Server to be Active
IBM Systems Director Server status is: Inactive
Wait 30 seconds ...
IBM Systems Director Server status is: Inactive
Wait 30 seconds ...
IBM Systems Director Server status is: Starting
Wait 30 seconds ...
IBM Systems Director Server status is: Starting
Wait 30 seconds ...
IBM Systems Director Server status is: Starting
Wait 30 seconds ...
IBM Systems Director Server status is: Active
Now waiting for communication state to be ready...
Now checking the space needed for the director server updates importing and
installation...    [done]
Now waiting for communication state to be ready...
Updating...
Collecting software inventory on the management server...
.....................................................................................
Inventory collection completed successfully. Importing updates...
...ATKUPD293I Update "cfgdbcmd.feature_1.0.2" was successfully imported to the
library.

... (content omitted) ...
```

```
ATKUPD741I Update Installation service: "Feature Installation" finished
successfully.
.............................ATKUPD747W Provider "Feature Installation" was
unable to restart local resource "IBM Systems Director". Restart must be performed
manually to complete the install operation.
ATKUPD703I Update Installation service: Request completed.
ATKUPD727I The update install task has finished successfully.
.Waiting for post-install inventory and compliance to complete...
.........................................................................
Post-install compliance is complete.
Deleting group: All Needed IBM Systems Director 6.1 Updates
It is now safe to restart the management server.
In post validation...
Now cleaning all temporary filesets and filesystems created during the
installation...
Shutting down IBM Director...
Stopping The LWI Nonstop Profile...
Waiting for The LWI Nonstop Profile to exit...
Waiting for The LWI Nonstop Profile to exit...
Waiting for The LWI Nonstop Profile to exit...
Stopped The LWI Nonstop Profile.
Removing file systems that can not be removed while director server is running...
Starting The LWI Nonstop Profile...
The LWI Nonstop Profile succesfully started. Please refer to logs to check the LWI
status.
Local resource "IBM Systems Director" restarted.
Starting IBM Director...
The starting process may take a while. Please use smstatus to check if the server
is active.

                                                                        [done]
root@p550ip2 /kits/SysDir_6_1_2_Server_AIX/bin>
```

Note that after the installation of the Director server 6.1.0.0 file set, the installer calls the `configAgtMgr.sh` script to configure the agent manager that the server uses to manage the Common Agent resources. In this case, the default Derby database is used by automatically answering “yes” to the question "Would you like to configure Agent Manager using the default database?". The resource manager credentials and the agent registration password need to be provided. The installation process continues without a need for user input.

At the end of the installation process, after the updates are imported, if you get the message `ATKUPD747W Provider Feature Installation was unable to restart local resource IBM Systems Director`, a restart must be performed manually to complete the install operation.

To restart the agent (which is the Common Agent component) use the following commands (see Example 3-8):

- `/opt/ibm/director/agent/runtime/agent/bin/endpoint.sh stop`
- `/opt/ibm/director/agent/runtime/agent/bin/endpoint.sh start`

Example 3-8 Restart of the agent after the installation of the IBM Systems Director Server

```
root@p55O1p2 /> /opt/ibm/director/agent/runtime/agent/bin/endpoint.sh stop
Stopping The LWI Nonstop Profile...
Waiting for The LWI Nonstop Profile to exit...
Stopped The LWI Nonstop Profile.
root@p55O1p2 /> /opt/ibm/director/agent/runtime/agent/bin/endpoint.sh start
Starting The LWI Nonstop Profile...
The LWI Nonstop Profile succesfully started. Please refer to logs to check the LWI
status.
root@p55O1p2 />
```

3.4 Updating the IBM Systems Director Server to version 6.1.2.1

Updating the IBM Systems Director Server components can be performed in one of the two ways:

3.4.1 Use the Fix Service Provider option

The IBM Systems Director Server needs to have access to the Internet. The IBM Systems Director Server contacts the IBM Support Web site and downloads the latest updates available for the product and imports them into the server repository.

3.4.2 Use the Fix Central Web site

Go to the IBM Support Fix Central Web site and download the latest updates available for the product. Upload the updates to a locally accessible location on the management server, import the updates into the server repository.

This section covers the steps required to update IBM Systems Director using the IBM Support Fix Central Web site.

To check for and acquire the IBM Systems Director updates through Fix Central, perform the following steps:

1. Go to IBM Support Fix Central Web site:

   `http://www.ibm.com/support/fixcentral/main`

2. Use the following options:
   - Product Group = IBM Systems Director
   - Product = IBM Systems Director
   - Installed Version = 6.1
   - Platform = All

   Click **Continue**.

3. Select fix pack `SysDir6_1_2_1` and click **Continue**.

4. Select the download method and click **Continue**.

> **Note:** Due to the large number of update files included in this update group, it is recommended to download the updates using the Download Director (Java applet).

5. Click **I Agree** to confirm the agreement of the terms and conditions. The next page lists all the updates and fixes included in the update group previously selected.
6. Click **Download now** to start downloading the updates.

The following steps illustrate the complete process of updating IBM Systems Director using the Update Manager plug-in.

1. Download the update package to the management server and store it to a local directory.

> **Note:** Use short names for the path where the updates will be stored.

2. Log into the IBM Systems Director Web interface as the root user. By default, this is the only user having the full administrative authority to manage the Director Server.
3. In the navigation area of the interface, click **Inventory** → **View and Collect Inventory** to view the inventory of the management server and to collect the most current inventory values.
4. Select the management server as the target system from the list. Use **Browse** to select it if it is not available yet in the list. Click **Collect Inventory**.
5. Select **Run Now** and click **OK** to start the inventory collection task immediately.
6. Click **Display Properties** in the message window that displays. The “Active and Scheduled Jobs” page opens up to show the status of the tasks (Figure 3-4). Wait for the task to finish, then you can close this page and the “View and Collect Inventory” page.

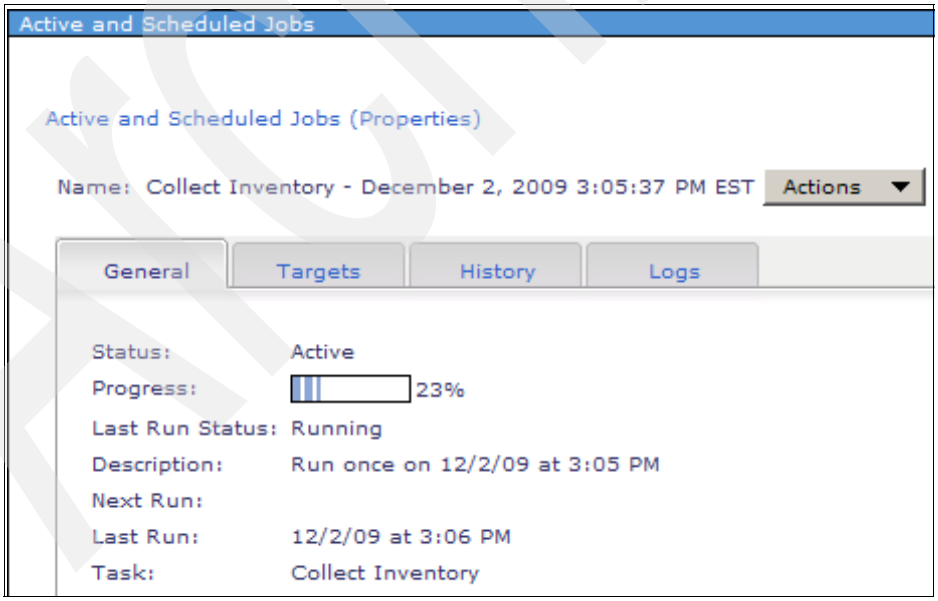

Figure 3-4 Status of the collect inventory task

7. In the navigation area, click **Release Management** → **Updates**.
8. On the “Update Manager” page, click **Import Updates** in the Common Tasks section. Enter the path where the updates are stored, as shown in Figure 3-5, and click **OK**.

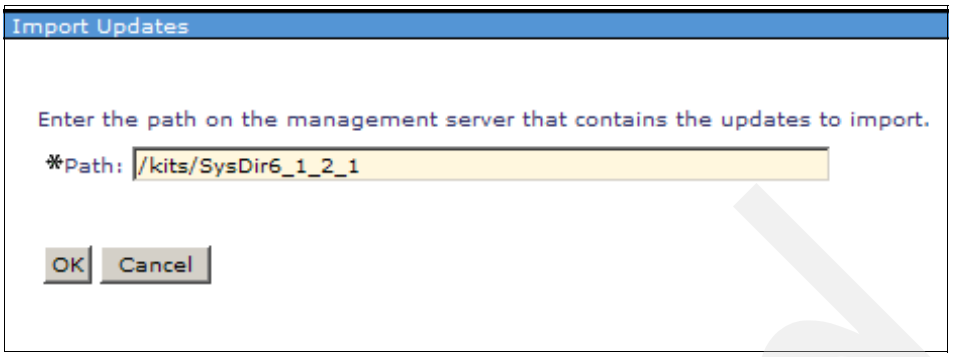

Figure 3-5 Provide the local directory path where the updates are stored

9. Select **Run Now** and click **OK** for the Import Updates task to start immediately.
10. Click **Display Properties** and wait for this task to complete. Further details might be provided in the Logs tab. After the import operation is finished, close all open pages.
11. Return to the “Welcome” page, go to the Manage tab and click **Update IBM Systems Director** on the Update Manager plug-in section, as shown in Figure 3-6.

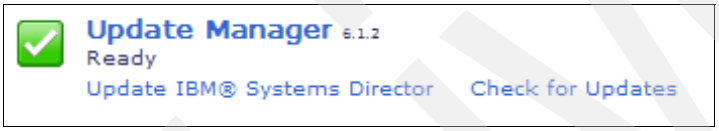

Figure 3-6 Update manager plug-in section available in the manage tab of the welcome page

12. The “Update IBM Systems Director” page is displayed (Figure 3-7). This lists all the updates that are available to install on top of the existing IBM Systems Director Server installation.

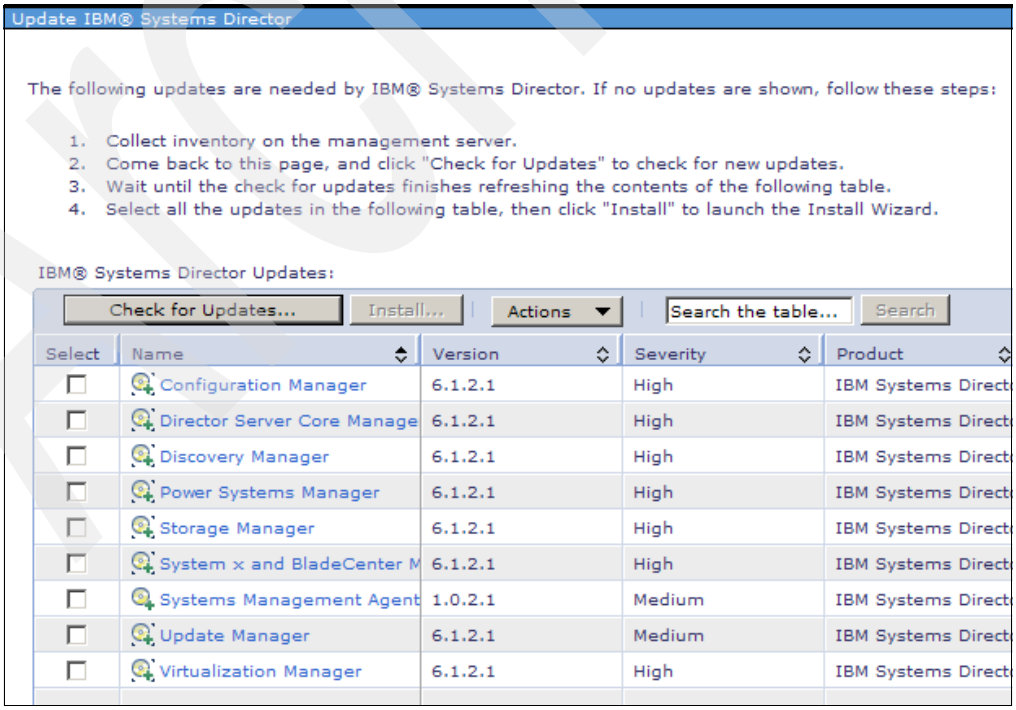

Figure 3-7 Updates available to apply on existing IBM Systems Director 6.1.2 installation

13. Click **Actions** → **Select All** and click **Install**.
14. The “Install Wizard” page opens. The Welcome pane is shown, click **Next**.
15. On the “Options” page, leave the **Automatically install missing required updates option** check box selected and click **Next**.
16. On the “Restarts” page, you might get a message window that informs you that a restart of the Director Server is required. Click **Next** to continue.
17. On the “Summary” page, review the options and click **Finish**.
18. When the install wizard finishes, click **Display Properties** to get the status and details of the update process running in the background, as shown in Figure 3-8.

Figure 3-8 Status of the IBM Systems Director update process

19. After the update is completed, restart the IBM Systems Director to activate the updates, as shown in Example 3-9.

    To restart the Director server, use the following commands:

    - `/opt/ibm/director/bin/smstop`
    - `/opt/ibm/director/bin/smstart`

Example 3-9 Restart the IBM Systems Director after the updates are installed

```
p5501p2(root)/kits/SysDir6_1_2_1> /opt/ibm/director/bin/smstop
Shutting down IBM Director...
p5501p2(root)/kits/SysDir6_1_2_1> /opt/ibm/director/bin/smstatus
Inactive
p5501p2(root)/kits/SysDir6_1_2_1> /opt/ibm/director/bin/smstart
Starting IBM Director...
The starting process may take a while. Please use smstatus to check if the server
is active.

p5501p2(root)/kits/SysDir6_1_2_1> /opt/ibm/director/bin/smstatus -r
Inactive
Starting
Active
p5501p2(root)/kits/SysDir6_1_2_1>
```

20. Log into the Web interface and go to the Manage tab of the “Welcome” page. The IBM Systems Director Server version reported will be 6.1.2.1, as shown in Figure 3-9.

Figure 3-9 Displaying the version of IBM Systems Director Server

3.5 Importing the Common Agent package into the IBM Systems Director Server

Most of the advanced features that are provided by IBM Systems Director requires the Common Agent component to be installed on the managed systems. This is also a requirement for VMControl to integrate with the NIM server. This integration is supported by the VMControl subagent for NIM, and must be installed on the NIM server on top of the Common Agent to extend the functionality.

The Common Agent component can be installed manually or deployed on the managed systems using the Release Management features. The installation of the Common Agent on the NIM server is performed using the Release Management plug-in. To deploy the Common Agent component using Release Management, the Common Agent package must be imported to the IBM Systems Director Server.

To import the Common Agent package to the IBM Systems Director Server, the following steps must be performed:

1. Go to the IBM Systems Director downloads Web site at:

   `http://www.ibm.com/systems/management/director/downloads`

2. Click **Download IBM Systems Director agents**.
3. Click **Choose and download Common or Platform Agents to install using the Agent installation wizard in IBM Systems Director Server**.
4. Select the **I agree** check box to confirm the license agreement and click **I confirm** to continue.
5. Select IBM Systems Director 6.1.2 Common Agent for AIX package with the file name `SysDir6_1_2_Common_Agent_AIX.tcdriver` and click **Download now**.

   In case of problems with the Java plug-in for your browser, you can download the package using the standard HTTP method. Transfer the file to a local directory on the IBM Systems Director Server. The package must be accessible from a local directory on the server.

6. Click **Release Management** → **Agents** and click **Import Agent**.

7. Enter the directory path that contains the package you previously transferred, as shown in Figure 3-10, and click **OK**.

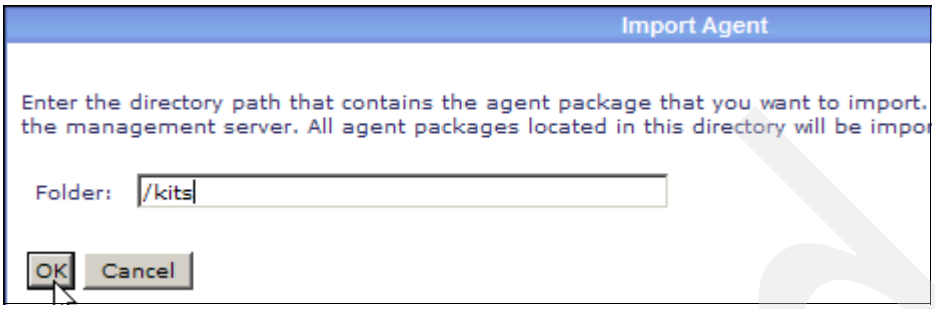

Figure 3-10 Select the path where the Common Agent package is stored

Wait for the import process to finish. A message window confirms that the package was imported successfully, as shown in Figure 3-11.

Figure 3-11 The message window that confirms the import of the Common Agent package

8. Restart the IBM Systems Director Server.

   You can now deploy the Common Agent to agentless managed systems directly from the IBM Systems Director Web interface using the Release Management tool.

3.6 Installing the Common Agent on the NIM server

IBM Systems Director VMControl includes virtualization manager subagents that can be deployed or installed on Common Agent-managed systems to extend the functionality and use the features VMControl provides for managing virtual resources available in the infrastructure.

This section covers the Common Agent installation on an agentless-managed system by deploying the Common Agent package using Release Management. This agent is required by the VMControl subagent for NIM components that will be installed later.

3.6.1 Hardware requirements

The Common Agent has minimum processor speed, memory, and disk space requirements. The processor can be POWER5 or POWER6 architecture and the minimum amount of memory (RAM) required is 512MB.

In terms of disk space requirements, Table 3-5 provides the minimum amount of space needed for installing the Common Agent on AIX systems.

Table 3-5 Disk space requirements for the Common Agent installation on AIX

File system	Disk space requirements
/	10 MB
/usr	110 MB
/var	170 MB
/tmp	292 MB
/opt	190 MB

Note: During the installation of the Common Agent, `/tmp` must have 280 MB of free space available. Although this space is only required during the installation and is released after the installation is completed, you need to make sure that this free space is available before starting the installation.

If you install the agent using the Agent Installation Wizard (this is the method described in this case, and not installing the agent manually), the local directory of your choice for the `dir6.1.2_common_agent_aix.sh` file must have at least 210 MB of free space available.

3.6.2 Software requirements

IBM Systems Director Common Agent 6.1.2 for AIX is supported on AIX 5.3 TL06 SP09 or later and on AIX 6.1 TL00 SP07 or later. Use the **`oslevel -s`** command to find the complete version of your AIX operating system, as shown in Example 3-10.

Example 3-10 Finding the complete version of the AIX operating system

```
root@p5501p1 / > oslevel -s
6100-04-01-0944
root@p5501p1 / >
```

To prepare the AIX system to be managed by the IBM Systems Director Server, make sure OpenSSH 4.7.0.530 or later is installed and the SSH service is running. Complete the following steps on the AIX system to enable the system to be discoverable.

1. Check if sshd is running using the **`lssrc -s sshd`** command.
2. If sshd is not running, use the **`startsrc -s sshd`** command to start it.

3.6.3 Deploying the Common Agent

Common Agent version 6.1.2 or later must be installed on the NIM server before installing the VMControl subagent for NIM.

To deploy the Common Agent on the NIM server, perform the following steps:

1. Discover the NIM server using **Inventory** → **System Discovery**. In this case, a range of IP addresses containing the NIM server's IP address are used, as shown in Figure 3-12.

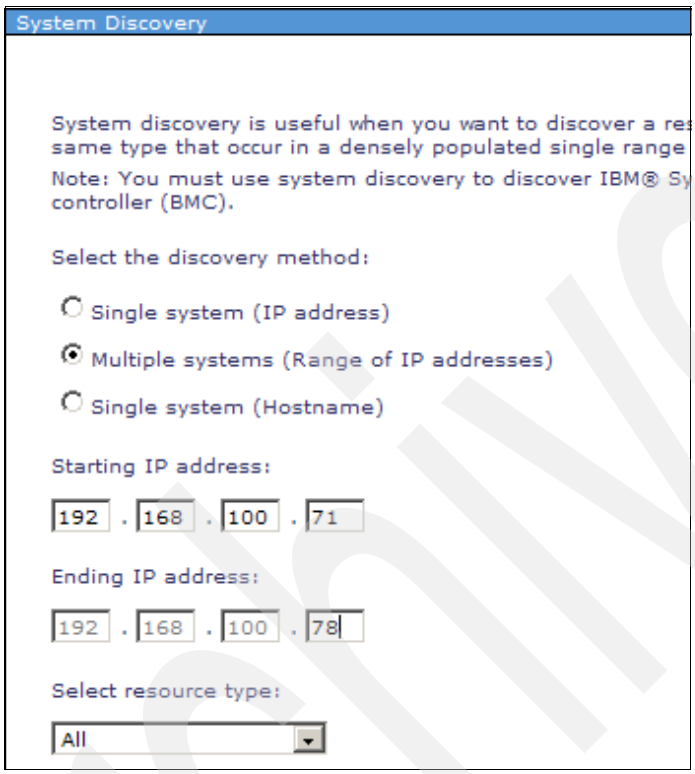

Figure 3-12 Discovering the NIM server

2. Having the NIM server included in the range of IP addresses provided allows the NIM server to be discovered along with any other system that might be found based on the discovery criteria. In our environment, the p5501p1 system is the NIM server, as shown in Figure 3-13.

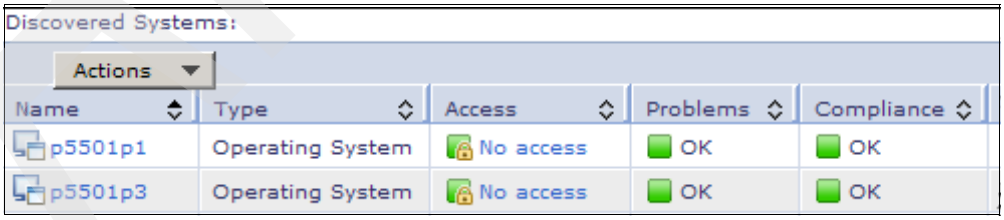

Figure 3-13 Discovery results

3. Right-click the p5501p1 system and select **Security** → **Request Access**. Or you can click **No access** to get to the same page. Provide the credentials for the root user and click **Request Access**. After the access is granted (Figure 3-14), you can close the page by clicking **Close**.

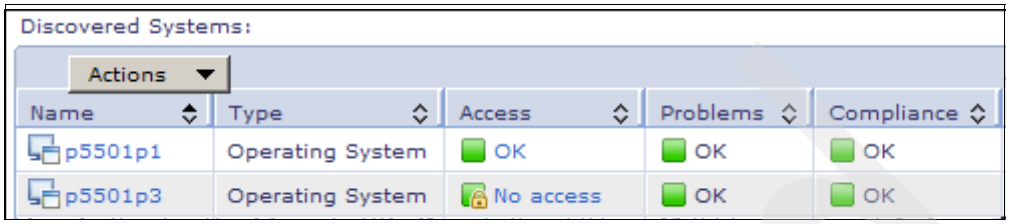

Figure 3-14 NIM server access status after an granted access request

The System Discovery page can also be closed.

4. In the navigation area of the Web interface, click **Release Management** → **Agents**.
5. On the Agents page that opens, click **Common Agent Packages**.
6. Select CommonAgent 6.1.2 AIX, as shown in Figure 3-15 and click **Install Agent**.

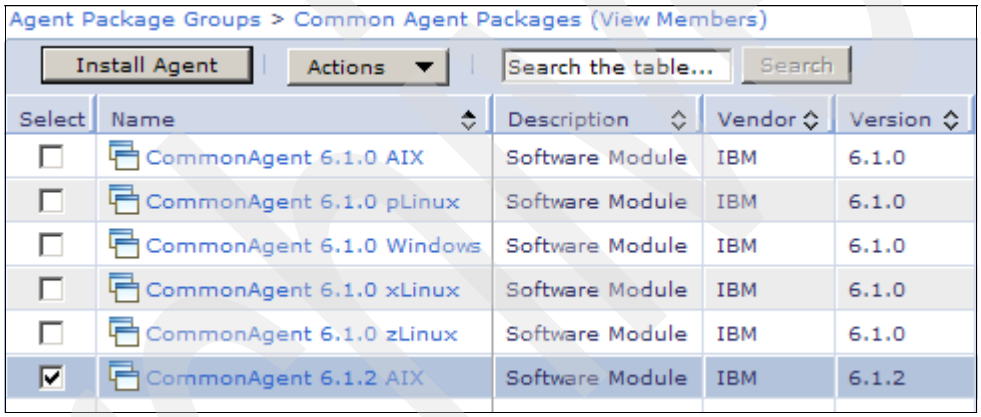

Figure 3-15 Select the Common Agent 6.1.2 package that was previously imported

7. On the “Welcome” page of the installation wizard, click **Next**.
8. On the Agents page of the wizard, ensure the Common Agent for AIX package is included in the selected section, as shown in Figure 3-16. Click **Next**.

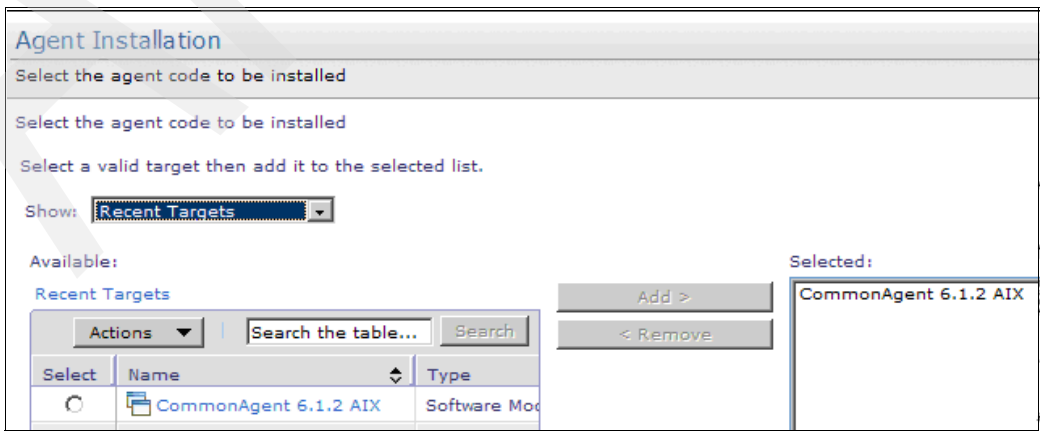

Figure 3-16 The agents page of the installation wizard

9. Select the system that runs the NIM server. In our case, this is the p5501p1 system shown in Figure 3-17, which was previously discovered. Click **Add** to include it in the selected section and click **Next**.

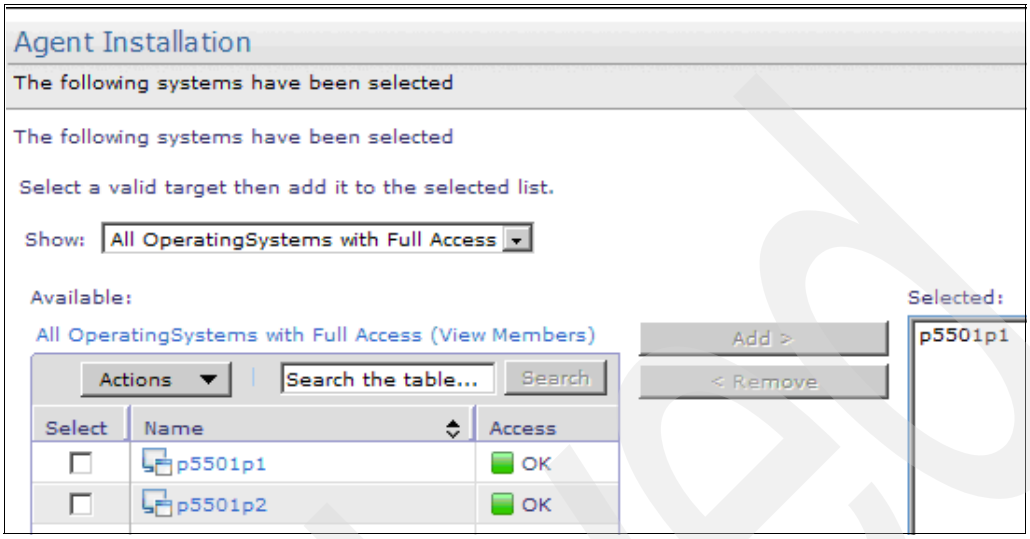

Figure 3-17 System page of the installation wizard

10. On the Summary page, as shown in Figure 3-18, review the options selected and click **Finish**.

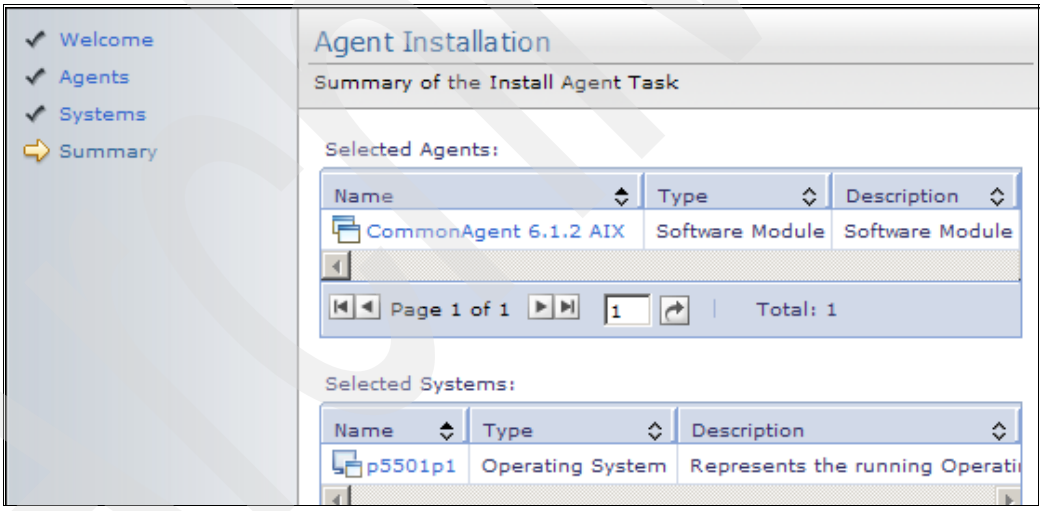

Figure 3-18 Summary page of the installation wizard

11. Select **Run Now** and click **OK** for the Install Agent task to start immediately.

12. Click **Display Properties** to get the status and details about the deployment of the agent on the selected system, as shown in Figure 3-19. Wait until the task is completed.

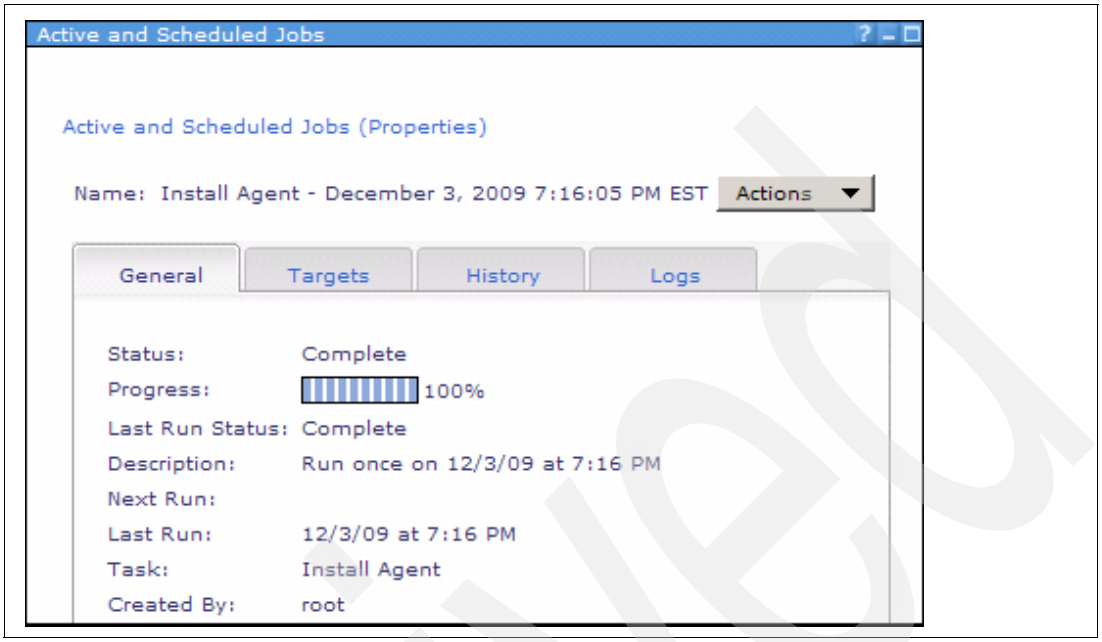

Figure 3-19 Status of a successful deployment of the Common Agent

13. It is recommended to collect again the inventory for this system. At the end, the system must be seen as a Common Agent-managed system as shown in Figure 3-20.

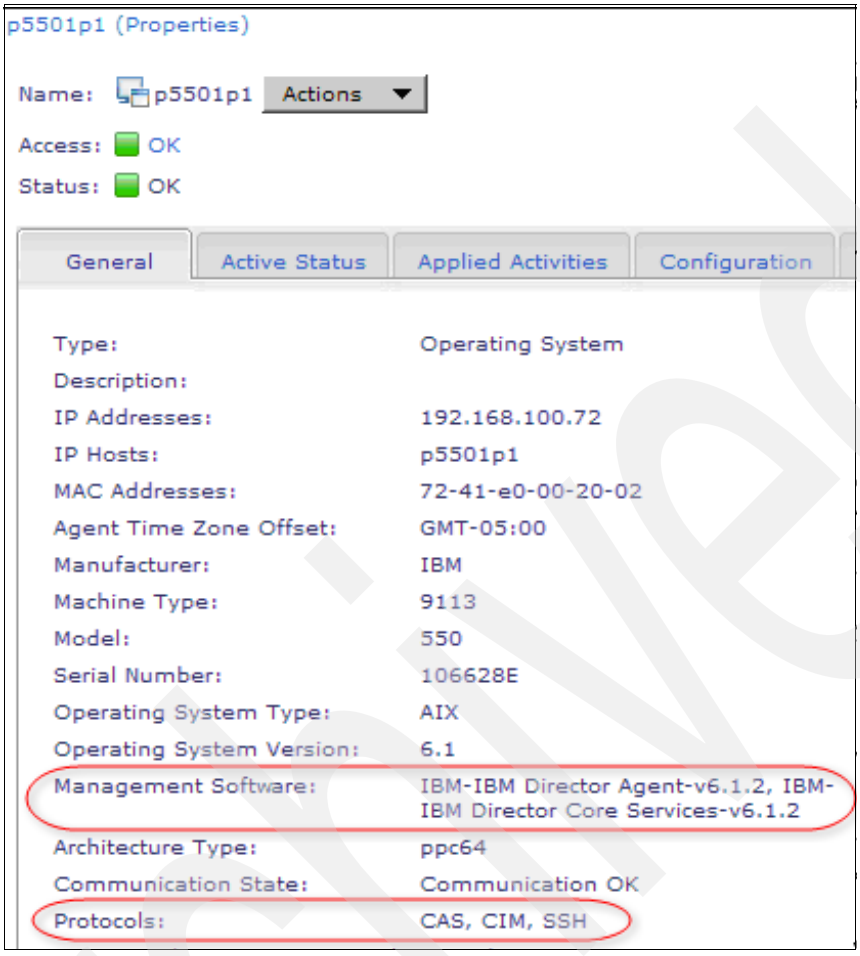

Figure 3-20 Status of the NIM server after the deployment of the Common Agent

3.7 Installing IBM Systems Director VMControl

IBM Systems Director VMControl is a separate installable plug-in that you can download from the IBM Systems Director VMControl Web site:

http://www.ibm.com/systems/management/director/plugins/vmcontrol/index.html

Install IBM Systems Director VMControl Express Edition, and the Standard and Enterprise Editions to exploit IBM Systems Director VMControl Image Manager and IBM Systems Director VMControl System Pools, respectively, in a virtualized environment.

3.7.1 Power Systems virtualization support

IBM Systems Director VMControl supports the same levels of the Hardware Management Console (HMC) and the Integrated Virtualization Manager (IVM) as IBM Systems Director Server version 6.1.2. However, if you want to relocate virtual servers based on predicted hardware failures, VMControl requires the following levels:

- HMC Version 7.3.5.
- IVM Version 2.1.2.

> **Note:** It is recommended that you apply the latest available service pack.

3.7.2 Installing the VMControl plug-in

The hardware and software requirements of VMControl 2.2 consist of the following:

- IBM Systems Director VMControl is supported on all hardware and software environments that are supported by the IBM Systems Director Server 6.1.2.1.
- For AIX and Linux, ensure that the appropriate X11 libraries are installed on the system.

For more detail information about the software and hardware requirements, see the IBM Systems Director VMControl 2.2 installation and user's guide planning section:

http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp?topic=/director_6.1/fqm0_main.html

Install IBM Systems Director VMControl by using either the installation program or by using a response file to perform an unattended installation. Either method installs both the no-charge function of IBM Systems Director VMControl and starts a 60–day evaluation period for IBM Systems Director VMControl Image Manager and IBM Systems Director VMControl System Pools. When the evaluation period expires, you can continue using the no-charge functions of the IBM Systems Director VMControl (Express Edition), and you can purchase a license to continue using the features of the IBM Systems Director VMControl Image Manager (Standard Edition) and the IBM Systems Director VMControl System Pools (Enterprise Edition).

For further details about the requirements and license, consult IBM Systems Director VMControl Installation and User's Guide manual available at the following Web page:

http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp?topic=/director_6.1/fqm0_main.html

To install the VMControl 2.2 plug-in in an existing IBM Systems Director Server 6.1.2.1 installation, the following steps must be performed:

1. Download the IBM Systems Director VMControl installation program from the IBM Systems Director downloads Web site:

   http://www.ibm.com/systems/management/director/downloads/plugins

   The download package for AIX is SysDir_VMControl_2_2_AIX.tar.gz.

2. Extract the contents of the download package as shown in Example 3-11.

   Example 3-11 Extract the VMControl installation package into a local directory

```
p5501p2(root)/kits/vmc22> ls
SysDir_VMControl_2_2_AIX.tar.gz
p5501p2(root)/kits/vmc22>
p5501p2(root)/kits/vmc22> mkdir aix ; cd aix
p5501p2(root)/kits/vmc22/aix>
p5501p2(root)/kits/vmc22/aix> gzip -dc ../SysDir_VMControl_2_2_AIX.tar.gz | tar
-xf -
p5501p2(root)/kits/vmc22/aix>
```

   Installation of the VMControl plug-in can be performed either in standard or silent mode. The standard method requires a graphical display to be available using an external X11 server and exporting the DISPLAY environment variable or through VNC which is not installed by default with AIX.

   Launch the installation wizard using the installation script provided. For AIX environments, the installation script file is Systems_Director_VMControl_2_2_AIX.sh. In this case, the installation is done using VNC, which means a graphical environment is used.

3. Start the installation wizard using the installation script as shown in Example 3-12.

   Example 3-12 Starting the installation of IBM Systems Director VMControl plug-in on AIX

```
p5501p2(root)/kits/vmc22/aix> ./Systems_Director_VMControl_2_2_AIX.sh
Preparing to install...
Extracting the JRE from the installer archive...
Unpacking the JRE...
Extracting the installation resources from the installer archive...
Configuring the installer for this system's environment...

Launching installer...
```

4. Click **OK** in the splash window to start the installation wizard.
5. In the Welcome pane, click **Next**.
6. Accept the license agreement and click **Next**.
7. Choose if you want IBM Systems Director Server to be restarted after the VMControl installation and click **Next**.
8. Click **Install** in the Summary pane of the wizard as shown in Figure 3-21 on page 48.

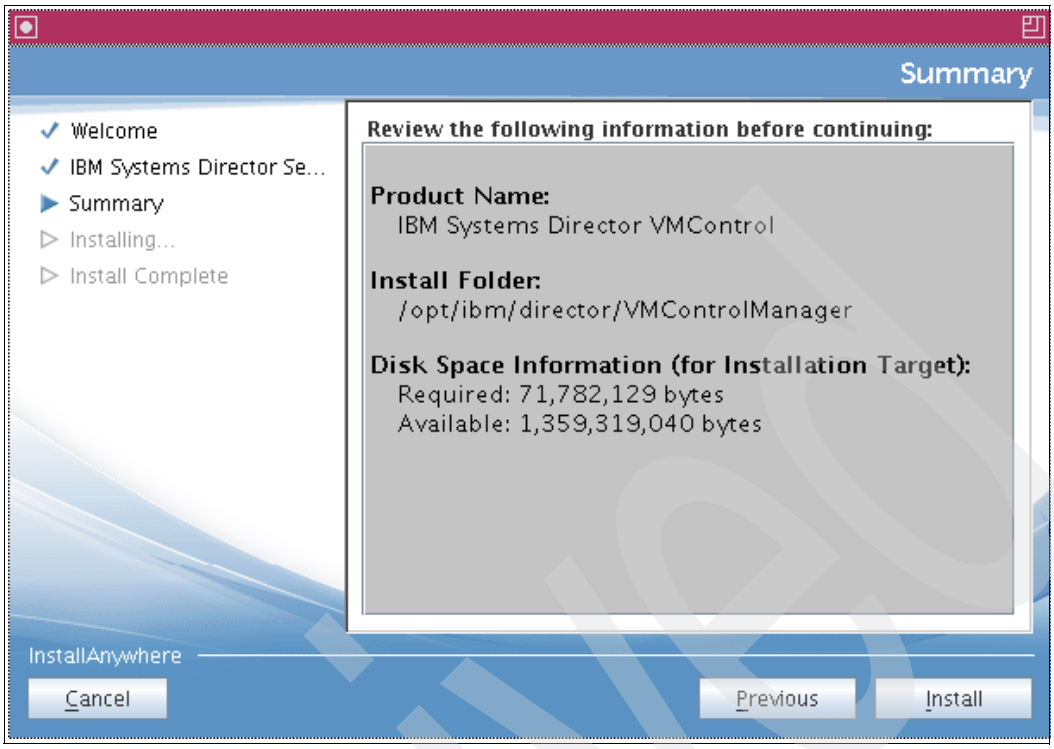

Figure 3-21 Summary pane of the VMControl installation wizard

9. The installation might take several minutes. The IBM Systems Director Server will be restarted during the installation time. Click **Done** to close the installation wizard when the installation process is finished, as shown in Figure 3-22.

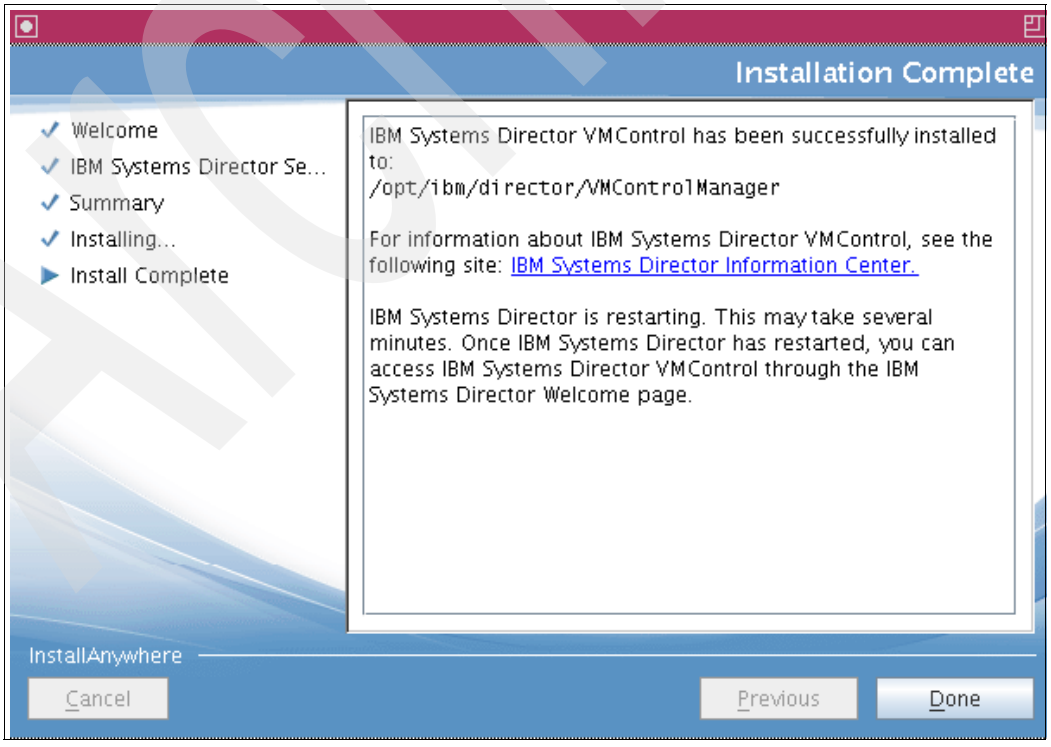

Figure 3-22 Last step of the VMControl installation wizard

10. To verify if the installation completed successfully, check the following install log file:

```
/opt/ibm/director/VMControlManager/installLog.txt
```

3.7.3 Installing the VMControl subagent for NIM

For IBM Systems Director VMControl to manage virtual appliances that contain AIX mksysb or lpp_source images, you must have a properly installed and configured NIM server in your environment.

Before you can use IBM Systems Director VMControl, you need to install a subagent in your NIM for your virtualized environment. You can install the subagent using the installation wizard or you can manually install the subagent.

Software requirements

Before installing the VMControl subagent for NIM, ensure that the NIM server meets the following requirements before continuing with the installation:

- The system is running AIX version 6.1 TL03 or later.
- The following file sets are installed:
  - dsm.core
  - OpenSSH packages:
    - openssh.base.client
    - openssh.base.server
    - openssh.license
    - openssl.base
    - openssl.license
- The system has been discovered, accessed, and inventoried by your IBM Systems Director Server.
- The system is configured as a NIM server, there is network communication between the NIM, the IBM Systems Director Server, and the systems where the images will be deployed.

To confirm the file sets mentioned are installed on the NIM server, run the following commands:

```
lslpp -l | grep dsm
lslpp -l | grep openssh
lslpp -l | grep openssl
```

See Example 3-13 for output on the software requirements verification.

Example 3-13 Requirements verification for VMControl subagent for NIM

```
p55O1p1(root)/> lslpp -l | egrep -i "dsm|openssh|openssl"
  dsm.core                    6.1.4.0  COMMITTED  Distributed Systems Management
  openssh.base.client      5.0.0.5301  COMMITTED  Open Secure Shell Commands
  openssh.base.server      5.0.0.5301  COMMITTED  Open Secure Shell Server
  openssh.license          5.0.0.5301  COMMITTED  Open Secure Shell License
  openssh.man.en_US        5.0.0.5301  COMMITTED  Open Secure Shell
  openssh.msg.EN_US        5.0.0.5301  COMMITTED  Open Secure Shell Messages -
  openssh.msg.en_US        5.0.0.5301  COMMITTED  Open Secure Shell Messages -
  openssl.base              0.9.8.801  COMMITTED  Open Secure Socket Layer
  openssl.license           0.9.8.801  COMMITTED  Open Secure Socket License
  openssl.man.en_US         0.9.8.801  COMMITTED  Open Secure Socket Layer
```

```
  dsm.core                    6.1.4.0  COMMITTED  Distributed Systems Management
  openssh.base.client      5.0.0.5301  COMMITTED  Open Secure Shell Commands
  openssh.base.server      5.0.0.5301  COMMITTED  Open Secure Shell Server
  openssl.base              0.9.8.801  COMMITTED  Open Secure Socket Layer
p5501p1(root)/>
```

Note: dsm.core fileset is the Distributed Systems Management Core package and is available starting with AIX V6.1 TL03 base image. This is also the minimum AIX level supported by IBM Systems Director VMControl plug-in.

Installation steps

To install the VMControl subagent for NIM from the VMControl Summary page, follow these steps:

1. In the navigation area click **System Configuration** → **VMControl**.
2. On the Summary page of VMControl (Figure 3-23), click **Install Agents**.

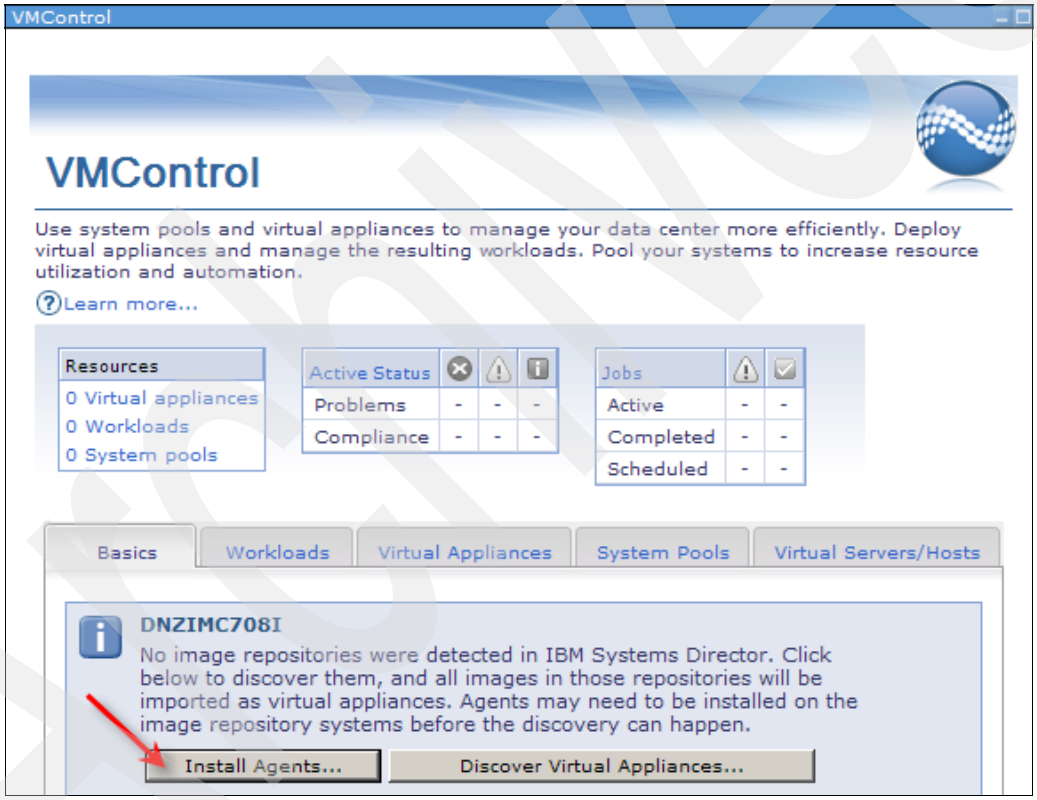

Figure 3-23 VMControl summary page

3. On the Welcome page of the Agent Installation Wizard, click **Next**.
4. On the Agents page, click **Common Agent Subagent Packages**.
5. Select the CommonAgentSubagent_VMControl_NIM-2.2.0 subpackage, and click **Add**. Click **Next** to continue.
6. On the Systems page, add the system that runs the NIM server as the selected target and click **Next**.

7. On the Summary page (Figure 3-24) review the selected options and click **Finish**.

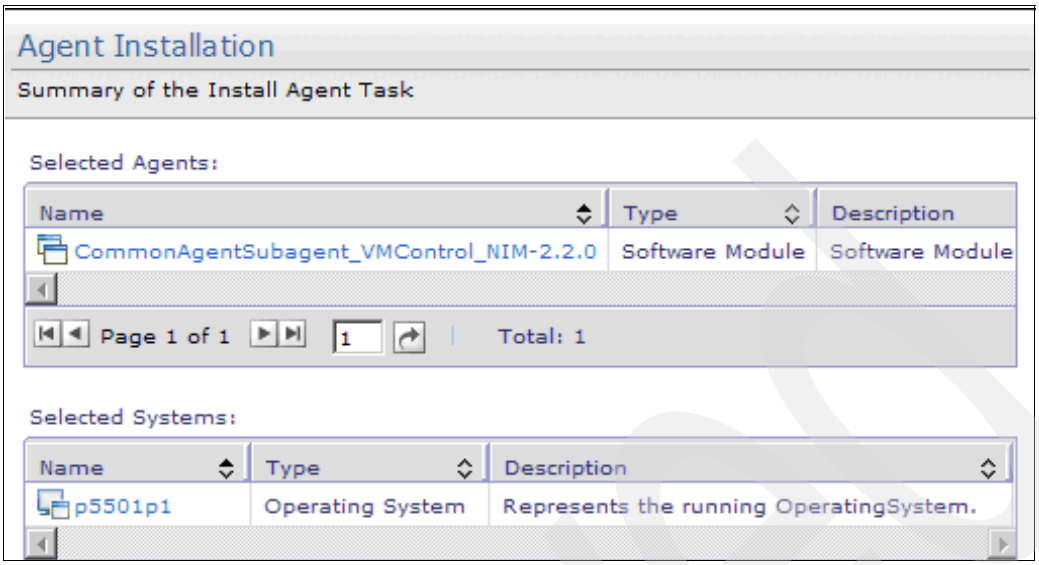

Figure 3-24 Summary page of the Agent Installation Wizard

8. Select **Run Now** and click **OK**.
9. Click **Display Properties** and wait for the deployment of VMControl subagent for NIM to finish.

Verification steps

Follow these steps to validate that the VMControl subagent for NIM was installed successfully in addition to the existing Common Agent:

1. Verify that the IBM Systems Director VMControl subagent for NIM is installed successfully by checking the logs files of the agent in the `/opt/ibm/director/agent/logs` directory. To verify that the subagent for NIM installed successfully, check the error log for messages beginning with DNZIMN.

> **Note:** Check the log files. You might get “DNZIMN704E VMControl subagent for NIM installation error: Fileset 'dsm.core' was not detected on the target system. Install fileset 'dsm.core' on the target system and try the task again. See the VMControl agent installation topics in the IBM Systems Director Information Center.” message.
>
> If that is the case, it means that the dsm.core fileset is not installed on the system and it is required.

2. Right-click the host system in Navigate Resources, and click **Security** → **Verify Connection**. You can view the virtualization manager tasks menu.

3. Restart the Common Agent to activate the IBM Systems Director VMControl virtualization manager subagent as shown in Example 3-14.

Example 3-14 Restart the Common Agent after VMControl subagent for NIM deployment

```
p550ip1(root)/> /opt/ibm/director/agent/runtime/agent/bin/endpoint.sh stop
Stopping The LWI Nonstop Profile...
Waiting for The LWI Nonstop Profile to exit...
Waiting for The LWI Nonstop Profile to exit...
Stopped The LWI Nonstop Profile.
p550ip1(root)/> /opt/ibm/director/agent/runtime/agent/bin/endpoint.sh start
Starting The LWI Nonstop Profile...
The LWI Nonstop Profile succesfully started. Please refer to logs to check the
LWI status.
p550ip1(root)/>
```

3.8 Introduction to VMControl system pools

System pools enable you to group similar hosts with IBM Systems Director VMControl. You can create, for example, system pools of selected hosts, add remove hosts from the system pools, enter and exit maintenance mode for the hosts, and permanently delete system pools.

Before we start the system pools section, we assume you have already installed the VMControl plug-in, and the entire infrastructure is operational. In our case, we prepared our environment following the steps shown in Figure 3-25.

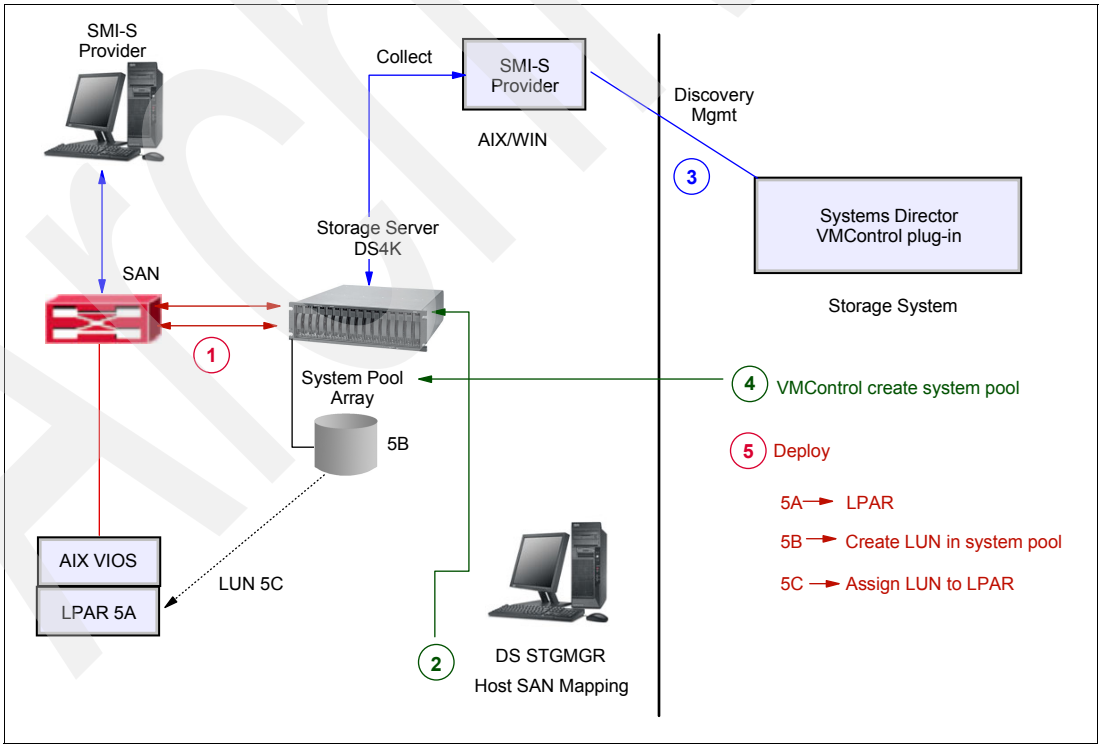

Figure 3-25 Preparing the environment for system pools

3.9 Preparing your environment for system pools

Before using IBM Systems Director VMControl to manage system pools, prepare your environment.

Important: From the experiences gathered during the residency, before and after configuring VMControl system pools, the preparation of the environment is critical to the success of the system pools implementation. We advise taking your time collecting and preparing your environment before thinking about configuring systems pools.

To prepare your environment for system pools, complete the following steps:

1. Check if the prerequisites are installed and ready to implement system pools by performing the following steps:
   a. Verify your HMC/IVMs are discovered and have inventory collected.
   b. Verify your VIOS LPARs are discovered and have inventory collected.
   c. Verify your VIOS LPARs are Dynamic LPAR-capable (RMC-connected).
   d. Verify you can deploy virtual appliance to virtual servers.
   e. Ensure that you are using storage subsystems that are supported by IBM Systems Director.

   Note: Check the IBM information center for SMI-S agents supported by IBM Systems Director:

   http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp?topic=/director.storage_6.1/fqm0_t_sm_configuring_storage.html

   If you use IBM Tivoli Productivity Center (TPC) to manage your storage subsystems, see the TPC documents for the supported storage agents.

   If your storage subsystem is not DS3000 or DS4000®, see the following pages to get a general support document to prepare the storage for system pools.

   - To prepare your environment for system pools see the following Web page:

     http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp?topic=/director.storage_6.1/fqm0_t_sm_configuring_storage.html

   - To manage storage using IBM Systems Director VMControl see the following Web page:

     http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp?topic=/director.storage_6.1/fqm0_t_sm_configuring_storage.html

   f. Ensure that you are using SAN switches that are supported by IBM Systems Director.

   Note: Check the IBM information center documentation previously mentioned to check if your switch requires a SMI-S agent.

2. Set up your SAN environment so that all the hosts in the pool are connected to the same shared storage.
   - Make sure the zones are correctly configured. At the time of writing this IBM Redbooks publication, VMControl only supported WWPN-based zones and did not support switch port-based zone configuration.
   - Check carefully if all the WWPNs are correctly entered for each VIOS and the storage subsystems. It is important for VMControl to get the correct topology of the SAN environment.
3. Install the SMI-S agents for your storage subsystems (see 3.10, “SMI-S: Storage Management Initiative Specification” on page 65 and 3.11, “Installing the SMI-S provider for the storage system” on page 71).

> **Note:** Download the storage SMI-S agent if you are using an IBM DS3000 or DS4000 storage:
>
> http://www.lsi.com/storage_home/products_home/external_raid/management_software/smis_provider/index.html?remote=1&locale=EN
>
> If you are planning to install the storage agent and switch agent in the same server, you need to change the ports used by these agents.
>
> If you install both agents on the Director Server, you need to change the ports too.
>
> See the IBM information center documentation to get more detailed information about the SMI-S agents and storage subsystems supported by the IBM Systems Director:
>
> http://publib.boulder.ibm.com/infocenter/director/v6r1x/topic/director.storage_6.1/fqm0_t_sm_configuring_storage.html

4. Discover and collect inventory on your storage devices.
   a. Click **Inventory** → **Advanced System Discovery**, as shown in Figure 3-26.

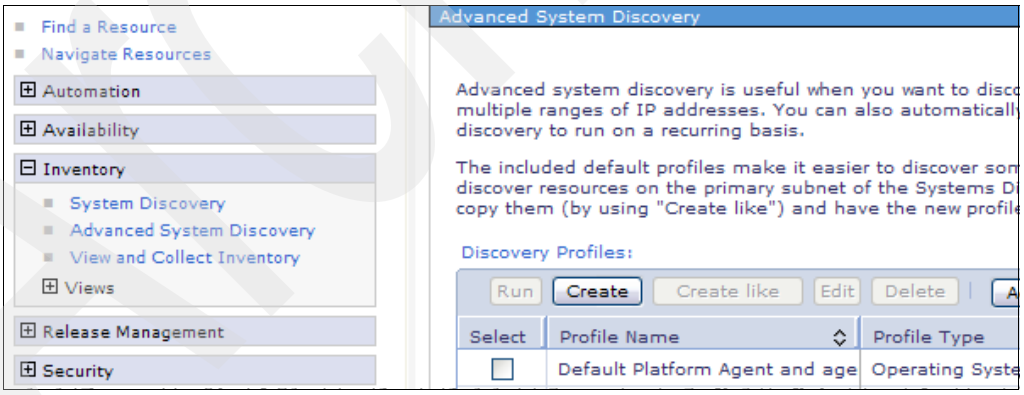

Figure 3-26 Discovering and collecting inventory on the storage devices

b. Click **Create** to open the Welcome page, as show in Figure 3-27.

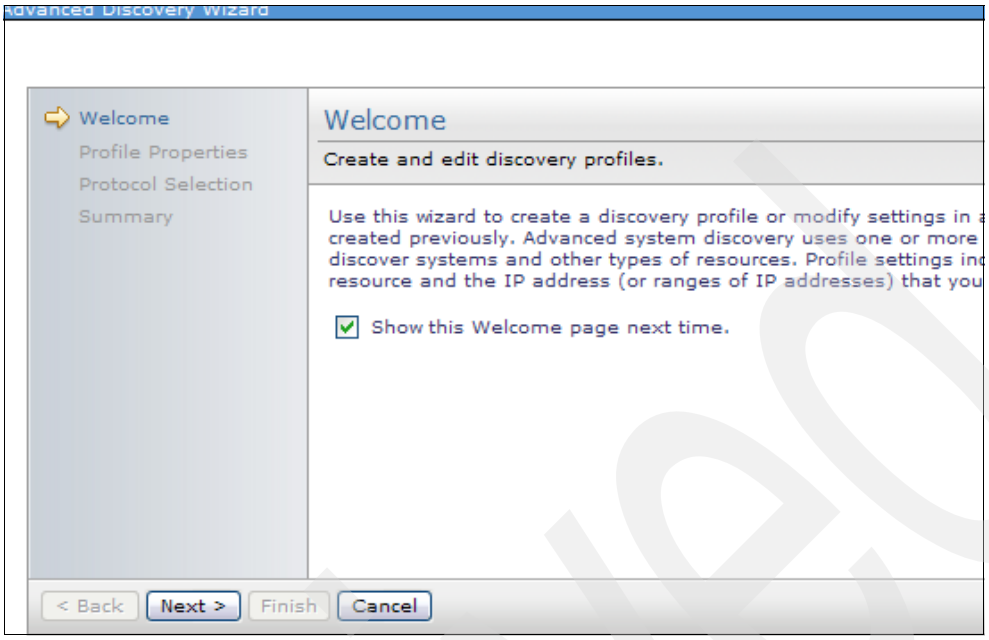

Figure 3-27 Welcome wizard to create and discover profiles

c. Click **Next** and type a name for the profile. In our environment, we used the following variables:

- profile name = LSI_SMI-S
- system type = Operating system
- system subtype = All

See Figure 3-28. Click **Next**.

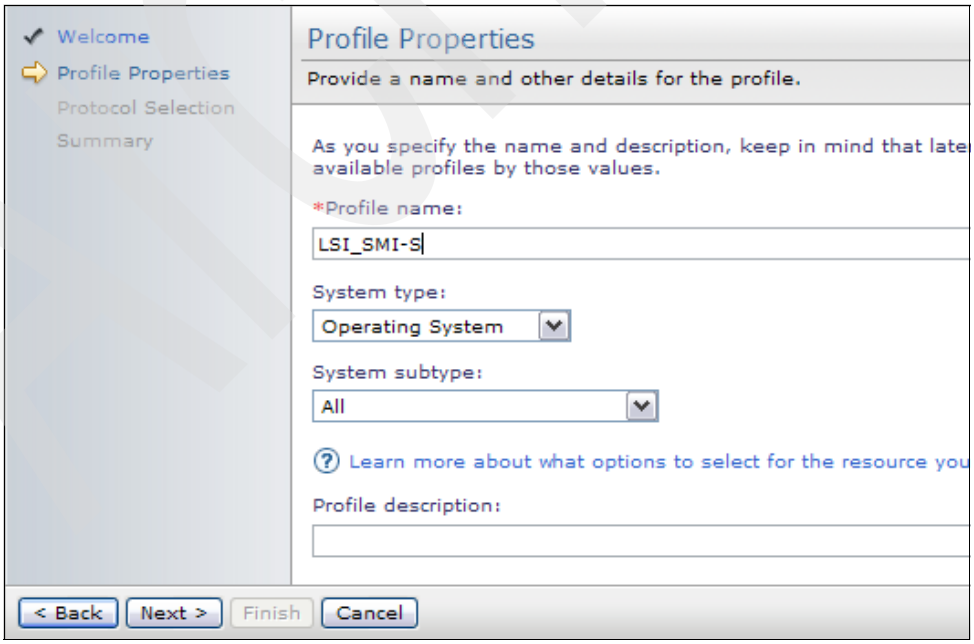

Figure 3-28 Profile properties pane

d. Click **SMI-S** check box as shown in Figure 3-29 and click **next**.

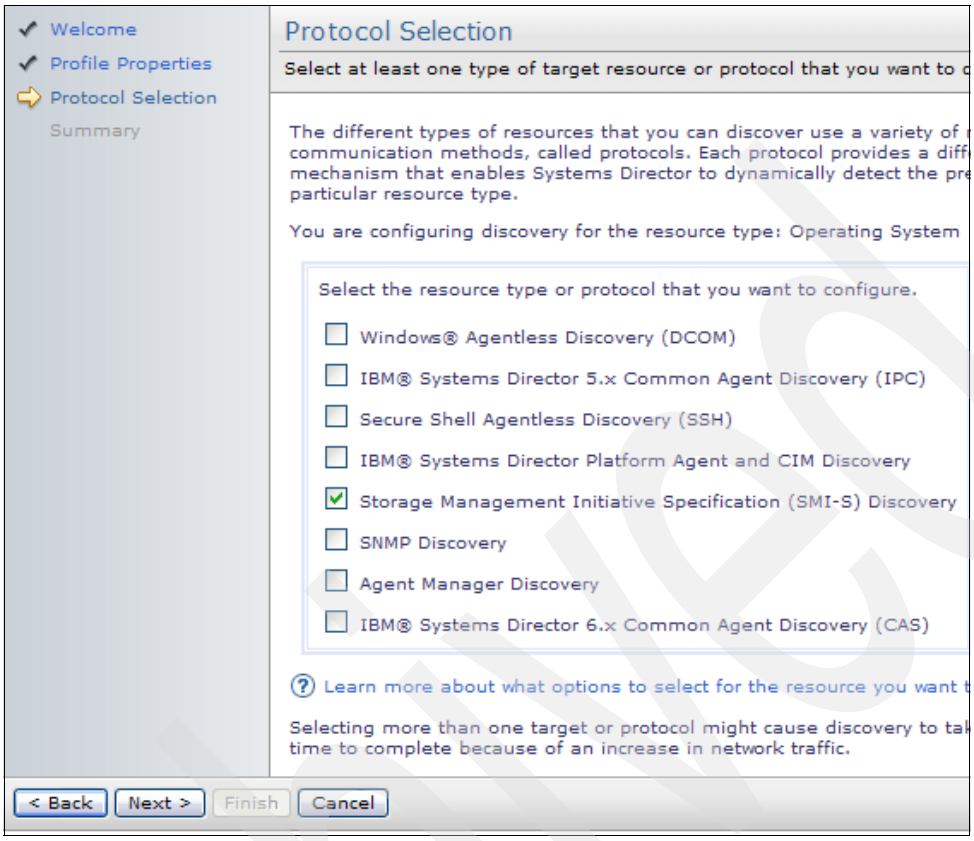

Figure 3-29 Protocol selection pane

e. Select the **Direct connection** radio button, as shown in Figure 3-30.

In our environment, the storage type is DS3000/DS4000, the protocol used https, the IP address used 192.168.100.125, which is the IP address of the SMI-S agent server, and the specified port 5989. If you changed the default port, enter the port used in your own configuration. Remember to change this port if you install all the agents on the same server, or install the agent on the director server.

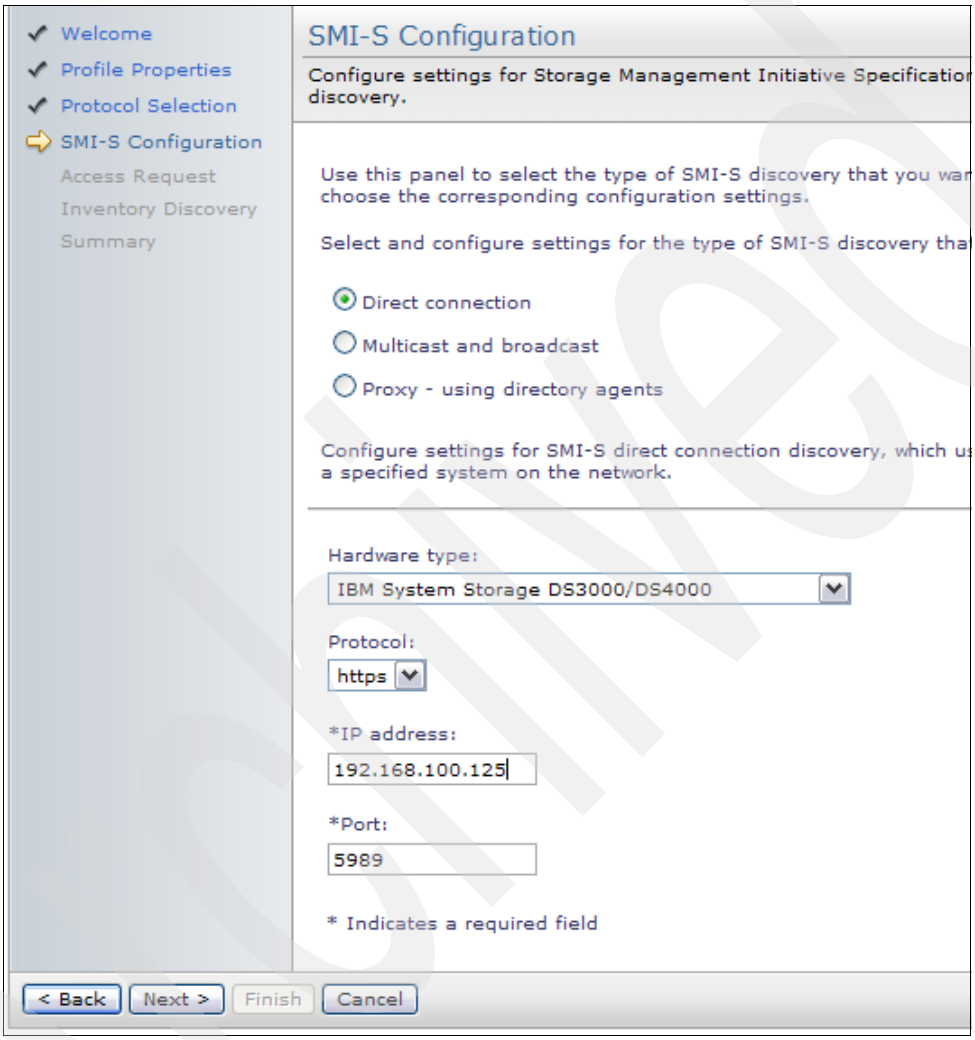

Figure 3-30 SMI-S configuration pane settings for storage management discovery

f. Click **Next**.

g. Enter the User ID and Password as shown in Figure 3-31, and click **Next**.

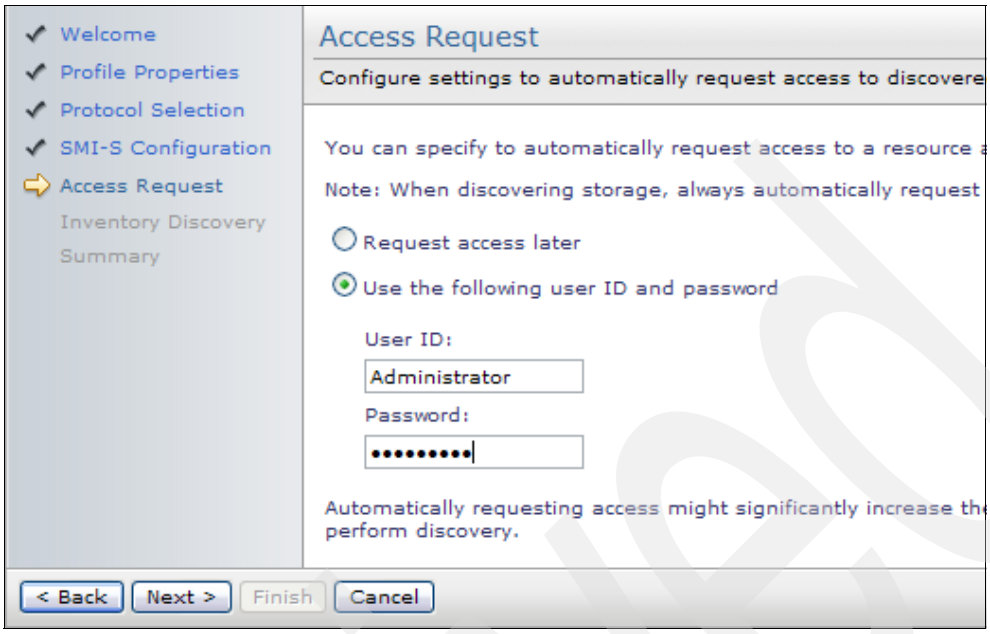

Figure 3-31 Access request pane to request access to discovered systems

h. Select the **Discover (collect) inventory later** radio button, as shown in Figure 3-32, and click **Next**.

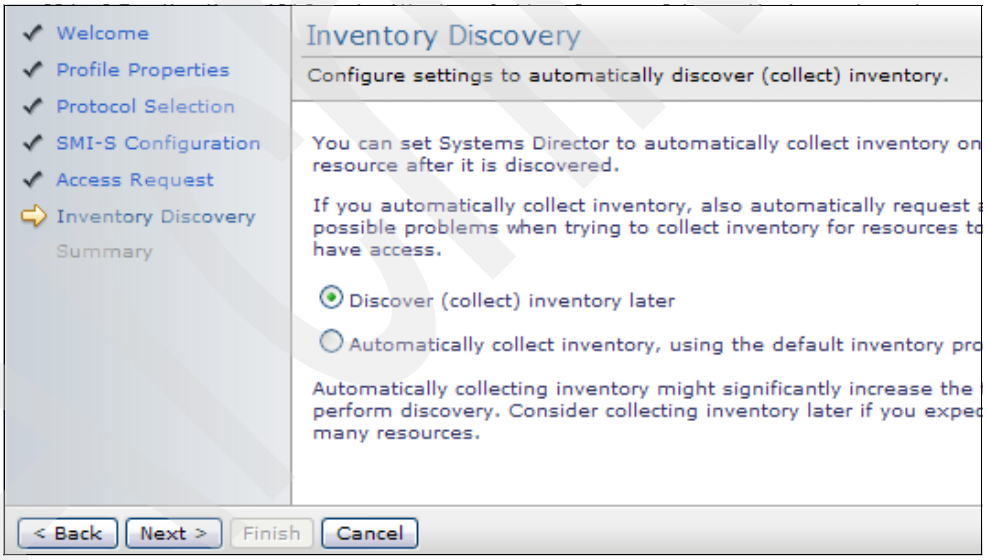

Figure 3-32 Inventory discovery pane to automatically discover inventory

i. Review the summary pane (Figure 3-33). If completed successfully, click **Finish**.

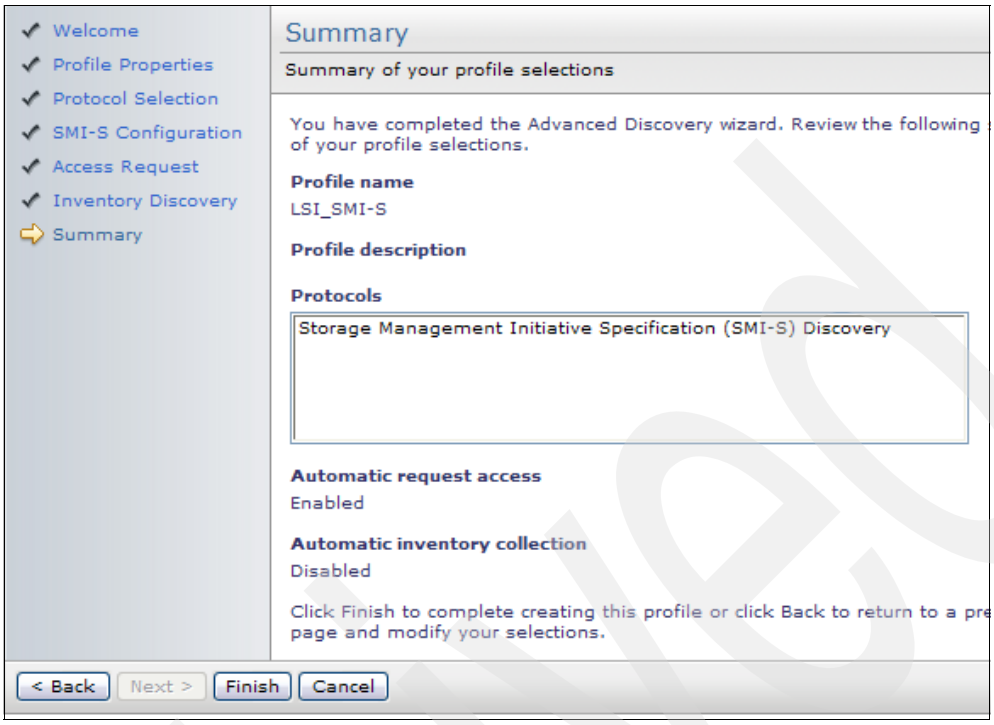

Figure 3-33 Summary pane of the profile selections

j. In the advance system discovery pane, check on the task you created, as shown in Figure 3-34, and click **Run**.

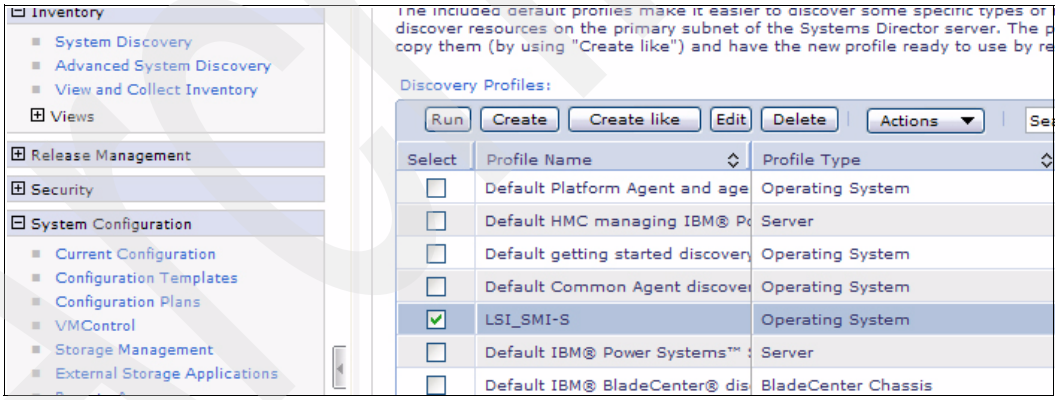

Figure 3-34 Advanced system discovery pane

k. After you have successfully discovered the storage SMI-S agent, your storage subsystems are discovered automatically. Check it by clicking **Navigate Resources** → **Groups** → **All systems**, as shown in Figure 3-35.

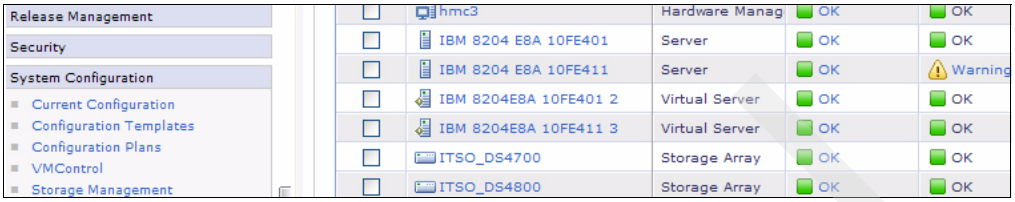

Figure 3-35 Storage subsystems discovered

l. After the storage subsystems are discovered, collect inventory on it.

5. Install the SMI-S agent for your SAN switch.

> **Note:** Download the SAN switch agent from the following link if you are using a Brocade switch:
>
> http://www.brocade.com/services-support/drivers-downloads/smi-agent/application_matrix.page
>
> If you install the storage agent and switch agent in the same server, you need to change the ports used by these agents.
>
> If you install both agents on the Director Server, you need to change the ports too.

6. Discover and collect inventory on your SAN switch.

   Follow these steps to discover the switch:

   a. Click **Inventory** → **Advanced System Discovery**.

   b. Click the **Create** button to open the wizard.

   c. Click **Next**, and type a profile name. In our environment, we use profile name = Brocade_SMI-S, set the system = Operating system, and system subtype = All. Then Click **Next**.

   d. Click **SMI-S** check box and click **Next**.

   e. Click **Direct Connection**.

      In our environment, as shown in Figure 3-36 on page 61, the hardware type is Brocade, the protocol used https, the IP address used 192.168.100.126, which is the IP address of the brocade agent server, and the specified port 5989. If you changed the default port, just enter the port use in your own configuration. Remember to change this port if you install all the agents on the same server, or install the agent on the director server.

   f. Click **Next**.

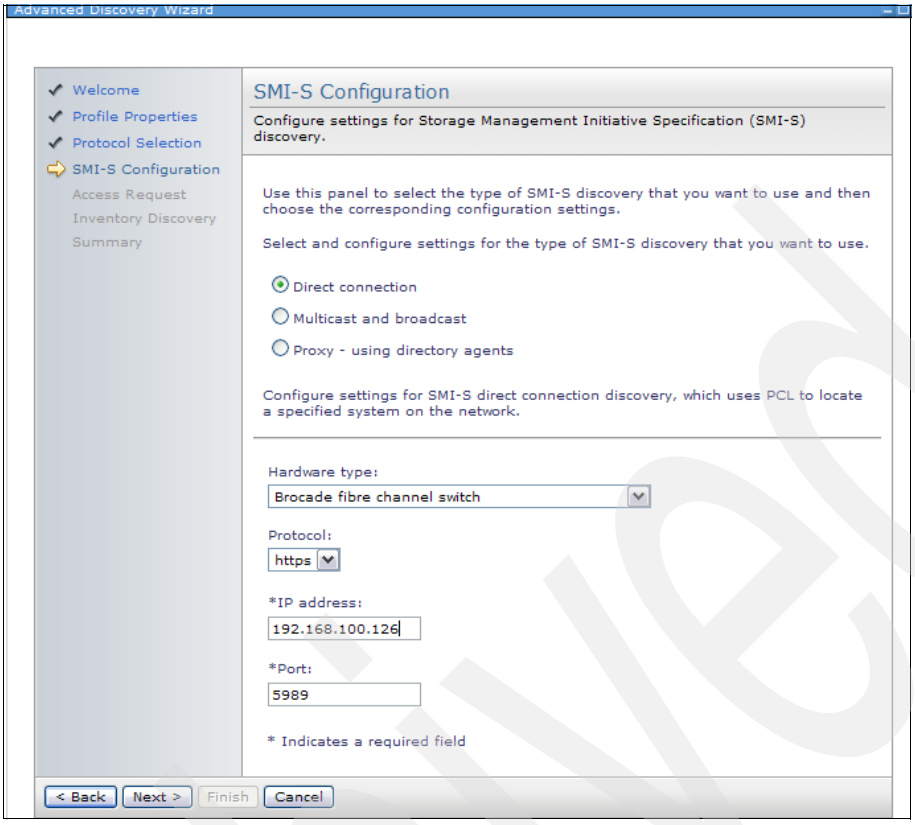

Figure 3-36 SMI-S configuration pane settings

g. Enter the User ID and Password.

h. Click **Finish**.

i. In the Advance System Discovery pane, check the task you created, and click **Run**.

After you have successfully discovered the Brocade SMI-S agent, your switches are discovered automatically. Check it using the **Navigate Resources** → **Groups** → **All systems** view shown in Figure 3-37.

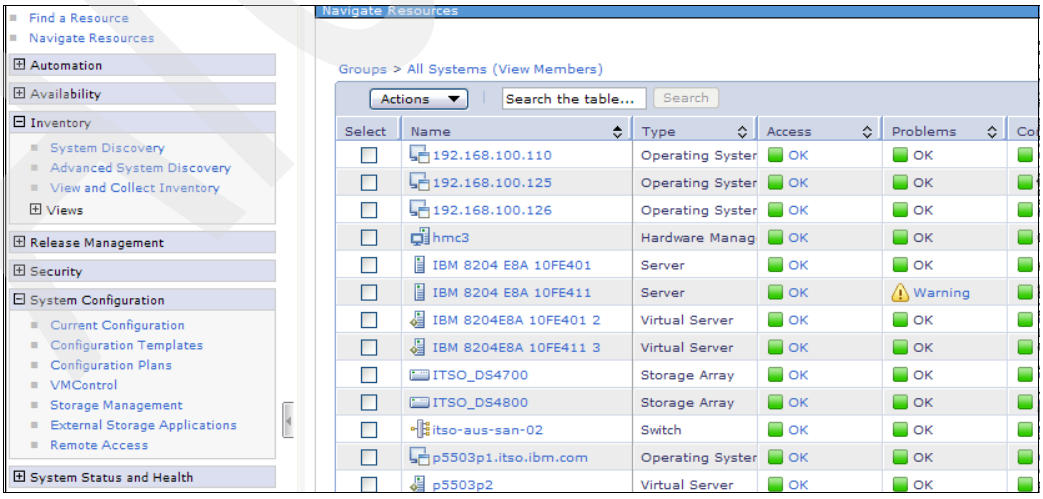

Figure 3-37 Discovered switches view

j. Collect inventory on the switches which are discovered.

7. Ensure that the SAN configuration is completed and that the VIOS can access the storage subsystem. From the director server command line, use the **smcli lsnhost** command to check for errors, as shown in Example 3-15. If you cannot get an output as in Example 3-15, check the zoning configuration.

> **Tip:** Use the **smcli lsnshost --help** to get detailed information about **lsnshost** command.

Example 3-15 Check if the SAN configuration is complete

```
root@p5503p2 / > smcli lsnshost -n VIOS_p6_1
<?xml version="1.0" encoding="UTF-8"?>
<SANProfile xmlns:po="http://www.ibm.com/sysmgt/sspt/profiles"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.ibm.com/sysmgt/sspt/profiles SANProfile.xsd">
  <profileName>VIOS_p6_1</profileName>
  <generationDate>2009-12-17T09:40:21Z</generationDate>
  <hostProfile>
    <hostScreenName>VIOS_p6_1</hostScreenName>
    <hostID>8E59DF10693637BC90BED56D350305E5</hostID>
    <fcNode>
      <portWWN>10000000C9771AD9</portWWN>
      <portWWN>10000000c9771ad8</portWWN>
      <portWWN>10000000c9771ad9</portWWN>
      <portWWN>10000000C9771AD8</portWWN>
    </fcNode>
    <sasNode/>
  </hostProfile>
  <storageList>
    <storage>
      <storageSystemProfile>
        <storageID>CDCCE826A36C3957AFE408E1DEC80325</storageID>
        <storageScreenName>ITSO_DS4700</storageScreenName>
        <systemAccessible>true</systemAccessible>
        <storageEndpoints>
          <storageEndpoint>
            <endpointID>202500a0b82904de</endpointID>
          </storageEndpoint>
          <storageEndpoint>
            <endpointID>202400a0b82904de</endpointID>
          </storageEndpoint>
          <storageEndpoint>
            <endpointID>203400a0b82904de</endpointID>
          </storageEndpoint>
          <storageEndpoint>
            <endpointID>203500a0b82904de</endpointID>
          </storageEndpoint>
          <storageEndpoint>
            <endpointID>204400a0b82904de</endpointID>
          </storageEndpoint>
          <storageEndpoint>
            <endpointID>204500a0b82904de</endpointID>
          </storageEndpoint>
          <storageEndpoint>
            <endpointID>201400a0b82904de</endpointID>
```

```
      </storageEndpoint>
      <storageEndpoint>
        <endpointID>201500a0b82904de</endpointID>
      </storageEndpoint>
    </storageEndpoints>
  </storageSystemProfile>
  <hostEndpoints>
    <hostEndpoint>
      <endpointType>FC</endpointType>
      <endpointID>10000000C9771AD9</endpointID>
      <clientTypeID>AIX</clientTypeID>
      <clientTypeName>AIX</clientTypeName>
    </hostEndpoint>
    <hostEndpoint>
      <endpointType>FC</endpointType>
      <endpointID>10000000c9771ad9</endpointID>
      <clientTypeID>AIX</clientTypeID>
      <clientTypeName>AIX</clientTypeName>
    </hostEndpoint>
  </hostEndpoints>
</storage>
<storage>
  <storageSystemProfile>
    <storageID>E8D042C5243C323CACE229ACE94C60B3</storageID>
    <storageScreenName>ITSO_DS4800</storageScreenName>
    <systemAccessible>true</systemAccessible>
    <storageEndpoints>
      <storageEndpoint>
        <endpointID>201300a0b811a662</endpointID>
      </storageEndpoint>
      <storageEndpoint>
        <endpointID>201200a0b811a662</endpointID>
      </storageEndpoint>
      <storageEndpoint>
        <endpointID>202200a0b811a662</endpointID>
      </storageEndpoint>
      <storageEndpoint>
        <endpointID>202300a0b811a662</endpointID>
      </storageEndpoint>
      <storageEndpoint>
        <endpointID>203200a0b811a662</endpointID>
      </storageEndpoint>
      <storageEndpoint>
        <endpointID>203300a0b811a662</endpointID>
      </storageEndpoint>
      <storageEndpoint>
        <endpointID>204200a0b811a662</endpointID>
      </storageEndpoint>
      <storageEndpoint>
        <endpointID>204300a0b811a662</endpointID>
      </storageEndpoint>
    </storageEndpoints>
  </storageSystemProfile>
  <hostEndpoints>
    <hostEndpoint>
```

```
            <endpointType>FC</endpointType>
            <endpointID>10000000C9771AD9</endpointID>
            <clientTypeID>AIX</clientTypeID>
            <clientTypeName>AIX</clientTypeName>
          </hostEndpoint>
          <hostEndpoint>
            <endpointType>FC</endpointType>
            <endpointID>10000000c9771ad9</endpointID>
            <clientTypeID>AIX</clientTypeID>
            <clientTypeName>AIX</clientTypeName>
          </hostEndpoint>
        </hostEndpoints>
        <attachment>
          <hostGroupName>ITSO_p6pool</hostGroupName>
          <hostEndpointID>10000000C9771AD9</hostEndpointID>
          <hostEndpointID>10000000c9771ad9</hostEndpointID>
          <volumeGroup>
            <volume>
              <volumeName>lun03</volumeName>
              <volumeID>600A0B8000291B080000A43B0439496D</volumeID>
              <storageEndpointID>201300a0b811a662</storageEndpointID>
              <storageEndpointID>202300a0b811a662</storageEndpointID>
              <storageEndpointID>203300a0b811a662</storageEndpointID>
              <storageEndpointID>204300a0b811a662</storageEndpointID>
              <storageEndpointID>201200a0b811a662</storageEndpointID>
              <storageEndpointID>202200a0b811a662</storageEndpointID>
              <storageEndpointID>203200a0b811a662</storageEndpointID>
              <storageEndpointID>204200a0b811a662</storageEndpointID>
              <lun>2</lun>
            </volume>

... (content omitted) ...

            <volume>
              <volumeName>IBMsvsp0</volumeName>
              <volumeID>600A0B800011463200000C96C4B27AFD7</volumeID>
              <storageEndpointID>201200a0b811a662</storageEndpointID>
              <storageEndpointID>202200a0b811a662</storageEndpointID>
              <storageEndpointID>203200a0b811a662</storageEndpointID>
              <storageEndpointID>204200a0b811a662</storageEndpointID>
              <storageEndpointID>201300a0b811a662</storageEndpointID>
              <storageEndpointID>202300a0b811a662</storageEndpointID>
              <storageEndpointID>203300a0b811a662</storageEndpointID>
              <storageEndpointID>204300a0b811a662</storageEndpointID>
              <lun>10</lun>
            </volume>
          </volumeGroup>
        </attachment>
      </storage>
    </storageList>
    <fabricList>
      <fabric>
        <fabricName>100000051E02AC2E</fabricName>
        <zoneList>
          <zone>
```

```
            <zoneName>PW9407_VIO401_FCS1_DS4700</zoneName>
            <zoneType>2</zoneType>
            <zoneMembers>
              <portWWN>10000000C9771AD9</portWWN>
              <portWWN>202500A0B82904DE</portWWN>
              <portWWN>202400A0B82904DE</portWWN>
            </zoneMembers>

... (content omitted) ...


          </zone>
        </zoneList>
      </fabric>
    </fabricList>
</SANProfile>

root@p5503p2 / >
```

8. If you want your system pools to support resilience, ensure that all the pre-requisites for live partition mobility are met. We assume you can perform a live partition mobility among the servers in the system pools.

3.10 SMI-S: Storage Management Initiative Specification

The Storage Management Initiative (SMI) was created by the SNIA in early 2002 to develop and foster the adoption of a highly functional open standards interface for the management of storage networks. From this came the Storage Management Initiative Specification (SMI-S).

The SMI-S was created to support the development and promotion of the industry's first standard interface for storage management. SMI-S defines the framework around which storage management solutions are built. SMI-S 1.1 is the latest version of the framework. The goal of the SMI-S 1.1 is to achieve interoperability with storage devices and storage systems. The SMI-S 1.1 achieves this goal by using the Common Information Model (CIM), Web Based Enterprise Management (WBEM) and by defining profiles and subprofiles.

WBEM is a set of standards that allow a client to perform operations on CIM data that is managed by a WBEM agent. A profile defines the base set of information and capabilities that allows a client to manage a particular storage resource. It defines all the CIM elements (classes, associations, properties, methods, and so forth) that a client must use to perform a particular task. A subprofile defines additional CIM elements that a vendor might choose to implement to enhance a profile. Doing so allows a client to use additional features of the vendor's product.

Brocade has developed an SMI standards-compliant agent to provide for simple integration and extended fabric management capabilities with storage management tools such as IBM Tivoli Storage Manager and IBM Systems Director.

3.10.1 Installing the SMI-S provider for the Brocade SAN switch

The Brocade SMI-S agent is a proxy that resides on a separate host system and provides application developers with programmatic access to manage Brocade fabrics. The agent is supported and can be installed on the following operating systems:

- Sun Solaris
- Microsoft Windows
- Linux

The SMI-S agent allows partner applications that are written to SMI standard to communicate with, and manage Brocade SAN infrastructures from a single access point. Partner management applications communicating with the SMI-S agent can access multiple switches and multiple fabrics. An advantage of the Brocade SMI-S agent is that it does not require any modifications or upgrades to deployed Brocade fabrics. It supports the widest range of switches in the industry. All the support required in Brocade switches is in place and nothing further needs to be done for the agent to manage the switches.

To install the Brocade SMI Agent on a Microsoft Windows system as performed in our lab environment, use the following steps:

1. Run the provided SMI-S executable. Click **Start**, click **Run**, and type the location of the executable.
2. Select the **I accept the terms of the License Agreement** check box and click **Next** (Figure 3-38).
3. Ensure you have enough free space available as the installation requires.

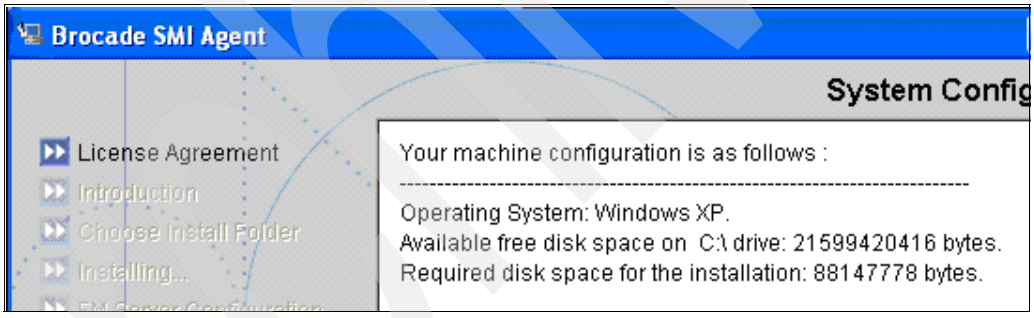

Figure 3-38 The report of the free space available and the disk space requirement

4. On the Introduction page of the installation wizard, it reports that the Java Runtime Edition (JRE) version 1.4.2 will be installed on the system. Click **Next** to continue.

5. Leave the default path to the directory where the agent will be installed as shown in Figure 3-39 and click **Next**.

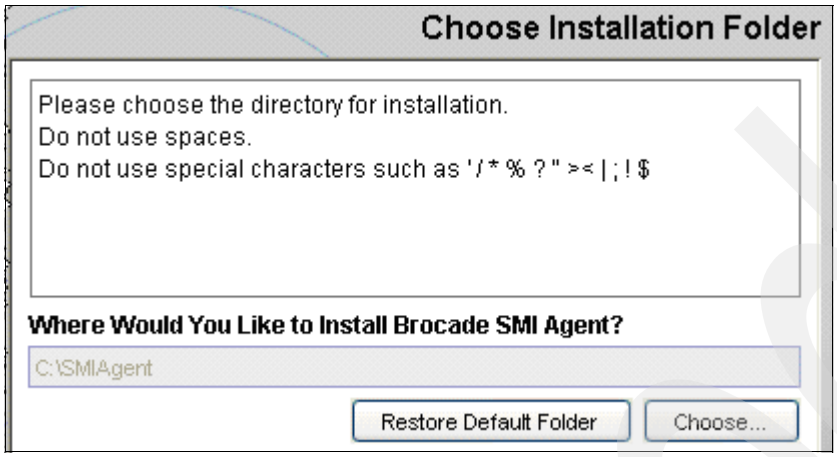

Figure 3-39 Default installation directory of the agent

6. Leave the standard value of the HTTP port used by the CIM Object Manager (Figure 3-40) and click **Next**.

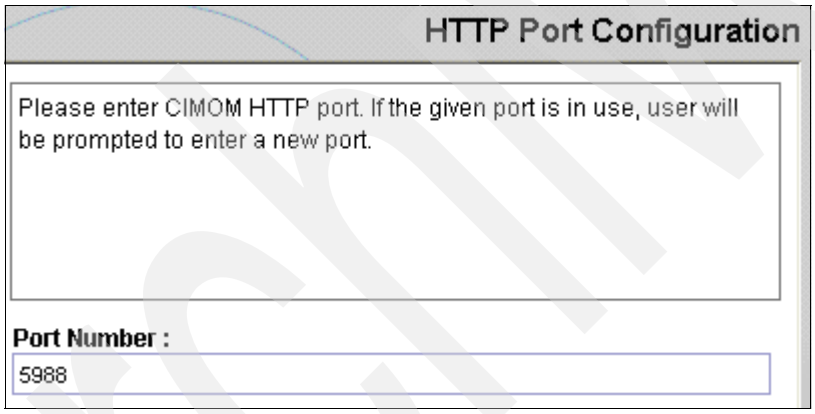

Figure 3-40 The standard value of the HTTP port used by CIM Object Manager

7. Leave the standard value of the HTTPS port used by the CIM Object Manager as shown in Figure 3-41 and click **Next**.

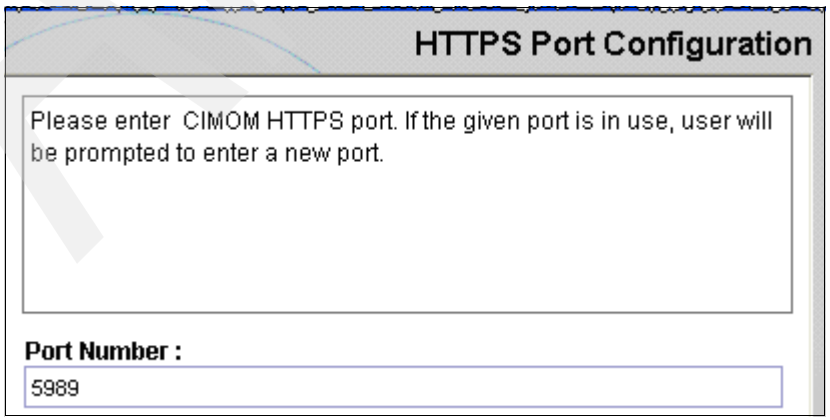

Figure 3-41 The standard value of the HTTPS port used by CIM Object Manager

8. Leave the default options for the Fabric Manager database connection as shown in Figure 3-42 and click **Next**.

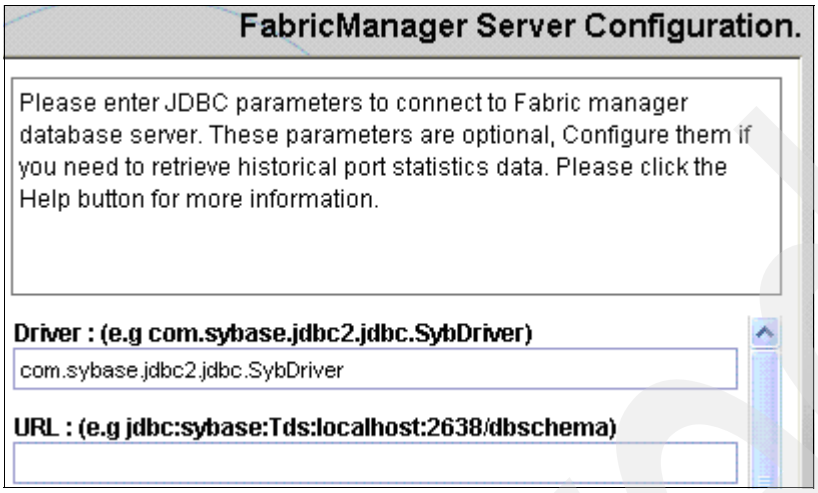

Figure 3-42 The default options for connecting to the fabric manager database

9. On the SMI Agent Configuration step shown in Figure 3-43, select **No** for the mutual authentication option for clients and click **Next**.

Figure 3-43 Disable the mutual authentication option

10. Select **No** for the mutual authentication for indications option and click **Next**.
11. Do not enable the security for SMI Agent (Figure 3-44). Select **No** and click **Next**.

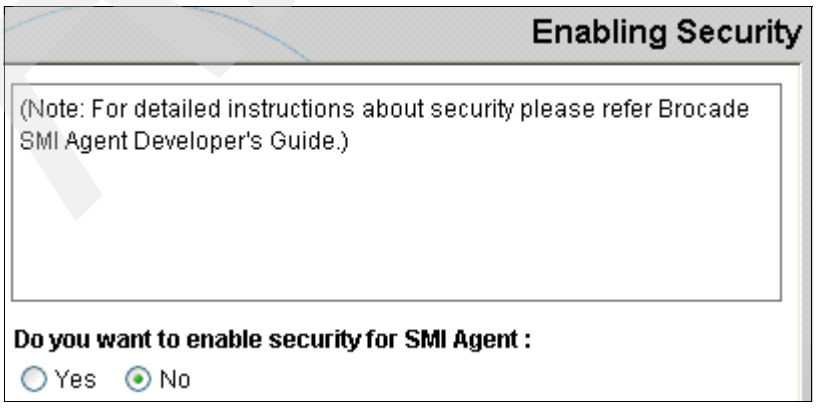

Figure 3-44 Do not enable the security for the agent

12. Do not provide any value for the TCP ports related to event and ARR channels. Click **Next**.
13. Do not enable console or file logging for the agent shown in Figure 3-45. Click **Next** to continue.

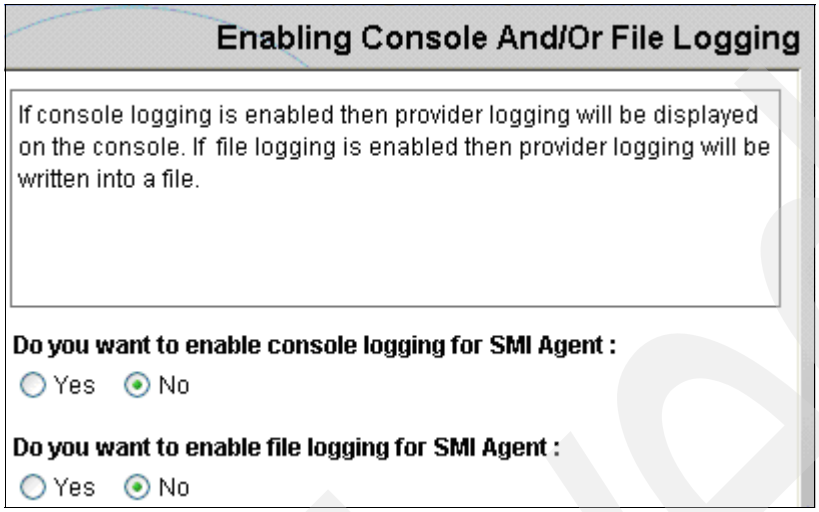

Figure 3-45 Do not enable console or file logging features

14. On the Proxy Connections Configuration page, click **Add** to provide the connection information of the switch that the SMI provider needs to communicate with.
15. Enter the values shown in Table 3-6.

Table 3-6 Brocade SAN switch connection information

Field name	Field value	Description
Proxy IP	9.3.194.59	IP address of the switch
User name	admin	Admin ID to login to the switch
Password	password	Password of the Admin ID user name

Click **OK**. The configuration entry will look like Figure 3-46.

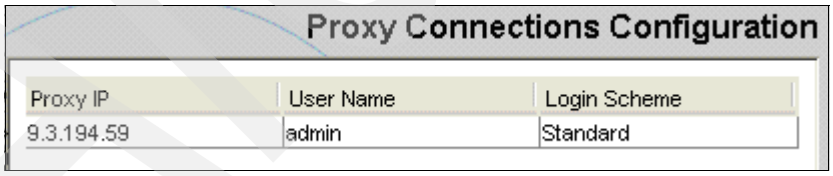

Figure 3-46 Connection entry for the switch and the SMI agent

16. On the “Important Information” page (Figure 3-47), review the locations of the configuration files listed. Click **Next**.

Figure 3-47 Locations of the configuration files

17. On the “Configuring and Starting as a Service” page, select **Yes** to start the SMI agent as a service on the Windows machine and click **Next** to start the installation.
18. After the installation is completed as shown in Figure 3-48, click **Done** to close the wizard.

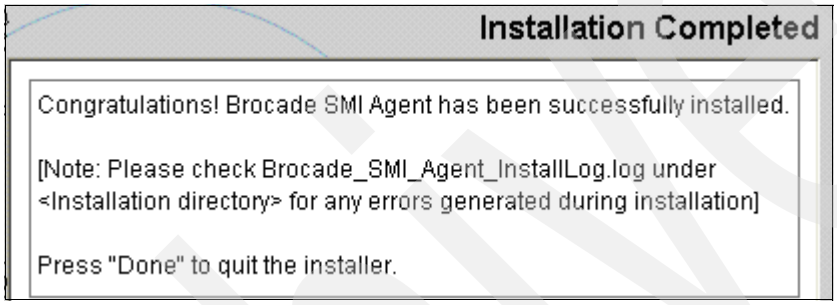

Figure 3-48 Last step of the installation wizard.

Note: The SLP service is not installed during this process. Therefore, you are only able to add the SMI-S provider. To discover the SMI-S provider through SLP in the IBM Systems Director, follow these steps:

1. Open a Windows Services management window by using **Start** → **Run**, type `services.msc` in the Run Command window and click **OK**.
2. Stop the Brocade SMI Agent (J WBEM Server) service.
3. Change directory to C:\SMIAgent\agent\bin.
4. Run the **`slpd -install`** command to enable the SLP service.
5. Run the **`slpd -start`** to start the SLP service.
6. Start the Brocade SMI Agent (J WBEM Server) service.

3.11 Installing the SMI-S provider for the storage system

To install the Engenio SMI-S provider on a Microsoft Windows server, use the following steps:

1. Run the provided SMI-S executable. Click **Start**, click **Run**, and type the location of the executable.
2. On the “Introduction” page, click **Next**.
3. Select the **I accept the terms of the License Agreement** check box and click **Next**.
4. Leave the default path of the installation directory as shown in Figure 3-49 and click **Next**.

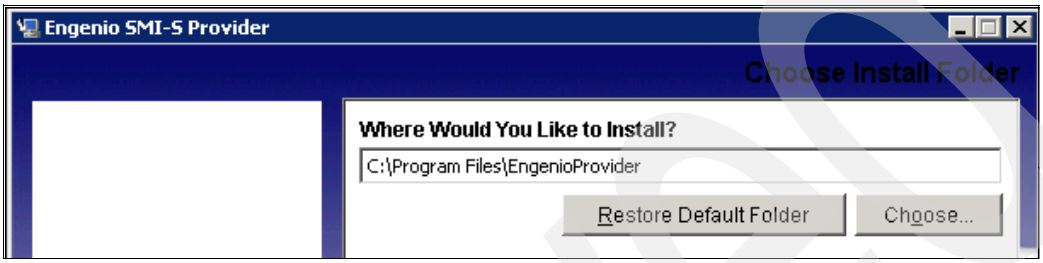

Figure 3-49 SMI-S agent installation folder

5. Review the installation information as shown in Figure 3-50 and click **Install**.

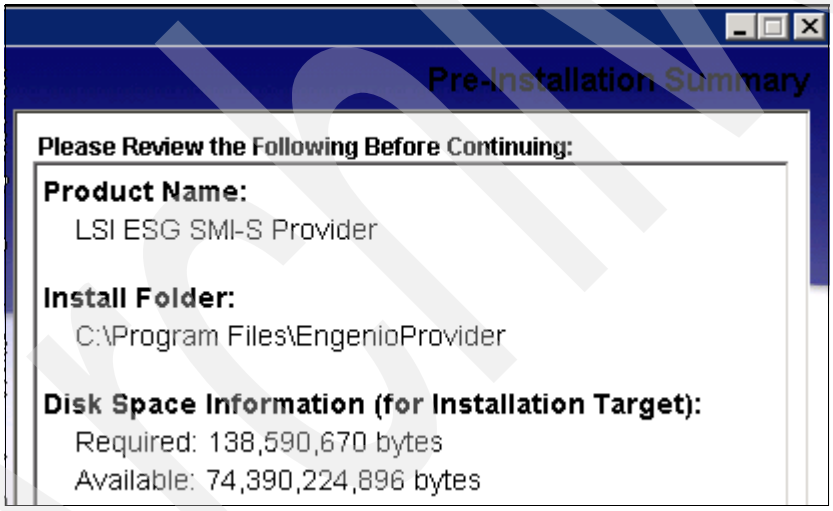

Figure 3-50 SMI-S agent installation information

6. A dialog window displays. Enter the IP addresses of both controllers, the DS3000 or DS4000 storage system as shown in Figure 3-51. Enter only one IP address for each controller.

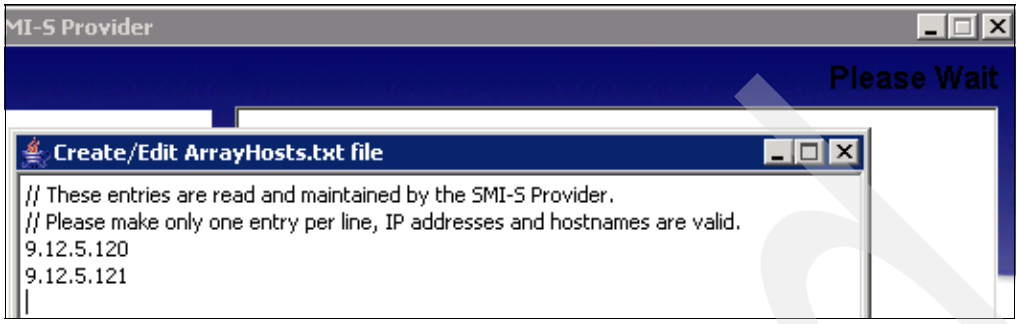

Figure 3-51 Enter the IP address of the storage system's controllers

7. Wait for the installation to finish and click **Done** as shown in Figure 3-52.

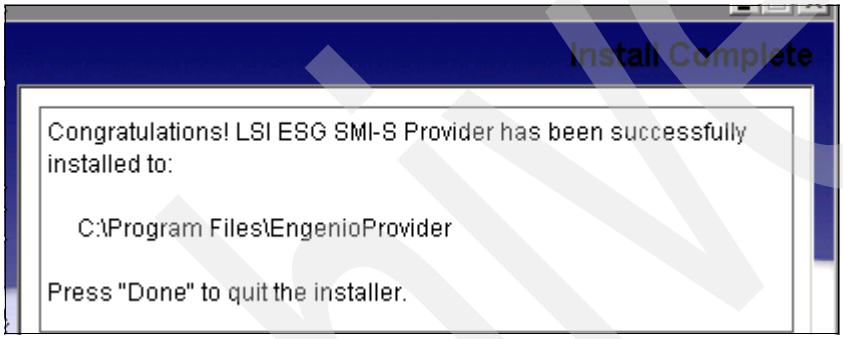

Figure 3-52 Last page of the installation wizard

Verification steps

To verify that the SMI-S provider has been configured correctly, the CIM view utility can be used. Follow the next steps to verify the access to the storage subsystem:

1. Click **Start** → **Run**, then enter **cmd** and click **OK** to open command prompt.
2. Change the directory to `c:\Program Files\EngenioProvider\wbemservices\bin`.
3. Run **cimworkshop**.
4. Provide the credentials used for accessing the storage subsystem as shown in Figure 3-53 and click **OK**.

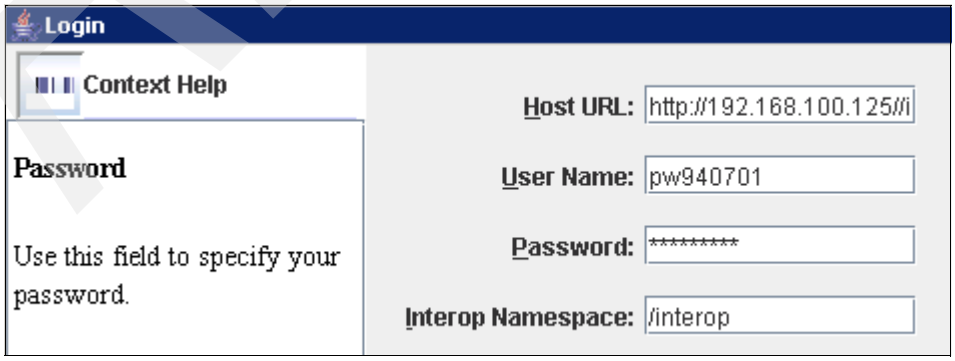

Figure 3-53 Login prompt of the CIM view utility

5. Change the namespace to `/root/lsissi11` using the drop down list available on the toolbar as shown in Figure 3-54.

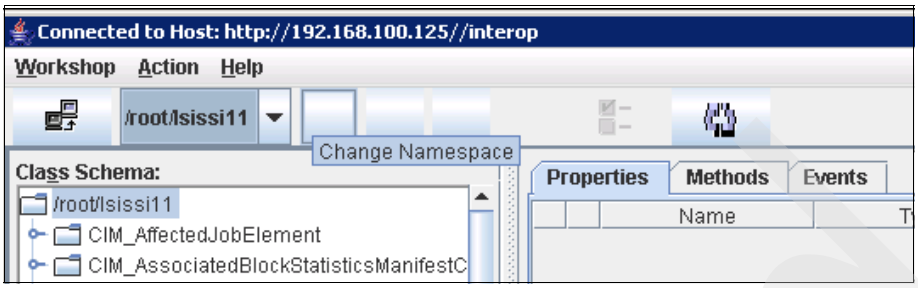

Figure 3-54 Main window of the CIM View utility

6. Select **Action** → **Find Class**, enter `CIM_ComputerSystem` as the name of the class and click **OK**.
7. Expand the class element found. Right click **LSISSI_StorageSystem** and select **Show Instances**, as shown in Figure 3-55.

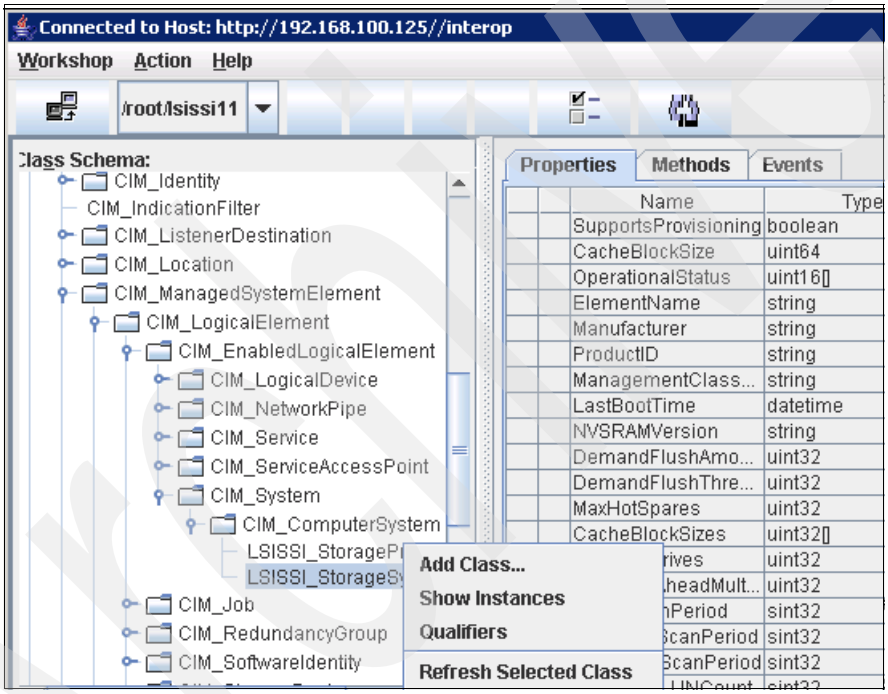

Figure 3-55 Expand CIM_ComputerSystem element to get LSISSI_StorageSytem elements

8. If you see one or more instances as shown in Figure 3-56, the provider is installed and configured successfully.

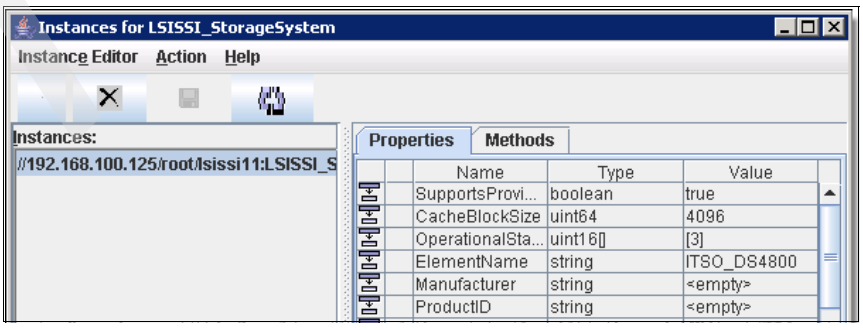

Figure 3-56 Instances of LSSIS_StorageSystem

4

Implementation scenarios

This chapter describes various implementation scenarios given the characteristics and nature of possible customer virtualized environments.

The scenarios described in this chapter provide directions on how to deploy IBM Systems Director leveraging various features provided by the VMControl plug-in.

The following sections are presented in this chapter:

4.1 VMControl general deployment scenarios

This section explains how to manage virtual servers using IBM Systems Director VMControl.

4.1.1 Managing virtual servers

With IBM Systems Director VMControl, virtual appliances can be deployed to virtual servers. Virtual servers can also be edited, deleted, and relocated from one host to another. In addition, multiple virtual servers can be grouped into a workload for aggregated monitoring.

Creating a virtual server

For IBM Systems Director VMControl in a Power Systems environment, a virtual server creation is tightly coupled with a virtual appliance creation or use. However, an empty virtual server can be created without a virtual appliance creation or input, and no workload is generated. The result is an empty virtual server into which the software image of the virtual appliance can be installed at a later time. The task creates a new empty LPAR on your Power Systems managed physical server.

To create a virtual server, click the Basics tab of the IBM Systems Director VMControl Web based GUI and click **Deploy A Virtual Appliance Task** as shown in Figure 4-1.

Figure 4-1 VMControl basics tab

The next window requests input regarding whether the virtual server is an empty virtual server or a virtual appliance. Select the **None. I want to deploy an empty virtual server** radio button, as in Figure 4-2.

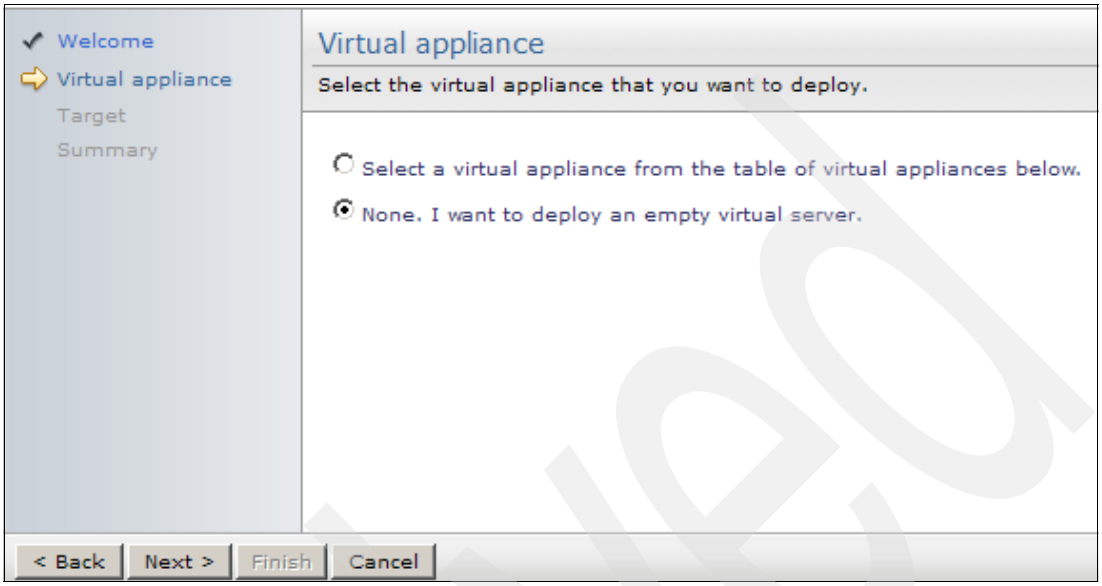

Figure 4-2 Virtual appliance pane - virtual appliance you want to deploy

Next, a target physical machine has to be selected. If the Hardware Management Console (HMC) has been discovered, and multiple Power Systems are attached to this HMC, they appear in the target selection as in Figure 4-3.

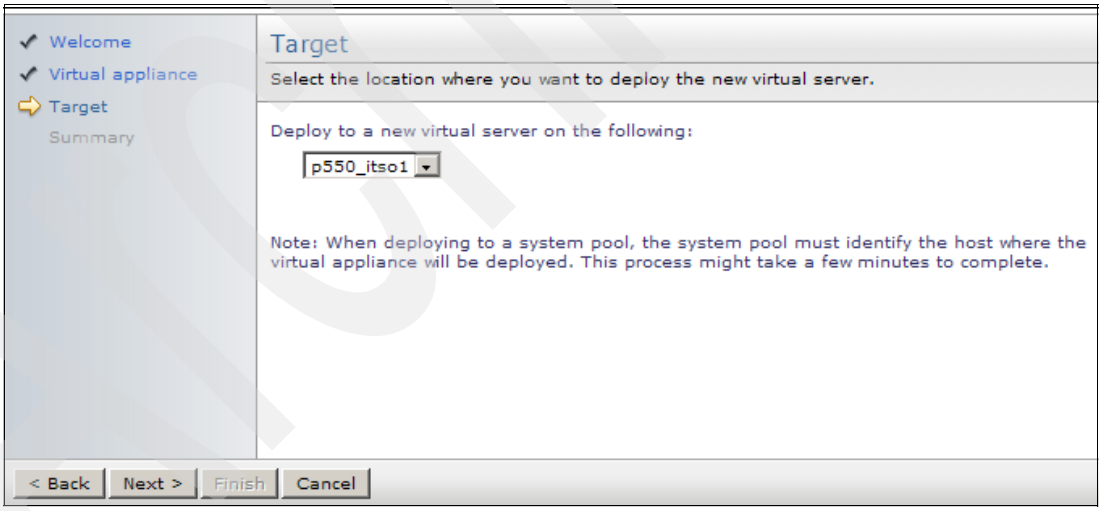

Figure 4-3 Target selection pane for the physical Power Systems

For a Power System server, the IBM Systems Director VMControl asks to launch a “Create Virtual Server Wizard”, as shown in Figure 4-4, and can also be directly launched from the IBM System Director Power Systems management pane.

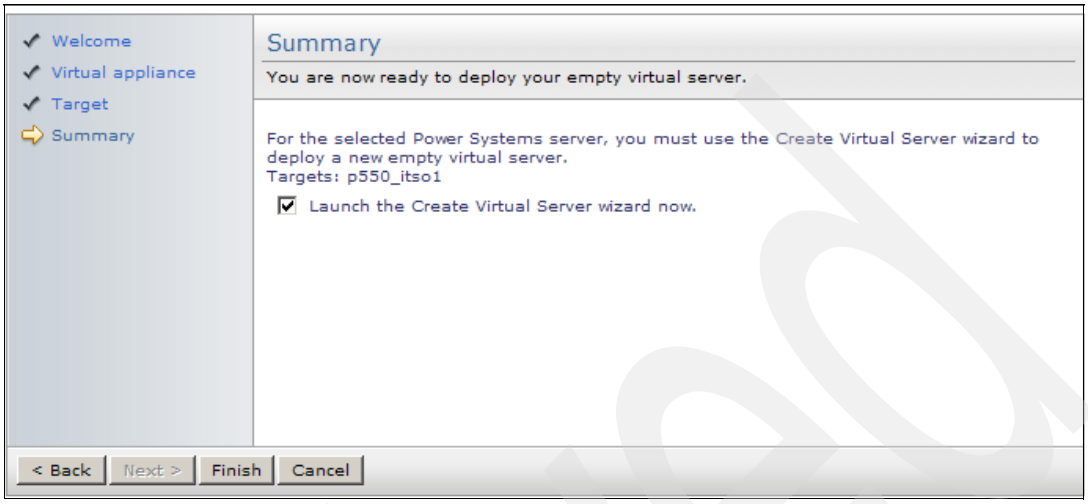

Figure 4-4 The VMControl wizard calls the IBM System Director Create Virtual Server wizard

The Create Virtual Server wizard is a reduced version of the Create LPAR wizard from the HMC.

The HMC wizard requests the following input:

- Virtual server (LPAR or logical partition) name
- Planned Operating System (OS)

  The OS options for Power Systems servers are:

  - AIX or Linux.
  - Virtual I/O server.
  - IBM i.
- Processor allocation
- Memory allocation
- Disk allocation or creation:
  - A new logical volume or storage pool virtual disk can be automatically created and mapped to the virtual server.
  - An existing physical disk can be exported into a virtual disk and be automatically created and mapped to the virtual server.
  - An existing backed logical volume or storage pool virtual disk can be selected and assigned to the virtual server.
  - A physical slot (storage controller) can be selected and used by the new virtual server.
- Virtual Ethernet network adapter creation and selection
- Physical devices to be assigned to the virtual server
- Physical slots to be assigned to the virtual server
- IBM i settings

After the wizard receives all the necessary input, it starts the creation of the virtual server.

Note: The Create Virtual Server task might take several minutes to complete for Power Systems that are managed by an HMC or an IVM. Check the job log for details of the creation process.

Editing a virtual server

In a Power Systems environment, the Edit Virtual Server function can be used to edit memory, processor, virtual or physical I/O slots, virtual or physical disks assigned to the virtual server, virtual Ethernet adapters, and optical devices.

Most attributes can only be changed on a powered off virtual server, while in a running virtual server only memory and processor allocation can be changed.

A running virtual server allows the changes to be either applied to the current running operating system and saved to the LPAR profile in the HMC. Or, it can be only saved to the LPAR profile in the HMC when it is activated after the next LPAR power cycle (Shutdown/Activate).

Note: In a running VIOS, only assigned processors, processing units, and assigned memory can be changed.

Virtual servers can be edited through the simplified IBM Systems Director Web interface, or by using the **`smcli chvrthost`** command.

To edit a virtual server using the Web interface, click **Inventory** → **Views** → **Virtual Servers and Hosts** and select the virtual server to be edited, as shown in Figure 4-5.

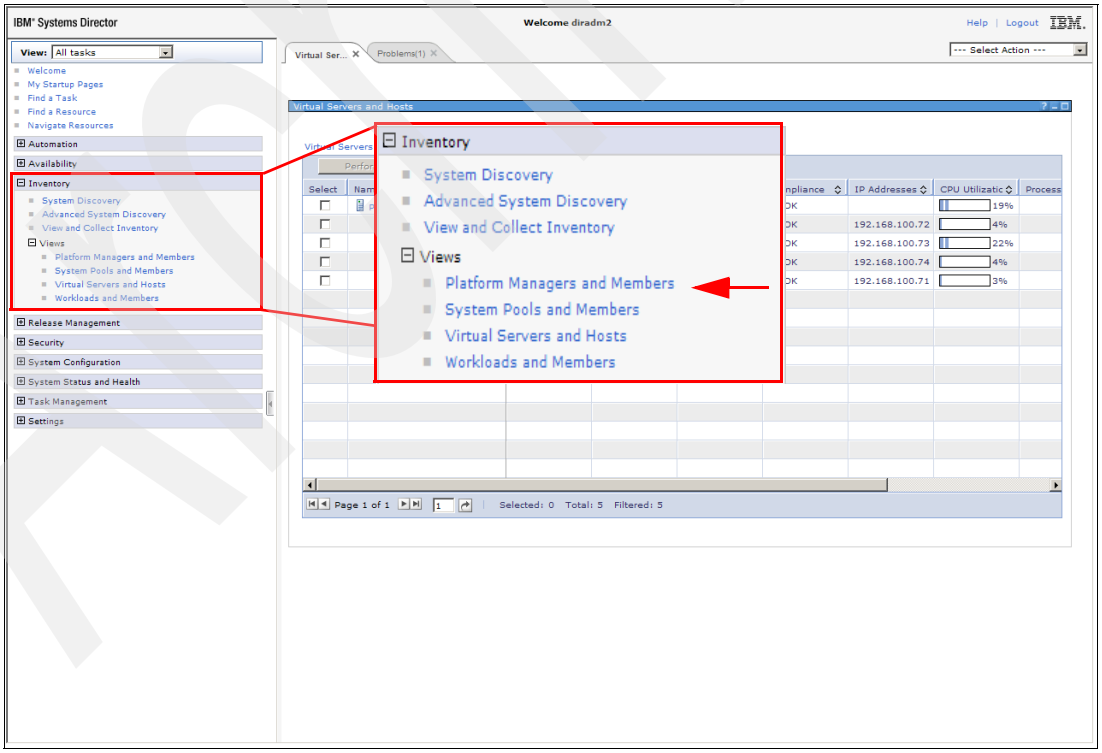

Figure 4-5 Virtual servers and hosts inventory

After selecting the virtual server to edit, click **Actions** → **System Configurations** → **Edit Virtual Server**, as seen on Figure 4-6.

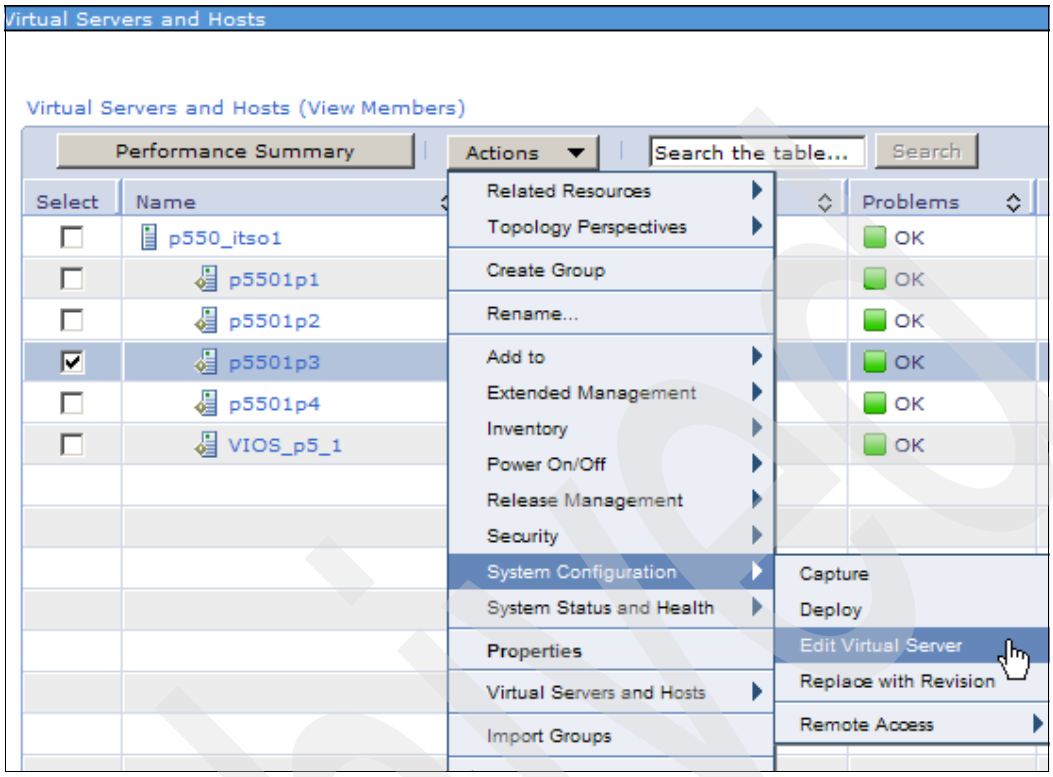

Figure 4-6 VMControl virtual server and hosts action menu

A new window opens on the IBM Systems Director Web interface, as shown in Figure 4-7. This new tab contains the editable items of the virtual server.

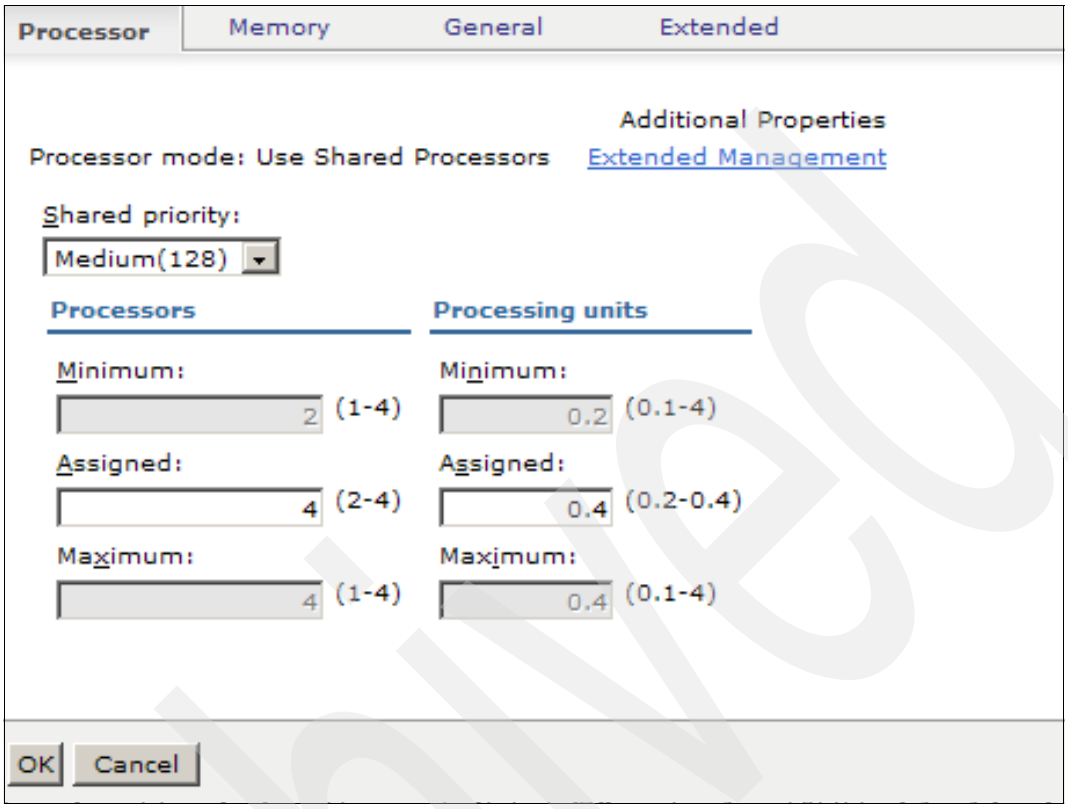

Figure 4-7 Editable items for virtual server (assigned processor)

For example:

- Processor tab

  This tab allows editing of processor resources allocated to the virtual server, as well as the priority weight. Note that minimum and maximum allocation fields are greyed out. This is because the virtual server is currently powered on.

- Memory tab

  This tab allows editing of memory resources allocated to the virtual server.

- General tab

  This tab contains a check box on which the changes can be marked as permanent or not. In a permanent change, VMControl executes a dynamic LPAR operation to the virtual server to assign the new resources and edits and saves the LPAR profile in the HMC. In contrast, a non-permanent change only performs a dynamic LPAR operation and does not change the LPAR profile in the HMC.

- Extended tab

  This tab contains a button where you can directly access the HMC management Web interface to further virtual server editing.

Note: All tabs contain an extended management link. Clicking it opens the HMC management Web interface.

It is possible to access most of the HMCs menu from the action menu. To do so, click **Action** → **Extended Management** as shown in Figure 4-8.

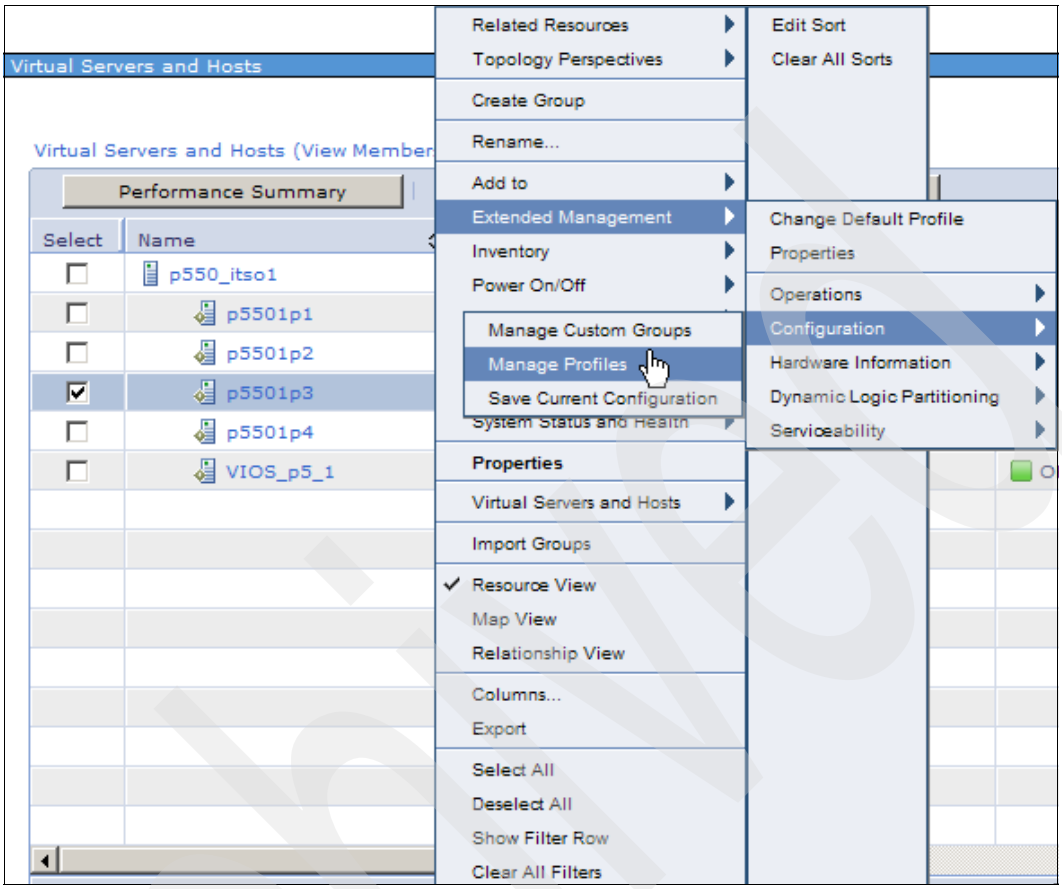

Figure 4-8 HMCs menus accessed from VMControl

Permanently deleting a virtual server

Removing a virtual server causes the LPAR to be removed permanently. To permanently remove a virtual server, it needs to be powered off first and then removed.

To shutdown the virtual server click **Actions** → **Power On/Off** → **Power Off now**, as seen in Figure 4-9.

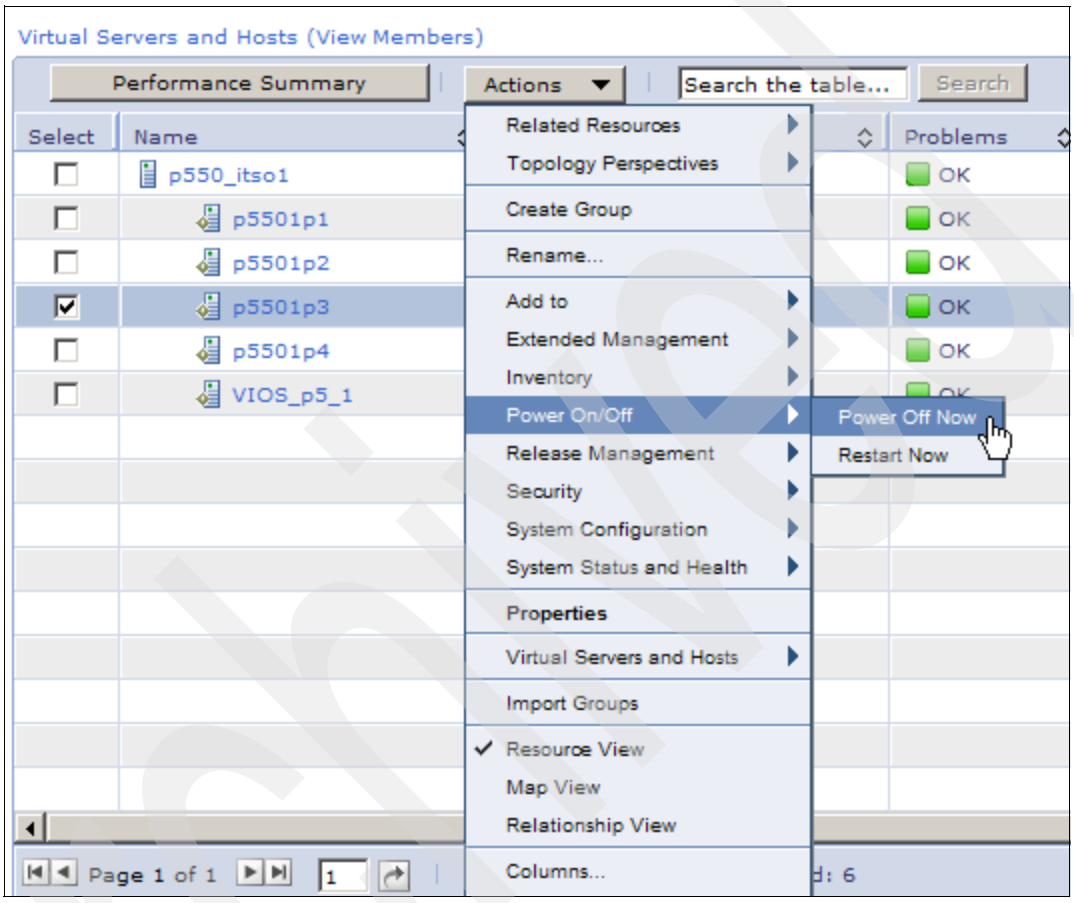

Figure 4-9 Powering off a virtual server through the virtual servers and hosts menu

Note: The power off option shown in Figure 4-9, does not gracefully shutdown the operating system. To shutdown your virtual server gracefully, click **Actions** → **Extended Management** → **Operations** → **Shut Down**.

After the server has been powered off, it is ready to be permanently deleted. To delete the virtual server permanently, click **Actions** → **Permanently Delete**, as shown in Figure 4-10.

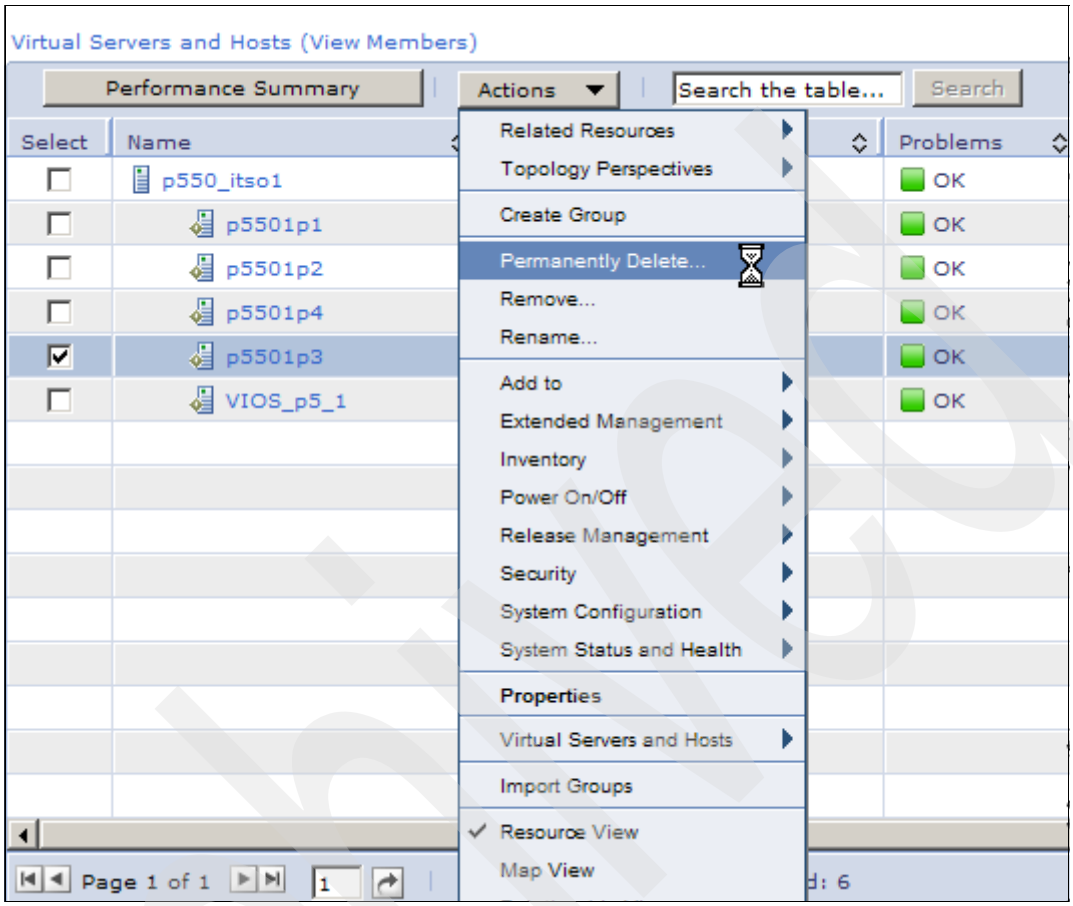

Figure 4-10 Deleting a virtual server through virtual servers and hosts action menu

A new window displays on the Web interface requesting confirmation. A check box can be selected to delete the attached virtual disks, as shown in Figure 4-11.

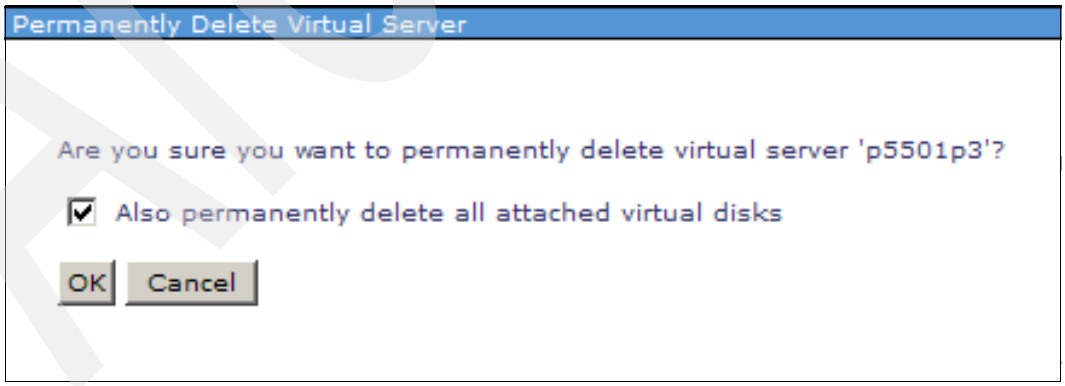

Figure 4-11 Confirmation window to permanently delete a virtual server

Requesting to delete permanently all attached virtual disks causes all of the data to be lost if it is a logical volume virtual disk, because this action also removes the logical volume.

Virtual server deletion can also be run from the command line. To perform this task using the command line interface, use the **`smcli rmvs`** command.

4.2 VMControl scenarios

The following sections describes VMControl general deployment scenarios.

4.2.1 Capturing the virtual appliance from an lpp_source

In this scenario, we describe how to capture a virtual appliance from an available Network Installation Manager (NIM) lpp_resource for further management and deployment tasks.

To prepare the environment, perform the following steps:

1. Create the lpp_source on the NIM server.

   To capture a virtual appliance from an lpp_source, the NIM resource object needs to be imported into the VMControl inventory. This task can only be achieved using the **smcli** command line utility.

   First, determine the NIM resource name for the lpp_source on the NIM server. On the NIM server, run the **lsnim -t lpp_source** command to determine the available lpp_source resources, as shown in Example 4-1.

Example 4-1 lsnim command with type option to show available lpp_source

```
root@p5502p1 / > lsnim -t lpp_source
lpp_aix6104     resources       lpp_source
lpp_aix5311     resources       lpp_source

root@p5502p1 / > lsnim -l lpp_aix6104
lpp_aix6104:
   class       = resources
   type        = lpp_source
   arch        = power
   Rstate      = ready for use
   prev_state  = unavailable for use
   location    = /export/nim/lpp_source/aix6104
   simages     = yes
   alloc_count = 0
   server      = master
root@p5502p1 / >
```

2. Discover the NIM repository within VMControl.

   Determine the ImageRepository object in which the lpp_source must be imported. Run the **smcli lsrepos -ol** command on the IBM Systems Director instance. See Example 4-2 for the command details.

Example 4-2 smcli command to list available repository

```
root@p5502p2 /opt/ibm/director/> smcli lsrepos -ol
p5502p1.itso.ibm.com
        ImageRepositoryType:1
        ChangedDate:2009-12-08T14:48:48-05:00
        Guid:39454B7F60363A8DAD8A8D750B845220
        OID:28586
        DisplayName:p5502p1.itso.ibm.com
        UniqueID:fa1abde1-bd11-4767-988e-66011c05fa99
        Id:28586
        ImagingTool:DISCOVERY_NIM_REPOSITORY
```

```
        ObjectType:ImageRepository
root@p5502p2 /opt/ibm/director/>
```

At this stage, we have all required information collected to start importing the available NIM lpp_source resources using the **smcli captureva** command. Example 4-3 shows the required command to import the AIX61 lpp_source resource with name lpp_aix6104 into the Image Repository with ID 28586.

Example 4-3 smcli command to capture lpp_source into repository

```
root@p5502p2 />smcli captureva -r 28586 -F repos:lpp_aix6104 -n aix6104_lppsource
```

The newly created virtual appliance, named aix6104_lppsource, is now ready and can be managed through the **System Configuration** → **VMcontrol Tab** → **Virtual Appliances** view, as shown in Figure 4-12.

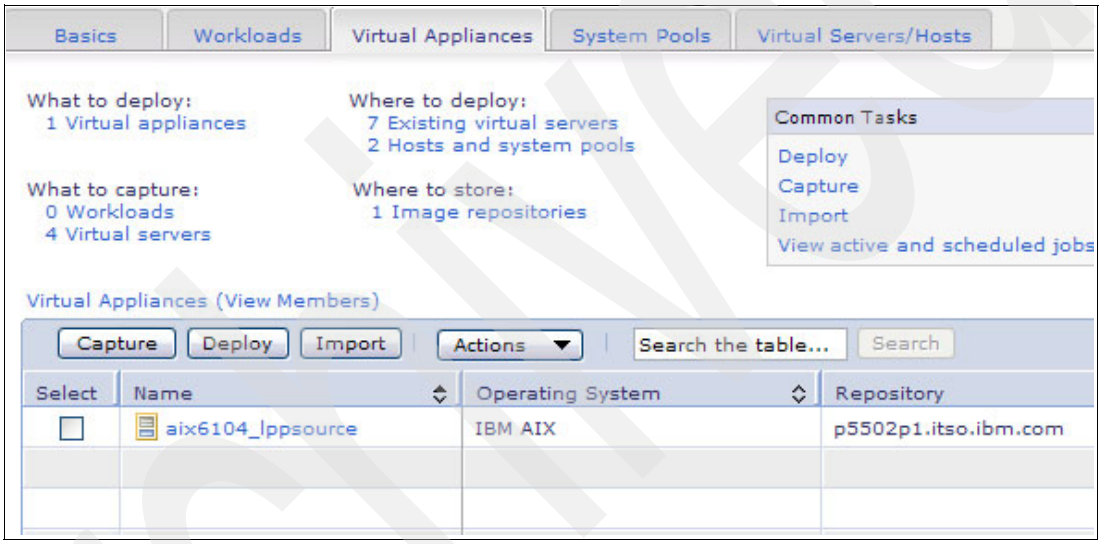

Figure 4-12 New Virtual Appliance from lpp_source view

The virtual appliance named aix6104_lppsource properties can be checked using the **smcli** interface. Example 4-4 shows the **smcli lsva** command output with a query option to limit the results on server p5502p2.

Example 4-4 Output of command smcli lsva -vl -q "name = aix6104_lppsource"

```
root@p5502p2 /> smcli lsva -vl -q "name = aix6104_lppsource"
Thu Dec 17 15:59:28 EST 2009  lsva Operation started.
aix6104_lppsource (aix6104_lppsource)
        TrunkId:3
        RevisionVersion:1.1
        ChangedDate:2009-12-09T13:18:58-05:00
        TrunkName:aix6104_lppsource
        Description:
        DisplayName:aix6104_lppsource
        SpecificationId:1
        SpecificationVersion:1.1
        Id:31000
        OID:31000
        Guid:05A6EFFBFA2833E4BCCB11EAD1BE5998
        ApplianceId:2accd91f-15f1-419f-a63c-dbeac75441f4
```

```
        ObjectType:VirtualAppliance

Thu Dec 17 15:59:28 EST 2009  lsva Operation took 0 seconds.
root@p5502p2 />
```

On the NIM server, the virtual appliance object is stored in the `appliances` subdirectory. In our case, we used `/export/nim/appliances/`. The final directory on the NIM server is made up of the `appliances` subdirectory and the ApplianceId. In Example 4-5, the directory listing for virtual appliance aix6104_lppsource n NIM server p5502p1 is listed.

Example 4-5 Output of physical NIM location for virtual appliance

```
root@p5502p1 /export/nim/appliances/2accd91f-15f1-419f-a63c-dbeac75441f4 > ls -ltr
-rw-r--r--    1 root     system        10075 Dec  9 13:18
2accd91f-15f1-419f-a63c-dbeac75441f4.ovf
drwxr-xr-x    2 root     system          256 Dec  9 14:39 vmcontrol
root@p5502p1 /export/nim/appliances/2accd91f-15f1-419f-a63c-dbeac75441f4 > ls -ltr
vmcontrol
-rw-r--r--    1 root     system            0 Dec  9 13:18 lpp_source.lpp_aix6104
-rw-r--r--    1 root     system            0 Dec  9 14:39
spot.lpp_aix6104.nimrf-0000000000000005-spot
root@p5502p1 /export/nim/appliances/2accd91f-15f1-419f-a63c-dbeac75441f4 >
```

4.2.2 Capturing a virtual appliance from an existing virtual server

To capture a virtual appliance from existing virtual server click **System Configuration** → **VMControl Tab** → **Basics** → **Common Tasks** and click **Item Capture**. See Figure 4-13 for the VMControl view.

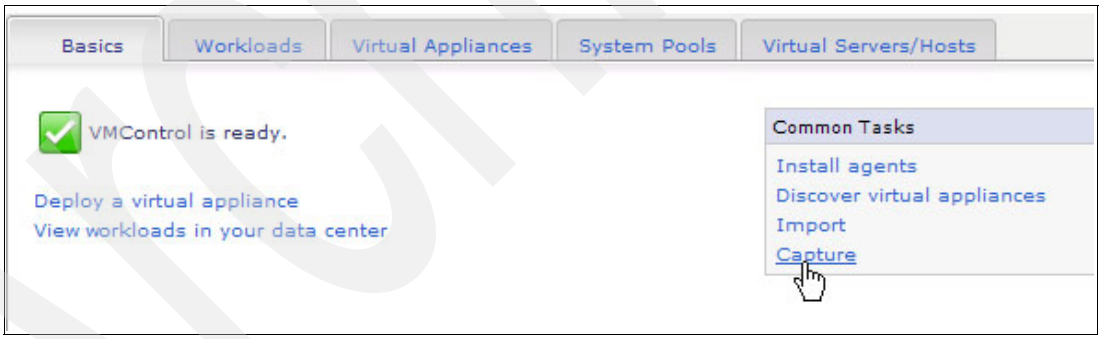

Figure 4-13 Common task pane item capture

In Figure 4-14 on page 88, the new name of the virtual appliance must be provided. Optionally, we provided a description and search tags for enhanced human readability and accessibility to the virtual appliance.

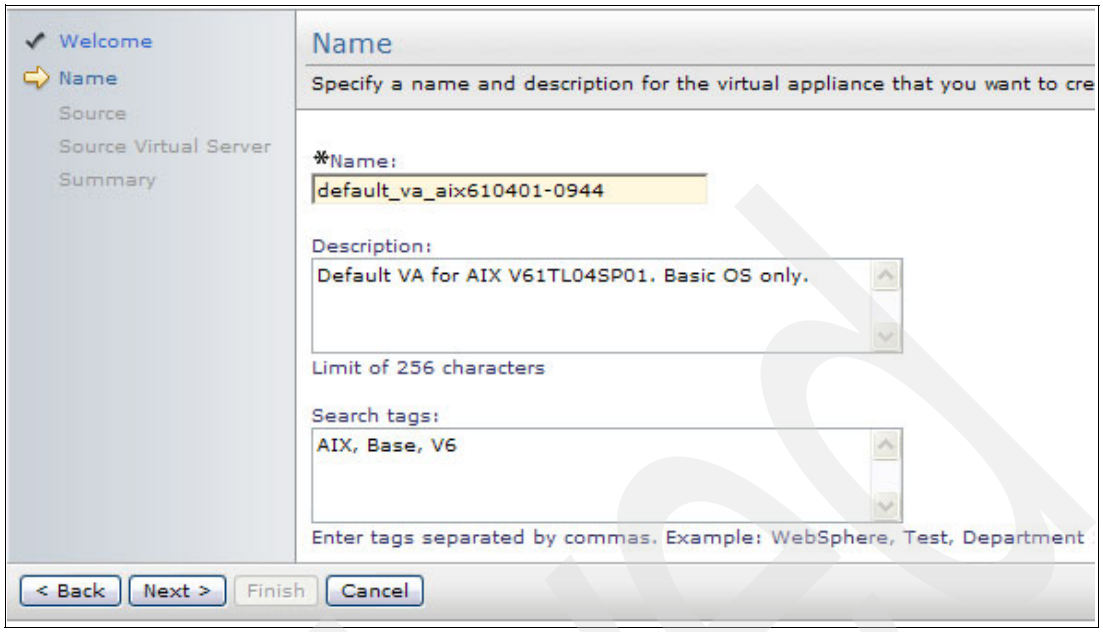

Figure 4-14 Virtual appliance definition for the capture task

Next, select the **Virtual Server** as source for capture and click **Next** to continue, as in Figure 4-15.

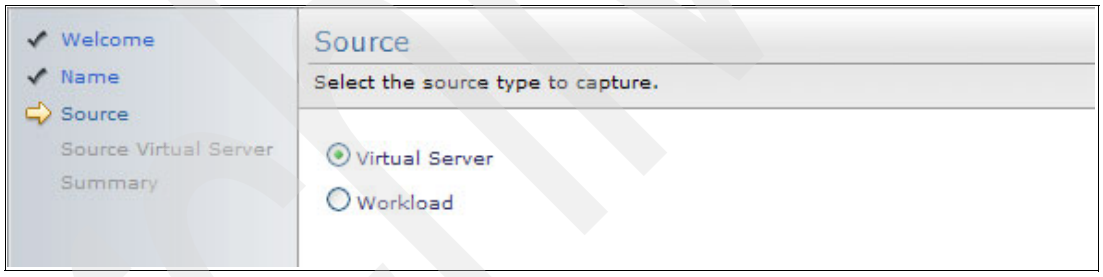

Figure 4-15 Virtual appliance source selection for capture

In the available list of virtual servers on Figure 4-16 on page 89, we selected server p5502p7 as the target. The virtual server must be started, or it cannot be captured and the Error DNZIMN384E will be logged. Select the **Virtual Server** and click **Add** to add the server to the selected list. Click **Next** to continue.

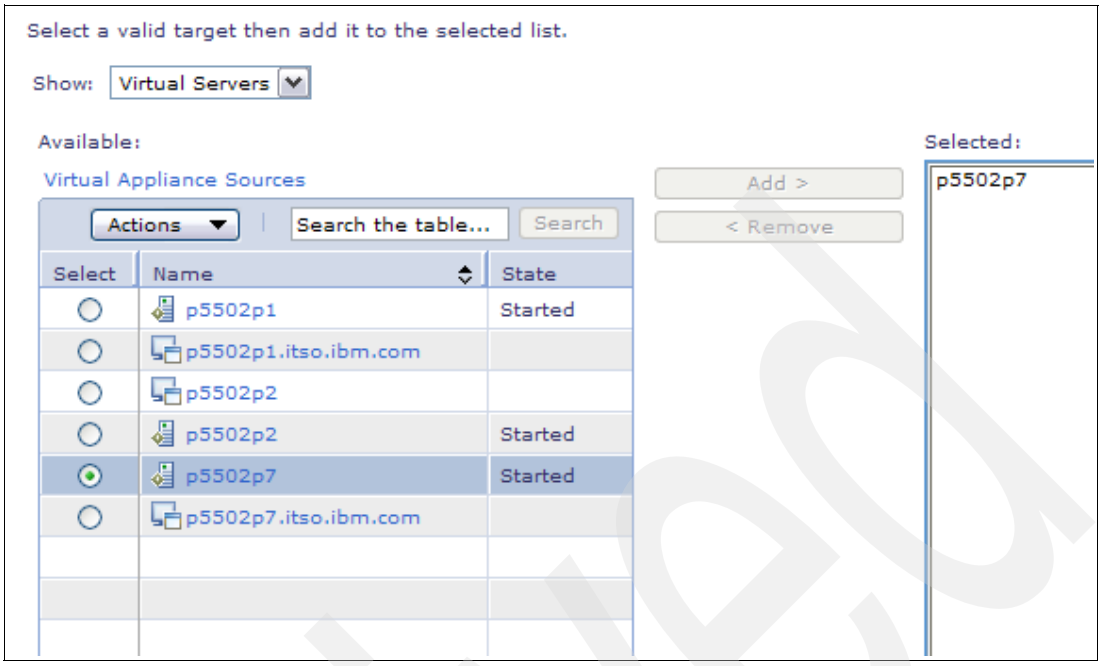

Figure 4-16 List of virtual server sources for the capture task

Note: Only virtual servers are listed for which System Director inventory has already been collected. A list of Systems with no inventory collected can be obtained clicking **Welcome View → Manage → Discovery Manager**. Check for systems with messages which have no inventory collected.

In Figure 4-17, we left the default Network Mapping default option.

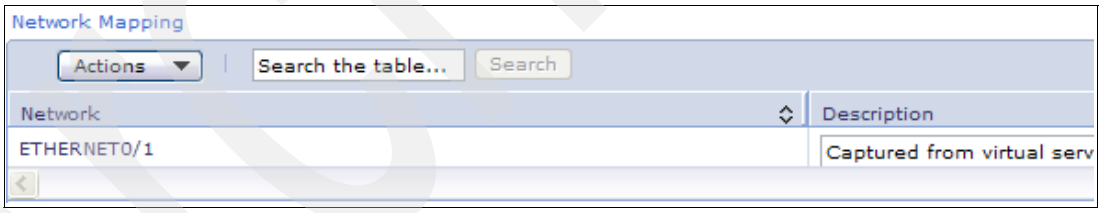

Figure 4-17 Network mapping view for the capture task

Click **Next** to check the Summary view, shown in Figure 4-18 on page 90.

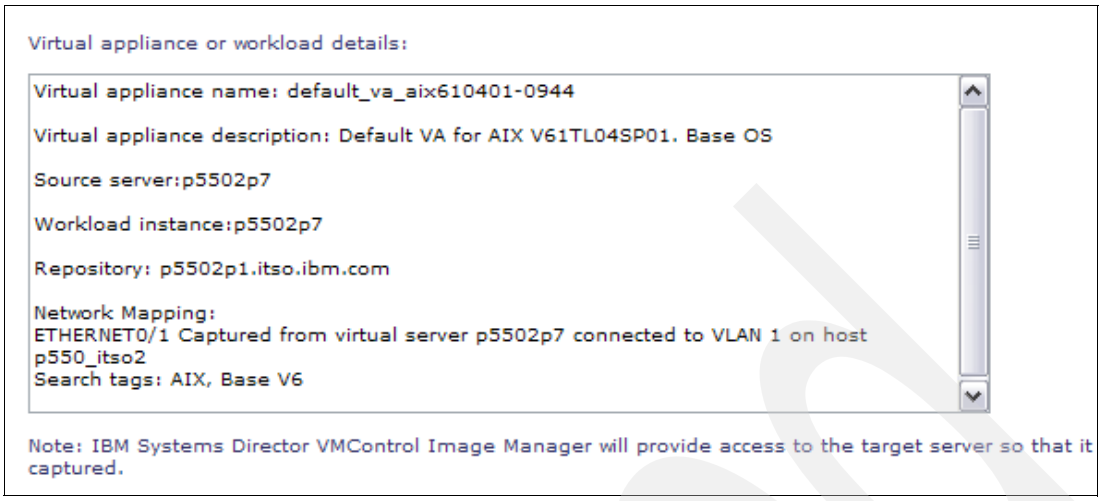

Figure 4-18 Summary view for the capture task

This task creates an AIX mksysb image from the selected client and create the associated NIM database entry as a virtual appliance.

4.2.3 Deploying a virtual appliance into an empty server

In this section, we describe how to deploy a virtual appliance into an empty server that acts as a container for later usage. Click **System Configuration** → **VMControl Tab** → **Basics** → **Common Tasks** and click **Deploy**. Select the **None. I want to deploy an empty virtual server** radio button, as shown in Figure 4-19.

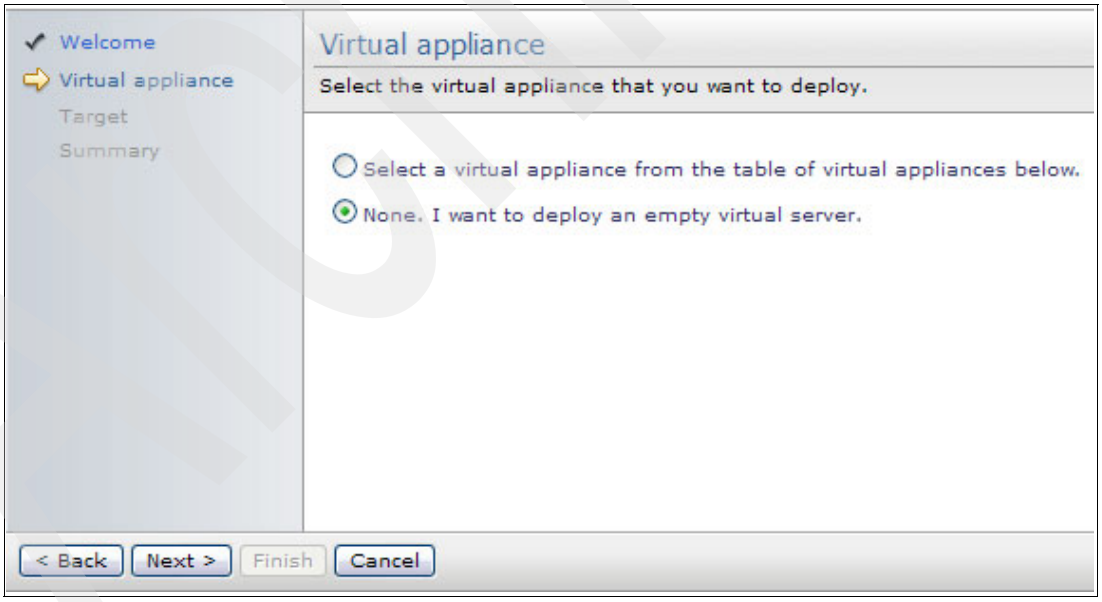

Figure 4-19 Deploying a virtual appliance selection view

Select the location where to deploy the new virtual server (Figure 4-20 on page 91). We used the POWER5 server named p550_itso2.

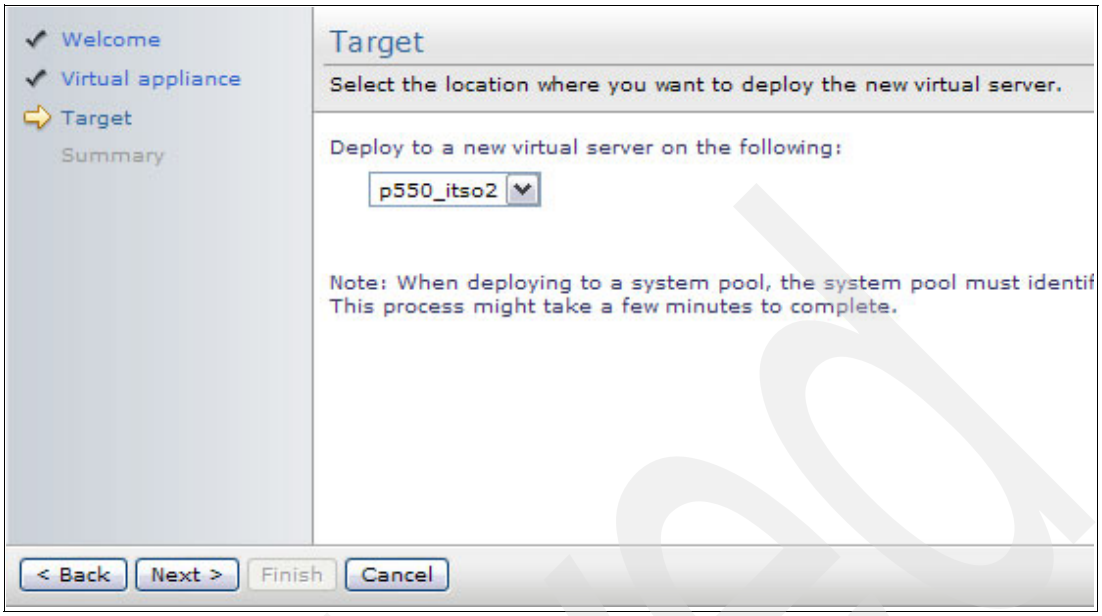

Figure 4-20 Selecting a target for the virtual appliance deployment

Click **Next**. In our scenario, we selected the **Launch the Create Virtual Server Wizard now** check box, as shown in Figure 4-21.

Note: Do not clear the **Launch the Create Virtual Server wizard now** check box, otherwise VMControl cannot set all required virtual server settings for the VIO server and cannot create the virtual server.

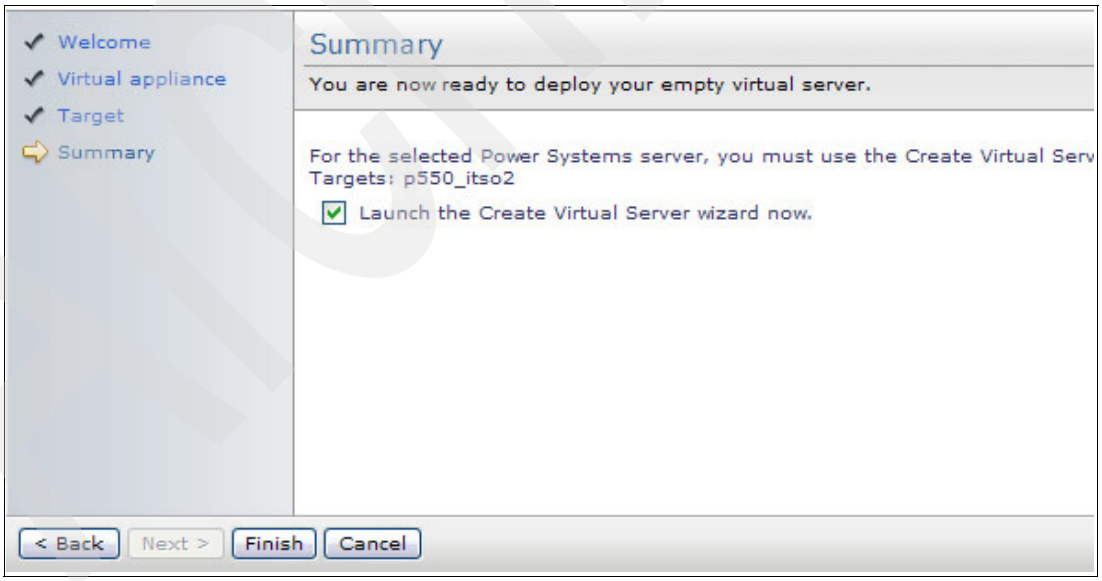

Figure 4-21 Summary view for the virtual appliance deployment

After you click **Finish**, the virtual server creation wizard starts with the **Welcome Page**, as shown in Figure 4-22 on page 92. The wizard is a common wizard for the virtual server creation.

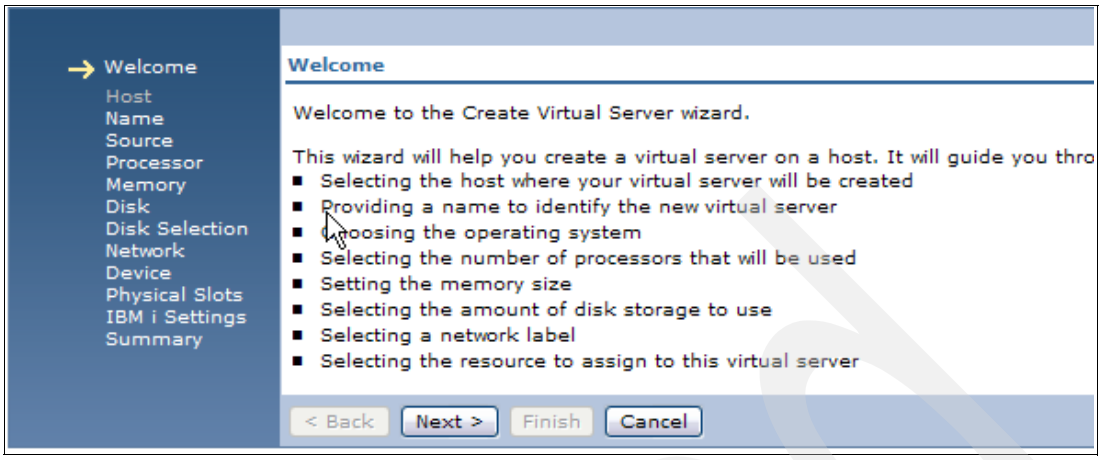

Figure 4-22 Virtual server wizard welcome window

Click **Next**. Provide the name of the virtual server to be created. In our case, we used `va_p5501p8`, as shown in Figure 4-23.

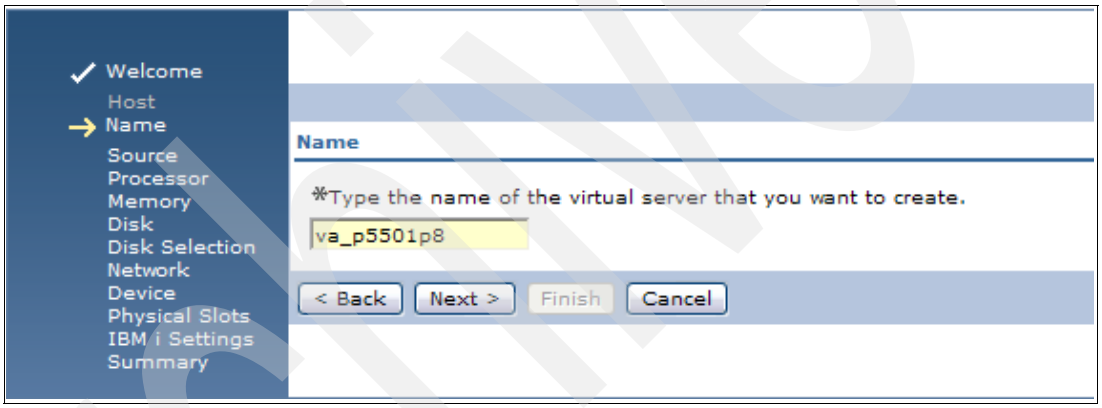

Figure 4-23 Virtual server wizard server name input window

Click **Next**. Choose the planned operating system from a pull-down menu. For Power environments only, AIX or Linux is a valid choice, as indicated in Figure 4-24.

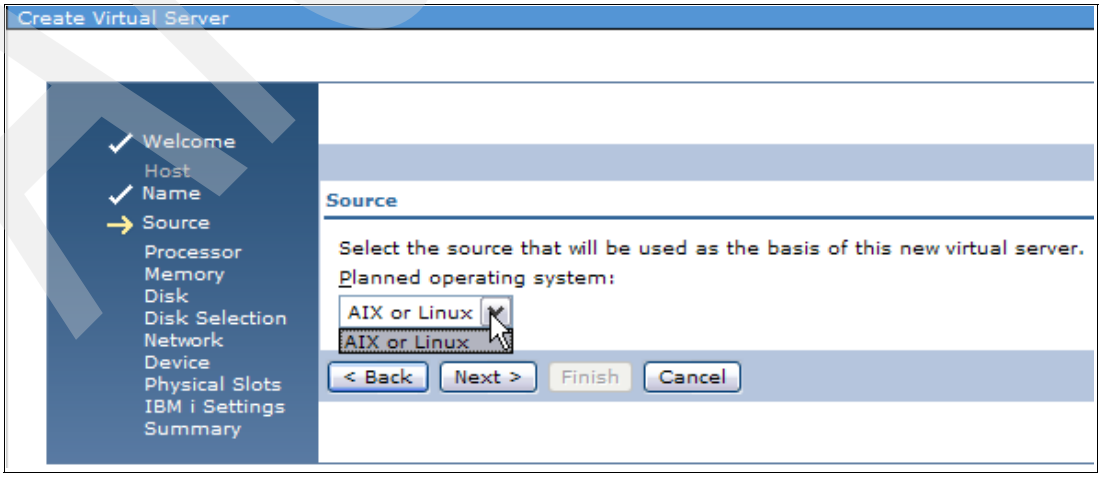

Figure 4-24 Virtual server wizard operating system source selection

In the next eight windows, you have to provide settings for processor, memory, disk storage, network, device, and physical slots. The available options depend on the available features and capabilities of the Power Systems server. The initial values you choose might vary in comparison to the values used for this scenario. We used the values in Table 4-1.

Table 4-1 Virtual server default properties

Property	Used value
Number of processors → Use shared processor → Assigned virtual processor	1
Memory size	1 GB
Disk to use → Create a virtual disk for this server	Name: va_p5501p8_vg with 15GB in size
Network select exhausting or create new network	Bridged network
Device attached physical devices such as CD	Nothing selected or used
Physical slots	Nothing selected or used

On the Summary page, click **Finish**, as shown in Figure 4-25 to launch the Task view shown in Figure 4-26 on page 94.

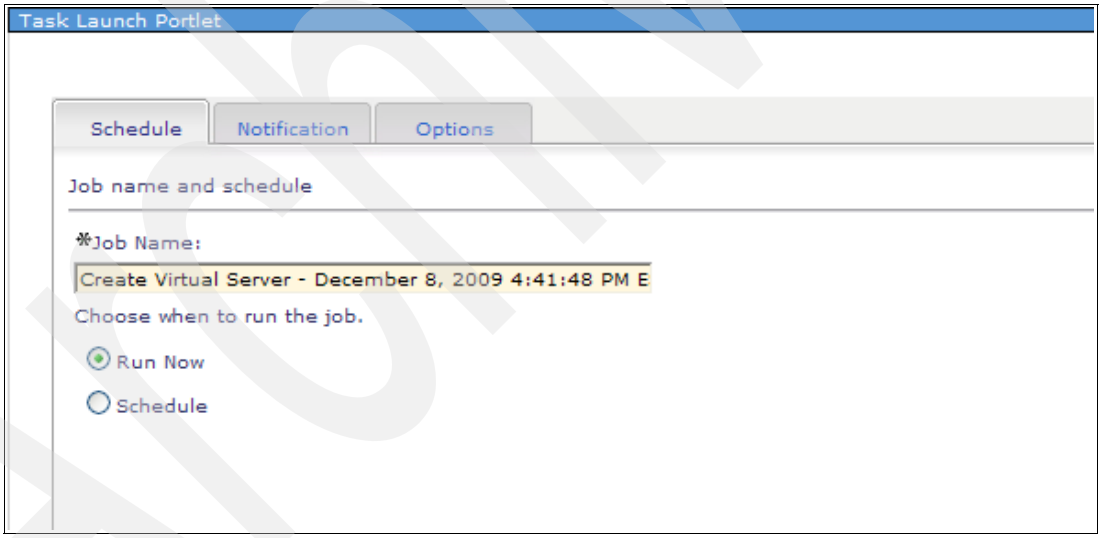

Figure 4-25 Start virtual server creation view task launch portlet

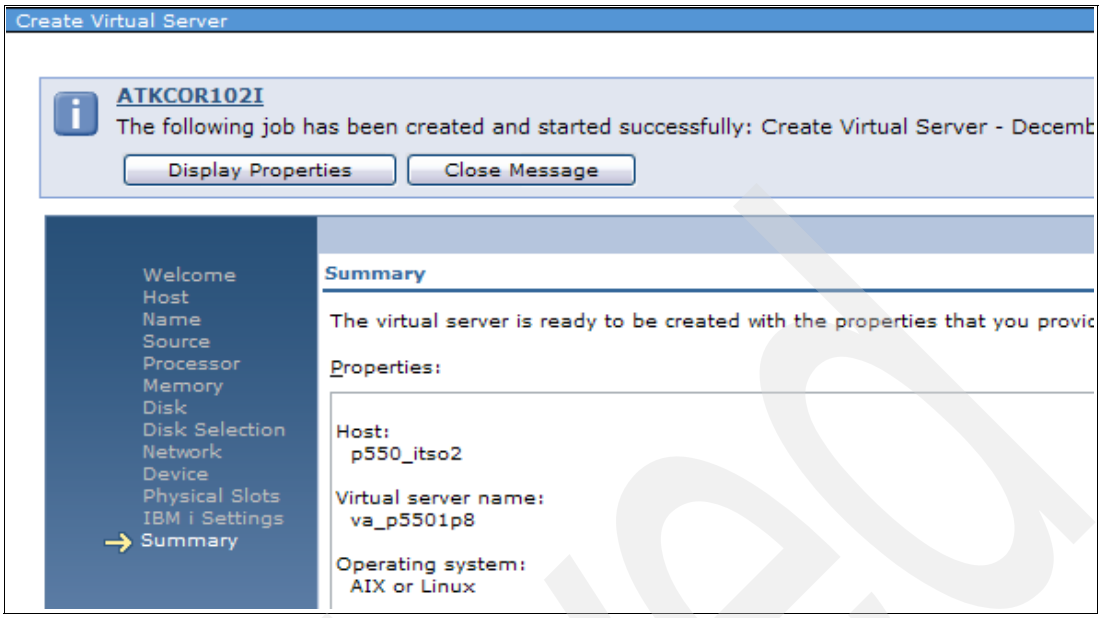

Figure 4-26 Start virtual server summary view - after creation task has been submitted

Click **Display Properties** to access the Active and Scheduled Jobs view, as in Figure 4-27.

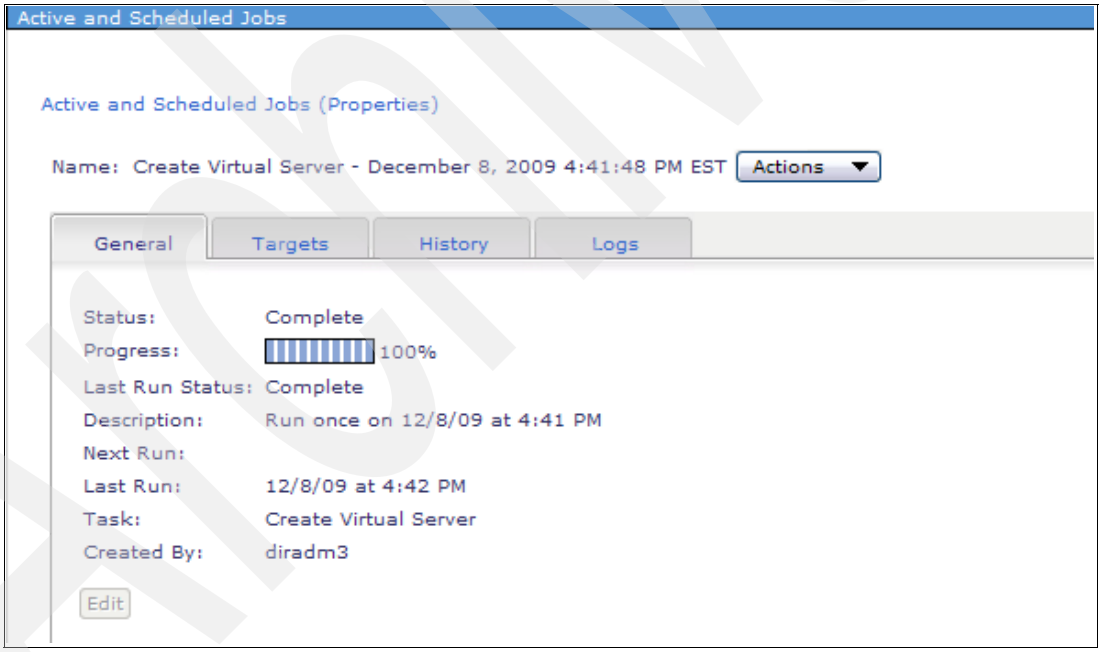

Figure 4-27 Create virtual server job properties view - active and scheduled jobs

To access the current log file of this job. Click **Logs** tab (Figure 4-27) to open the full log view as shown in Figure 4-28 on page 95.

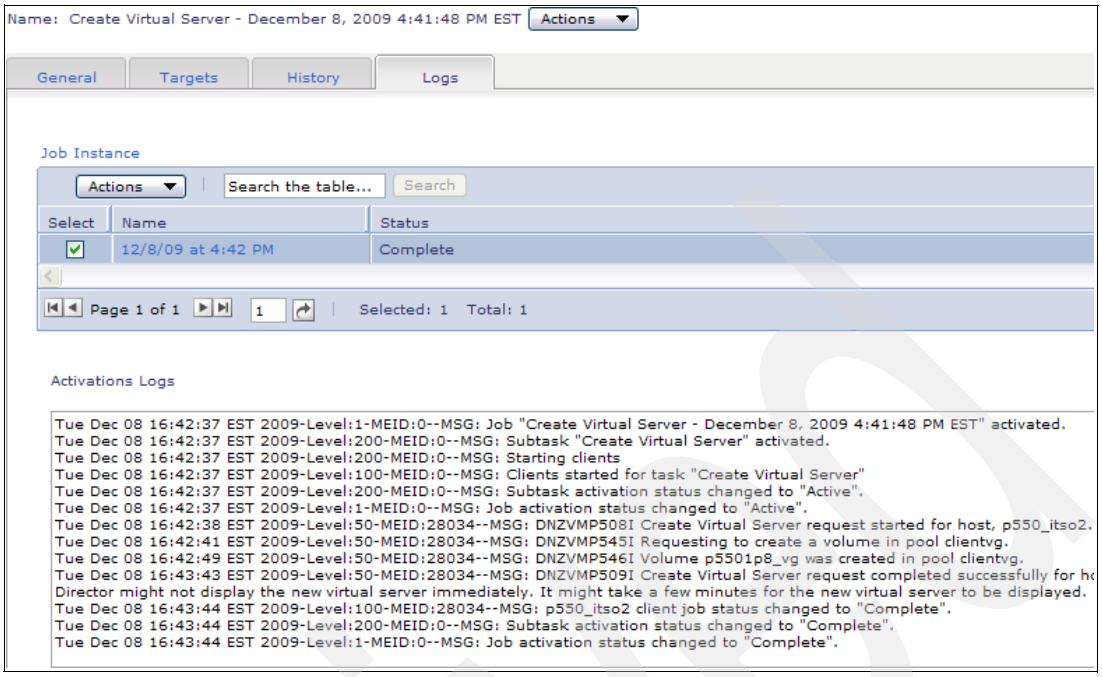

Figure 4-28 Create virtual server job logs view

The success message of the deployment wizard is shown in Figure 4-29.

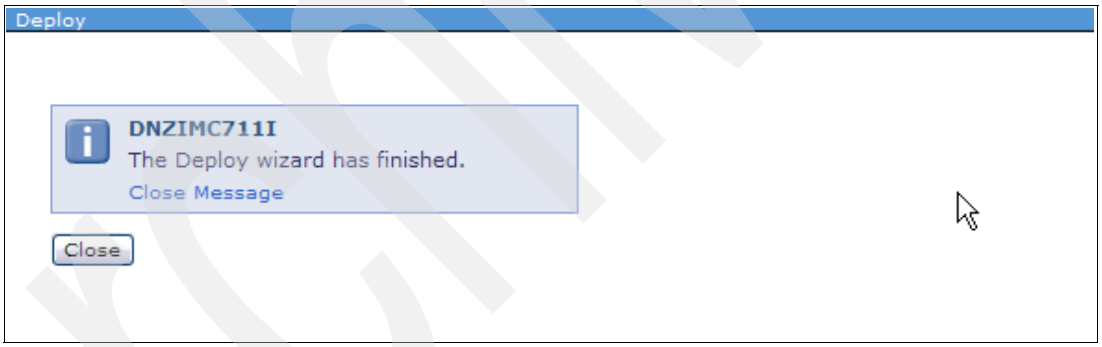

Figure 4-29 Deploy wizard confirmation window

Click **Close** and return to **VMControl** → **Virtual Server/Hosts** → **Common Task** → **Virtual servers and hosts** view as shown in Figure 4-30. In this view, you see the newly created virtual server va_p5501p8. The virtual server status is `Stopped`, as no virtual appliance has been deployed on this empty server.

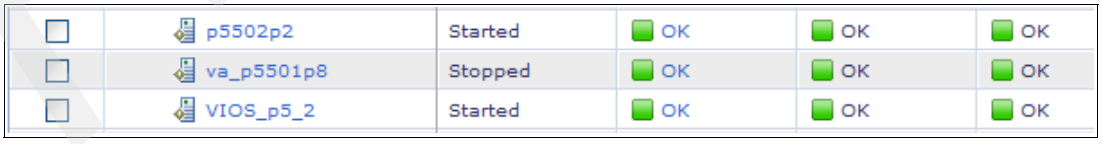

Figure 4-30 Virtual servers and hosts

Administrators can check the log information from the AIX command line, as shown in Figure 4-28. Based on our installation, the logs are stored in the `/opt/ibm/director/data` directory and `J129A1.log` file. For details, see Example 4-6 on page 96.

Example 4-6 Command line access to system log file for create virtual server task

```
root@p5502p2 /opt/ibm/director/data> strings ./J129A1.log
i#com.tivoli.twg.log.TWGLogResources:jobActCreated|Create Virtual Server -
December 8, 2009 4:41:48 PM EST
,#:newsubtaskActivation|Create Virtual Server
#:subtaskActStartClients
3#:newsubtaskActClientsStarted|Create Virtual Server
#:subtaskActStatus1
#:jobActStatus1
FDNZVMP508I Create Virtual Server request started for host, p550_itso2.
:DNZVMP545I Requesting to create a volume in pool clientvg.
:DNZVMP546I Volume p550lp8_vg was created in pool clientvg.
DNZVMP509I Create Virtual Server request completed successfully for host,
p550_itso2. Systems Director might not display the new virtual server immediately.
It might take a few minutes for the new virtual server to be displayed.
$#:subtaskActClientStatus2|p550_itso2
#:subtaskActStatus-1
#:jobActStatus-1

..... (content omitted) ......
root@p5502p2 /opt/ibm/director/data>
```

4.2.4 Deploying a virtual appliance to a host

In this scenario, we deploy the lpp_source virtual appliance created in 4.2.1, “Capturing the virtual appliance from an lpp_source” on page 85 into a new virtual server. Click **VMControl Tab** → **Basics** → **Deploy** to open the virtual appliance view, shown in Figure 4-31.

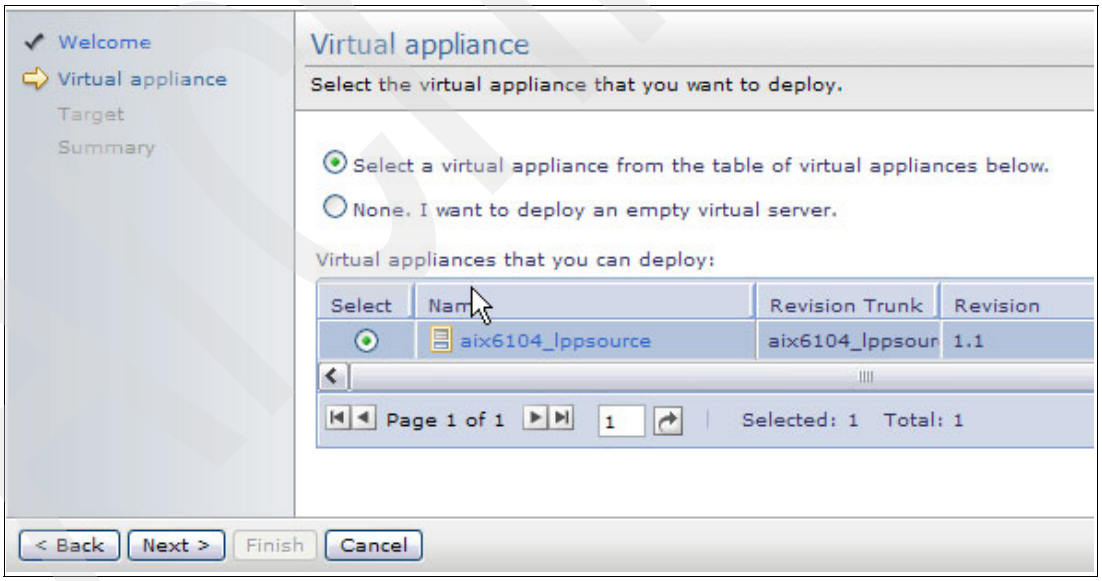

Figure 4-31 Deploy virtual appliance selection view

In the Target view, you can choose an existing virtual server or deploy a new virtual server. For this scenario, we deploy a new virtual server on target p550_itso2. See Figure 4-32 on page 97 to review the selection made.

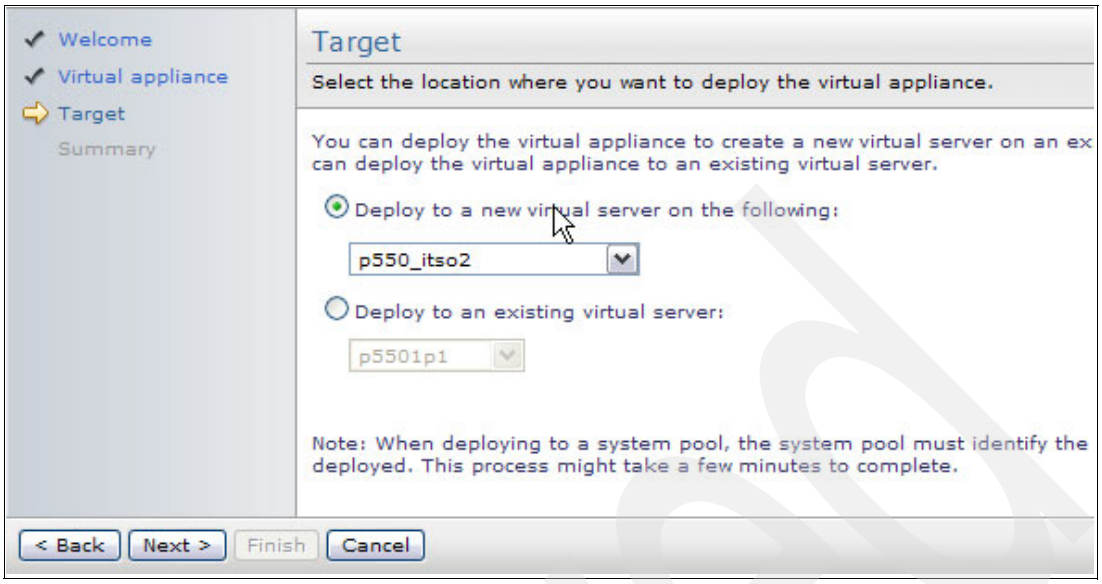

Figure 4-32 Virtual appliance target view for a new virtual server

Because the metadata of the virtual appliance does not contain any deployment parameters of the virtual server, we need to specify basic information such as the storage pool and the network mapping.

Note: We do not show the selections made as options depend on your VIOS setup.

Click **Next** to continue with the product view, as shown in Figure 4-33 on page 98. In this view, we need to provide product settings required to deploy the virtual appliance, such as host name, domain name, and IP address for static IP address assignment.

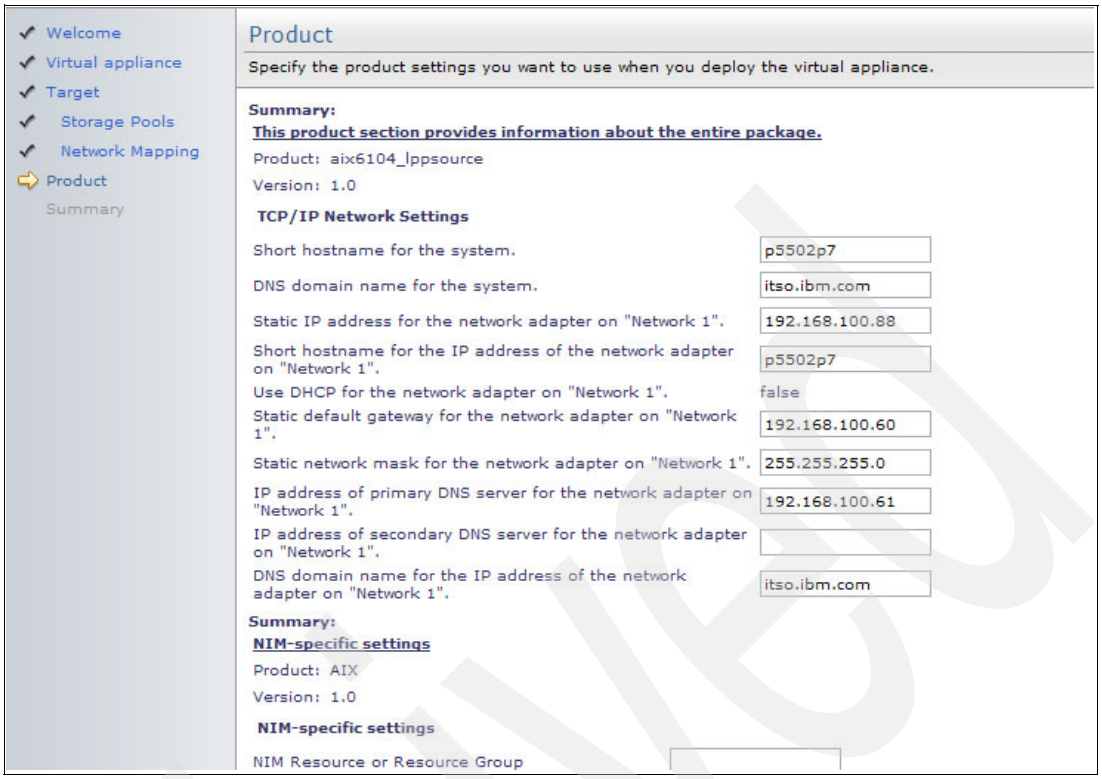

Figure 4-33 Virtual appliance product specification view

On the summary view panel, click **Finish** to start the creation of the deployment job, See Figure 4-34.

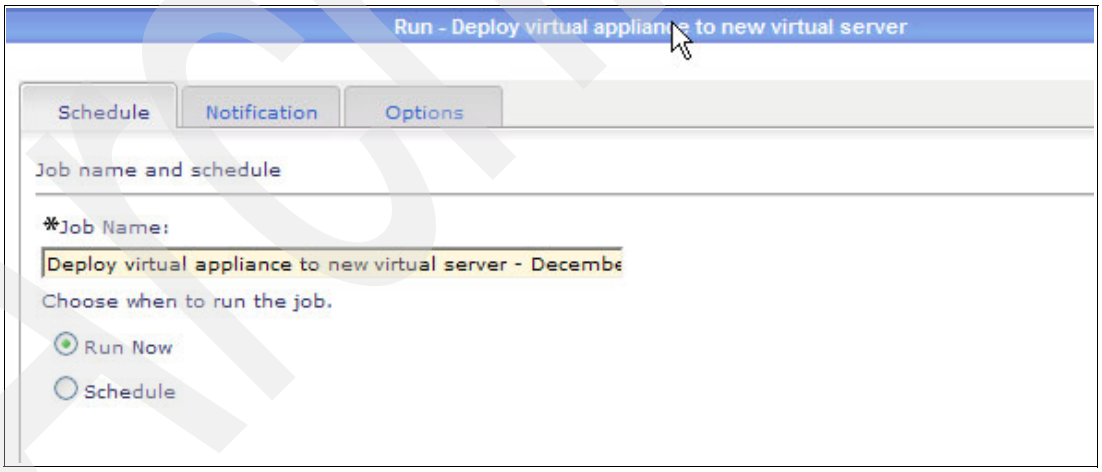

Figure 4-34 Deploying a virtual appliance to new server - job creation view

Click **Display Properties** to access the active Jobs view. See Figure 4-35.

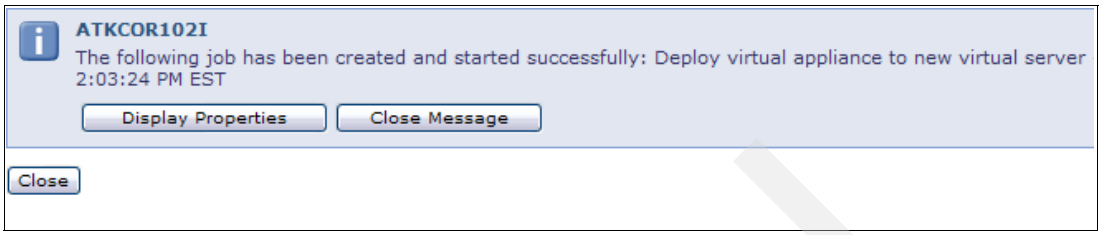

Figure 4-35 Job creation and start confirmation window

Progress of the active task can be monitored within the Active Jobs view, as shown in Figure 4-36.

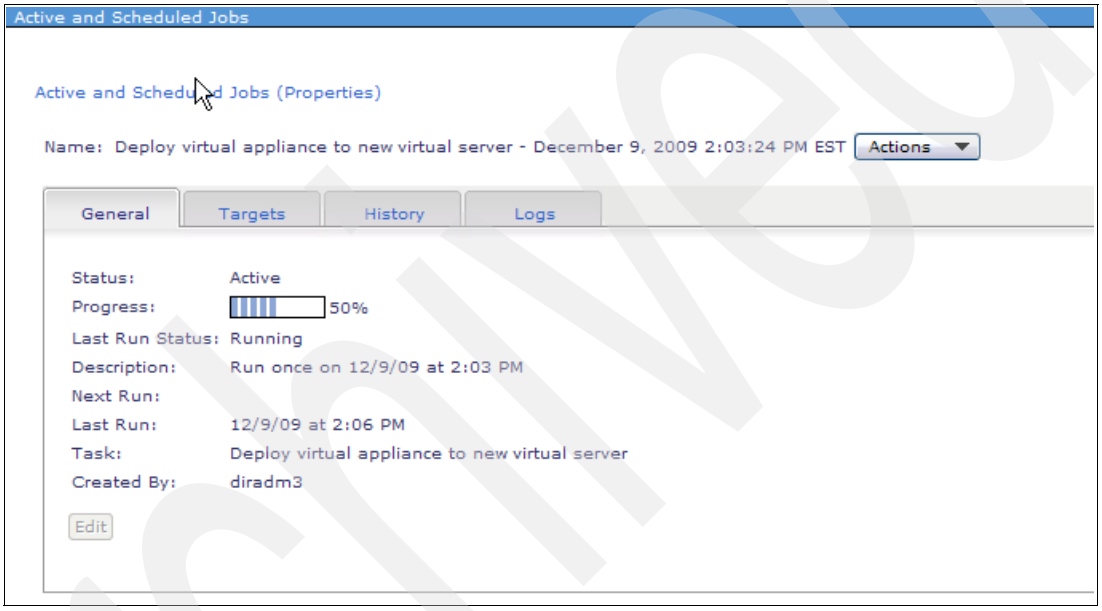

Figure 4-36 Active and scheduled Jobs view - deploy new virtual server

Another option to view and manage active jobs is go to the **VMControl Tab** → **Jobs** → **Active**, as shown in Figure 4-37.

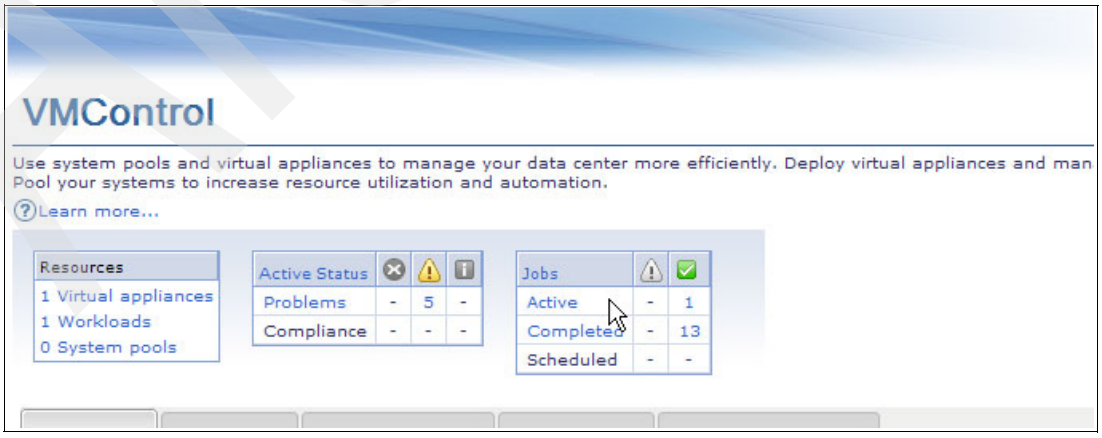

Figure 4-37 VMControl active jobs summary

The VMControl active jobs view panel shown in Figure 4-38 enables you to view, search, and manage all jobs from a single view.

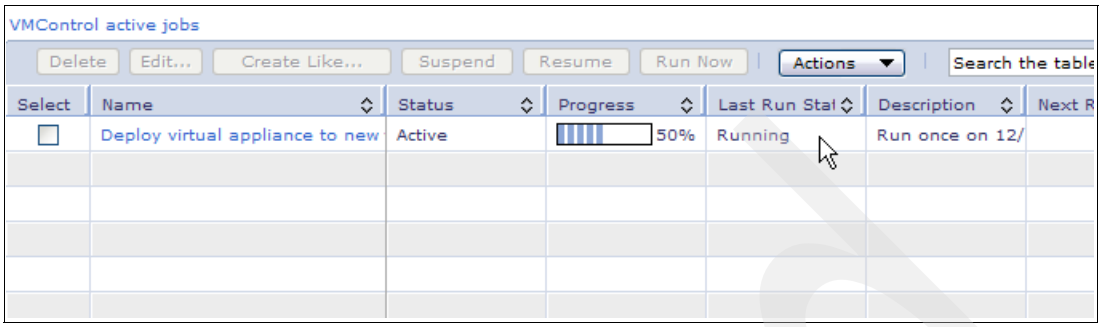

Figure 4-38 VMControl active jobs detail view

Note: Overall execution time might vary and depends on several parameters, such as processing capability and workload on the NIM server. This is because the required NIM resources are created before the actual installation can be initiated.

After the job is logged as complete, click **Task** → **Logs** to open the log file. This is shown in Figure 4-39.

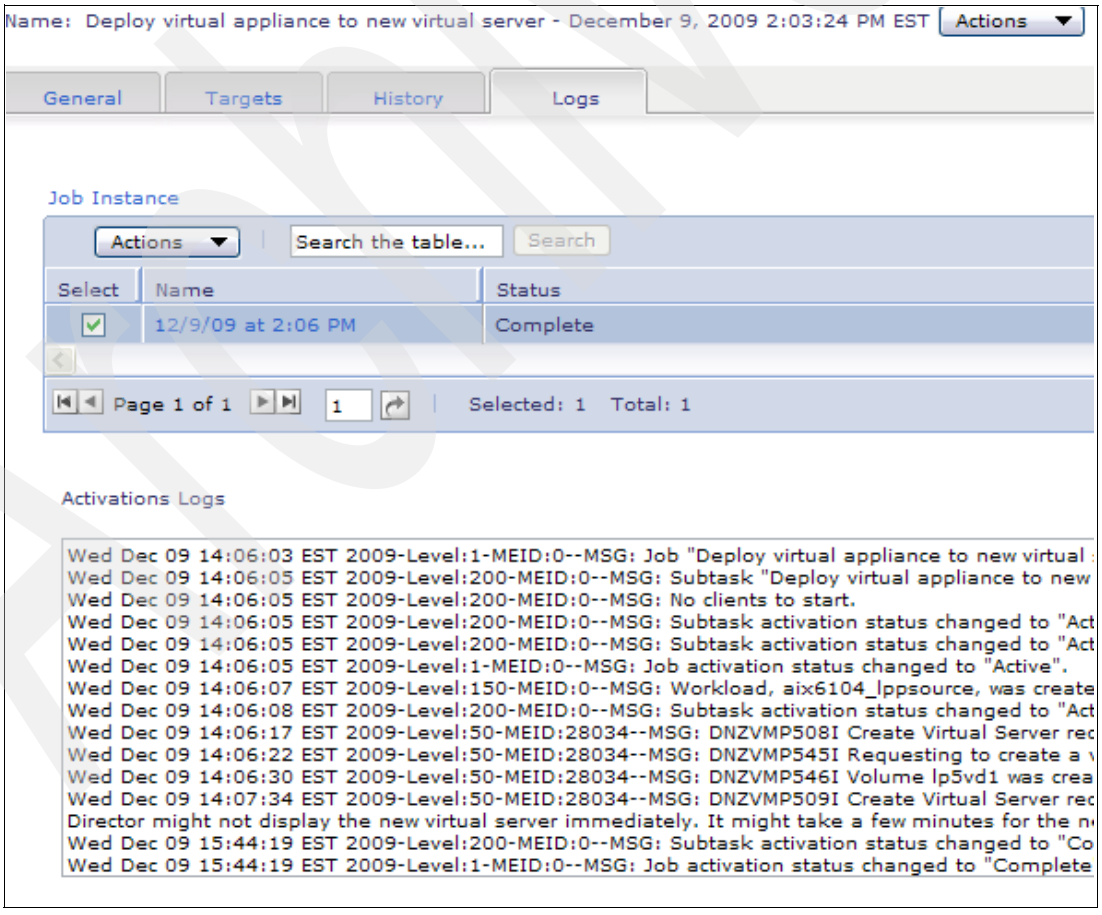

Figure 4-39 Activations log for deployment of virtual appliance to new virtual server

Example 4-7 shows the full activations log output. The output log shown in Figure 4-39 on page 100 is a partial view of the log file.

Example 4-7 Full activations log for deployment of virtual appliance to new virtual server

```
Wed Dec 09 14:06:03 EST 2009-Level:1-MEID:0--MSG: Job "Deploy virtual appliance to
new virtual server - December 9, 2009 2:03:24 PM EST" activated.
Wed Dec 09 14:06:05 EST 2009-Level:200-MEID:0--MSG: Subtask "Deploy virtual
appliance to new virtual server" activated.
Wed Dec 09 14:06:05 EST 2009-Level:200-MEID:0--MSG: No clients to start.
Wed Dec 09 14:06:05 EST 2009-Level:200-MEID:0--MSG: Subtask activation status
changed to "Active".
Wed Dec 09 14:06:05 EST 2009-Level:200-MEID:0--MSG: Subtask activation status
changed to "Active".
Wed Dec 09 14:06:05 EST 2009-Level:1-MEID:0--MSG: Job activation status changed to
"Active".
Wed Dec 09 14:06:07 EST 2009-Level:150-MEID:0--MSG: Workload, aix6104_lppsource,
was created.
Wed Dec 09 14:06:08 EST 2009-Level:200-MEID:0--MSG: Subtask activation status
changed to "Active".
Wed Dec 09 14:06:17 EST 2009-Level:50-MEID:28034--MSG: DNZVMP508I Create Virtual
Server request started for host, p550_itso2.
Wed Dec 09 14:06:22 EST 2009-Level:50-MEID:28034--MSG: DNZVMP545I Requesting to
create a volume in pool clientvg.
Wed Dec 09 14:06:30 EST 2009-Level:50-MEID:28034--MSG: DNZVMP546I Volume lp5vd1
was created in pool clientvg.
Wed Dec 09 14:07:34 EST 2009-Level:50-MEID:28034--MSG: DNZVMP509I Create Virtual
Server request completed successfully for host, p550_itso2. Systems Director might
not display the new virtual server immediately. It might take a few minutes for
the new virtual server to be displayed.
Wed Dec 09 15:44:19 EST 2009-Level:200-MEID:0--MSG: Subtask activation status
changed to "Complete".
Wed Dec 09 15:44:19 EST 2009-Level:1-MEID:0--MSG: Job activation status changed to
"Complete".
Wed Dec 09 15:44:19 EST 2009-Level:150-MEID:0--MSG: Virtual server, p550_2p7, added
to workload, aix6104_lppsource.
Wed Dec 09 15:44:22 EST 2009-Level:150-MEID:0--MSG: Workload, aix6104_lppsource,
is started.
Wed Dec 09 15:44:22 EST 2009-Level:150-MEID:0--MSG: DNZIMC094I Deployed Virtual
Appliance aix6104_lppsource to new Server p550_2p7 hosted by system p550_itso2.
Wed Dec 09 15:44:22 EST 2009-Level:200-MEID:0--MSG: Subtask activation status
changed to "Complete".
Wed Dec 09 15:44:22 EST 2009-Level:100-MEID:0--MSG: Deploy virtual server
complete.
```

Next, check the status of the newly deployed virtual server by clicking **VMControl Tab** → **Virtual servers and hosts**. For our scenario, check the status for virtual server p5502p7. In Figure 4-40, apply a search filter for host p5502p7 to narrow down the results.

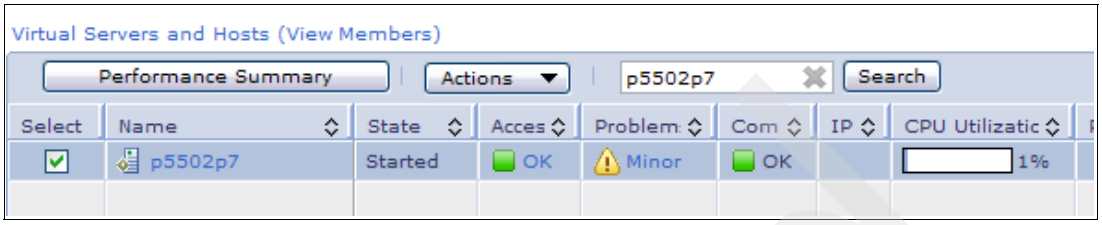

Figure 4-40 View of the virtual server p5502p7

Note: For this scenario, we ignored the minor problem reported in Figure 4-40. In our case, this related to power state changes of the virtual server.

Showing the status of the virtual server can also be achieved with the **smcli** command line extension. First, find the internal ID of the virtual appliance to deploy using the **smcli lsva** command with the query option. In Example 4-8, we check the OID for the virtual appliance aix6104_lppsource (31000 in our case).

Example 4-8 smcli session to list aix6104_lppsource virtual appliance

```
root@p5502p2 /> smcli lsva -q "name = aix6104_lppsource" -l
aix6104_lppsource
        TrunkId:3
        RevisionVersion:1.1
        ChangedDate:2009-12-09T13:18:58-05:00
        TrunkName:aix6104_lppsource
        Description:
        DisplayName:aix6104_lppsource
        SpecificationId:1
        SpecificationVersion:1.1
        Id:31000
        OID:31000
        Guid:05A6EFFBFA2833E4BCCB11EAD1BE5998
        ApplianceId:2accd91f-15f1-419f-a63c-dbeac75441f4
        ObjectType:VirtualAppliance
root@p5502p2 />
```

Find all hosts on which the virtual appliance can be deployed. Use the **smcli lsdeploytargets** command as shown in Example 4-9 for the virtual appliance aix6104_lppsource with ID 31000.

Example 4-9 smcli lsdeploytargets session for aix6104_lppsource virtual appliance

```
root@p5502p2 /> smcli lsdeploytargets -v -a deploy_new -V 31000 -o
Sat Dec 12 11:08:49 EST 2009  lsdeploytargets Operation started.
p550_itso2, 28034 (p550_itso2)
Sat Dec 12 11:08:50 EST 2009  lsdeploytargets Operation took 0 seconds.
root@p5502p2 />
```

Optionally, check all attributes that can be customized for the virtual appliance during deployment. Use the **smcli lscustomization** command for the virtual appliance aix6104_lppsource with ID 31000 and target host with ID 28034. A sample output for the **smcli lscustomization -a deploy_new -V 31000 -s 28034** command is shown in Example 4-10. Appendix C, “Customizable parameters file for deploying a new virtual appliance” on page 189, provides the full list of customizable parameters.

Example 4-10 smcli lscustomization session for host p550_itso2

```
root@p5502p2 /> smcli lscustomization -a deploy_new -V 31000 -s 28034 -v
Sat Dec 12 11:19:17 EST 2009  lscustomization Operation started.
cpushared
        Value:  1
        Min:    1
        Max:    128
        Increment:      1
        IncrementType:  LINEAR
        Description:    The desired number of dedicated or virtual processors to
be assigned to the virtual server.

poolstorages
        Min:    1
        Max:    1
        Options:
        Key,    Pool,   Storage Server Path,    Free Space (GB),
Description
        [rootvg:VIOS VIOS_p5_2] rootvg  VIOS VIOS_p5_2  113.75  VIOS logical
volume pool. Virtual servers using this pool cannot be relocated.
        [clientvg:VIOS VIOS_p5_2]       clientvg        VIOS VIOS_p5_2  327.5
VIOS logical volume pool. Virtual servers using this pool cannot be relocated.
product.AIX1.com.ibm.ovf.vim.2.system.hostname
        Value:
        Description:    Short hostname for the system.
        Category:       TCP/IP Network Settings
        OVFClass:       com.ibm.ovf.vim.2
root@p5502p2 />
```

The final step is to invoke the deployment of the virtual server using the **smcli deployva**, command, as described in Example 4-11.

Example 4-11 smcli deployva session for new virtual host

```
root@p5502p2 /> smcli deployva -v -s 28034 -V 31000 -a deploy_new -A
"poolstorages=clientvg:VIOS VIOS_p5_2,
virtualnetworks[Virtual Network 1]=hostVnet:ETHERNET0/3,
product.AIX1.com.ibm.ovf.vim.2.system.hostname=p5502p7,
product.AIX1.com.ibm.ovf.vim.2.system.domainname=itso.ibm.com,
product.AIX1.com.ibm.ovf.vim.2.networkport.6.ip=192.168.100.88,
product.AIX1.com.ibm.ovf.vim.2.networkport.6.hostname=p5502p7,
product.AIX1.com.ibm.ovf.vim.2.networkport.6.netmask=255.255.255.0,
product.AIX1.com.ibm.ovf.vim.2.networkport.6.gateway=192.168.100.60,
product.AIX1.com.ibm.ovf.vim.2.networkport.6.dns1.ip=192.168.100.61"
Sat Dec 12 13:19:17 EST 2009 deployva Operation started.
root@p5502p2 />
```

4.2.5 Exporting virtual appliances

Although no command or utility is provided by VMControl to export virtual appliances, this section discusses one possible scenario to create a virtual appliance package for distribution. In this example, we create an AIX system backup from a preconfigured virtual server that has been tailored to our basic needs. This scenario still applies to a virtual server with any application installed on top of the basic AIX operating system.

We used the **smitty nim_mkres** command to create the mksysb image from the running AIX virtual server p5502p7. The virtual system image has been created as aix61def.mksysb, as shown in Example 4-12.

Example 4-12 snim output for AIX mksysb image

```
root@p5502p1 /export/nim/mksysb > lsnim -l aix61def_mksysb
aix61def_mksysb:
   class          = resources
   type           = mksysb
   arch           = power
   Rstate         = ready for use
   prev_state     = unavailable for use
   location       = /export/nim/mksysb/aix61def.mksysb
   version        = 6
   release        = 1
   mod            = 4
   oslevel_r      = 6100-04
   alloc_count    = 0
   server         = master
   creation_date  = Thu Dec 10 12:27:00 2009
   source_image   = p5502p7
root@p5502p1 /export/nim/mksysb
```

Copy the virtual system image `/export/nim/mksysb/aix61def.mksysb` to another directory. In our case, we used the local directory `/OVF`.

We create the description file `aix61def.ovf` using the AIX vi editor from the sample provided in the VMControl manual:

http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp?topic=/director_6.1/fqm0_main.html

The most important information is illustrated in Example 4-13.

Example 4-13 Excerpt from OVF description file aix61def.ovf

```
<ovf:References>
    <ovf:File ovf:href="aix61def.mksysb" ovf:id="vimRef1" ovf:size="1948569600"/>
  </ovf:References>
  <ovf:DiskSection>
    <ovf:Info>Disk Section</ovf:Info>
    <ovf:Disk ovf:capacity="10000000000" ovf:capacityAllocationUnits="byte"
ovf:diskId="vimRef1disk" ovf:fileRef="vimRef1" ovf:format="http://ww
w.ibm.com/xmlns/ovf/diskformat/power.aix.mksysb" ovf:populatedSize="10000000000"/>
  </ovf:DiskSection>
  <ovf:NetworkSection>

..... (content omitted ....)

<ovf:Info>This product section provides information about the entire
package.</ovf:Info>
      <ovf:Product>AIX61_tailored</ovf:Product>
```

For additional information about the OVF format standard, see Appendix D, “Open Virtualization Format (OVF) support” on page 195. To obtain the complete sample file `aix61def.ovf` see Appendix E, “Additional material” on page 203.

Example 4-14 shows the listing of the virtual system imagine and ovf description file.

Example 4-14 Listing of Virtual System Image and ovf description file

```
root@p5502p1> ls -ltr
-rw-r--r--    1 root     system   1948569600 Dec 10 14:24 aix61def.mksysb
-rw-r-----    1 root     system         9997 Dec 10 14:42 aix61def.ovf
root@p5502p1>
```

An optional step is to package the `aix61def.mksysb` and `aix61def.ovf` files into a single OVA package file using the standard **`tar`** command, as shown in Example 4-15. The source files have been located in local directory `/OVF` and packaged into file `/OVA/aix61def.ova`.

Example 4-15 Creation of an OVA package file

```
root@p5502p1> tar -cvf /OVA/aix61def.ova aix61def.ovf aix61def.mksysb
a aix61def.mksysb 3805800 blocks
a aix61def.ovf 20 blocks
root@p5502p1> ls -ltr /OVA
-rw-r--r--    1 root     system   1948590080 Dec 10 14:43 aix61def.ova
root@p5502p1>
```

Note: The ovf file must be the first file in the tar package. If this is not the case, the **`importva`** operation stops with error code DNZOVF009E.

This virtual appliance is now ready to be distributed.

4.2.6 Importing virtual appliances

A virtual appliance can be imported from a simple OVF file or from an OVA package. The OVF description language is in XML and the OVA is a tar package consisting of:

- The OVF file
- The manifest file (optional)
- The digital certificate (optional)
- The virtual system image

The virtual appliance package is always imported into an image repository. In our example, we use the OVF and OVA files created previously and locally downloaded into the following directory:

- `/mnt/OVF` (For the OVF description file and the virtual system image import)
- `/mnt/OVA` (For the OVA package import)

Importing from OVF

Note: The package name as specified in the <ovf:Product> section of the XML description file cannot be changed during import. Therefore, if you want to import the package using the **`smcli`** command line tool using the **`-n "name"`** option, an error DNZIMC064E is returned.

Click **VMControl Tab** → **Virtual Appliances** → **Common Tasks** → **Import** and provide the absolute path to the OVF description file. In Figure 4-41, we used `/mnt/OVF/aix61.def`.

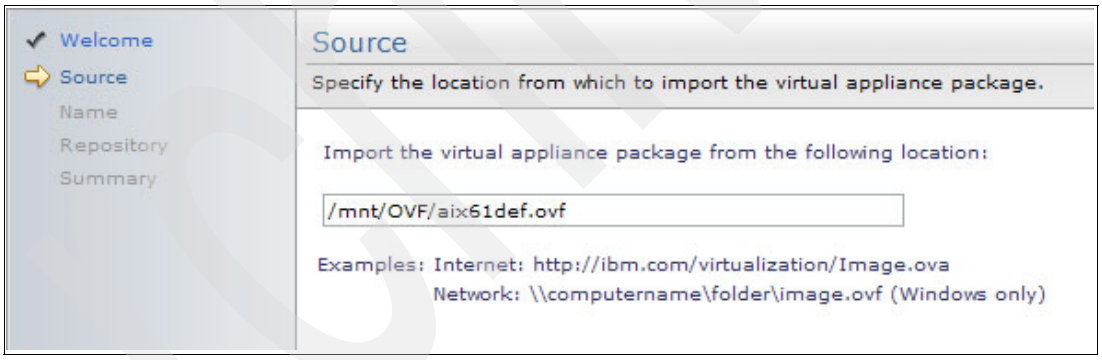

Figure 4-41 Select source for OVF import

In our example, we did not provide a digital signature. As shown in Figure 4-42, we select the associated box to import the OVF without a digital signature.

Figure 4-42 Import OVF without digital signature

A name for the virtual appliance is required, as listed in Figure 4-43. For better readability we provided the optional description.

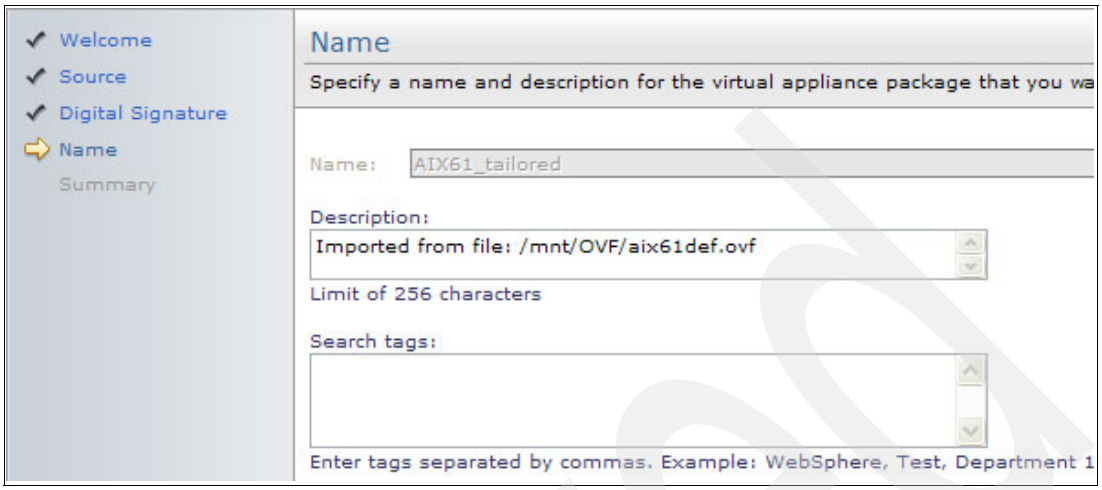

Figure 4-43 Description and search tags for OVF import

Click **Next** to continue to the Summary page for verification (Figure 4-44).

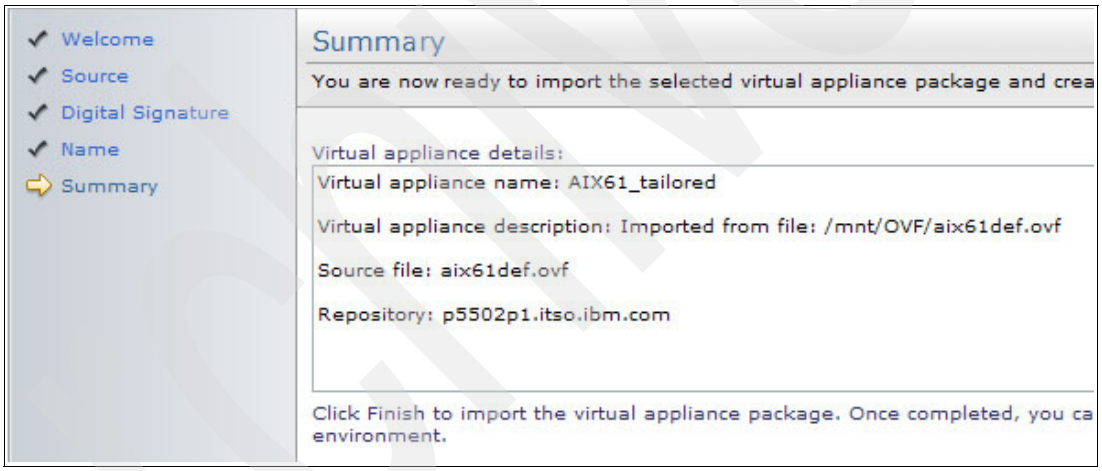

Figure 4-44 Summary page for OVF import

Click **Finish** to continue with the import and start the associated job, as shown in Figure 4-45.

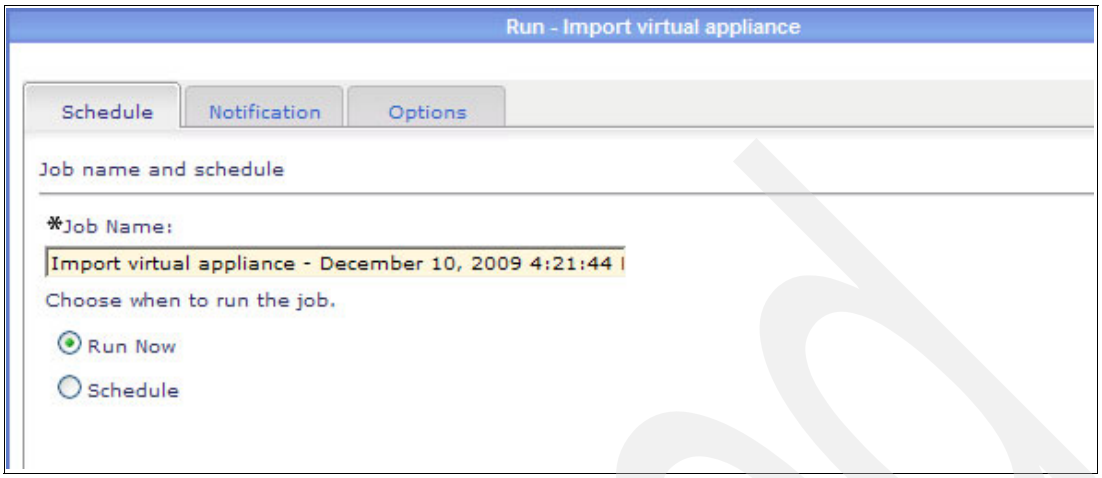

Figure 4-45 Job creation and start confirmation window

After the import has been completed, the log file information can be accessed through the Active Job view, as shown in Figure 4-46.

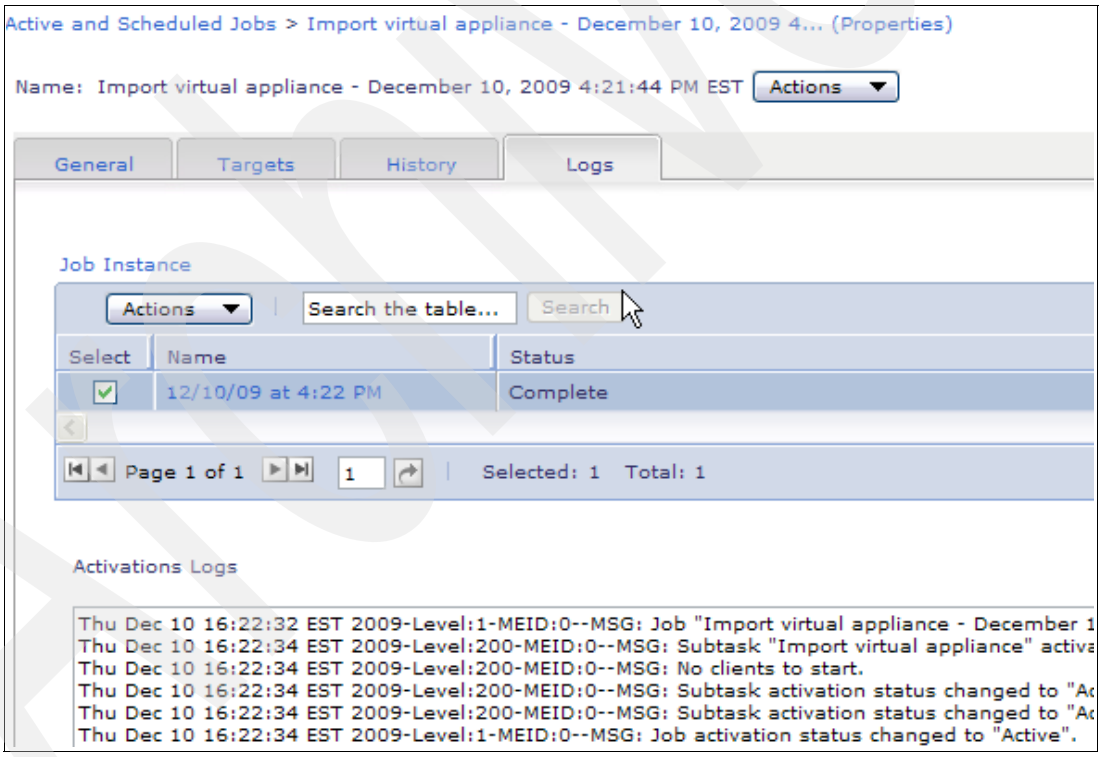

Figure 4-46 Import OVF file Job Log file view

Example 4-16 lists the full log file contents that are partially listed in Figure 4-46 on page 108 for your reference.

Example 4-16 Activations log for deployment for import of OVF

```
Thu Dec 10 16:22:32 EST 2009-Level:1-MEID:0--MSG: Job "Import virtual appliance -
December 10, 2009 4:21:44 PM EST" activated.
Thu Dec 10 16:22:34 EST 2009-Level:200-MEID:0--MSG: Subtask "Import virtual
appliance" activated.
Thu Dec 10 16:22:34 EST 2009-Level:200-MEID:0--MSG: No clients to start.
Thu Dec 10 16:22:34 EST 2009-Level:200-MEID:0--MSG: Subtask activation status
changed to "Active".
Thu Dec 10 16:22:34 EST 2009-Level:200-MEID:0--MSG: Subtask activation status
changed to "Active".
Thu Dec 10 16:22:34 EST 2009-Level:1-MEID:0--MSG: Job activation status changed to
"Active".
Thu Dec 10 16:22:34 EST 2009-Level:150-MEID:0--MSG: DNZIMC047I Validated
Descriptor Envelope for Virtual Appliance OVF Package file /mnt/OVF/aix61def.ovf.
Thu Dec 10 16:22:35 EST 2009-Level:200-MEID:0--MSG: Subtask activation status
changed to "Active".
Thu Dec 10 16:22:36 EST 2009-Level:150-MEID:0--MSG: DNZIMC046I Importing Virtual
Appliance OVF Package Reference ovf:fileid=vimRef1 file ovf:href=aix61def.mksysb.
Thu Dec 10 16:25:39 EST 2009-Level:200-MEID:0--MSG: Subtask activation status
changed to "Complete".
Thu Dec 10 16:25:39 EST 2009-Level:1-MEID:0--MSG: Job activation status changed to
"Complete".
Thu Dec 10 16:25:39 EST 2009-Level:200-MEID:0--MSG: Subtask activation status
changed to "Complete".
Thu Dec 10 16:25:39 EST 2009-Level:100-MEID:0--MSG: Import virtual appliance
complete.
```

In the **VMControl** → **Virtual Appliance** view, the imported appliance is now available for deployment, as shown in Figure 4-47.

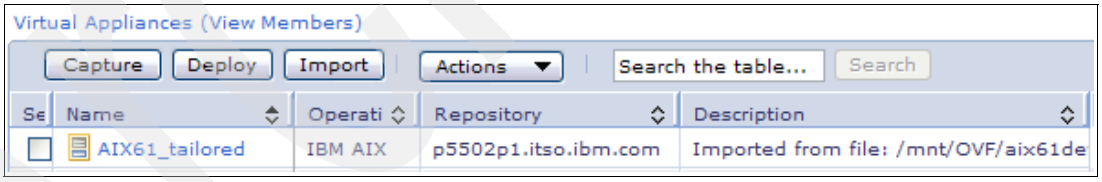

Figure 4-47 Virtual appliances view after import of OVF

On the NIM server, a new resource is created for the appliance in directory `/export/nim/appliances/`.

Importing from OVA

In this section, we explain how to import a virtual appliance from an OVA package.

First, we use **ftp** to transfer the OVA Package `aix61def.ova` from the source into the local directory `/mnt/OVA`, as shown in Example 4-17.

Example 4-17 ftp transfer session for OVA package

```
root@p5502p2 /mnt/OVA>  ftp p5502p1
Connected to p5502p1.itso.ibm.com.
220 p5502p1 FTP server (Version 4.2 Wed Jun 3 15:43:49 CDT 2009) ready.
Name (p5502p1:root):
331 Password required for root.
Password:
230-Last unsuccessful login: Thu Dec 17 14:05:44 2009 on ftp from
p5502p8.itso.ibm.com
230-Last login: Thu Dec 17 15:06:26 2009 on ftp from p5502p2.itso.ibm.com
230 User root logged in.
ftp> cd /export/nim/OVA
250 CWD command successful.
ftp> bin
200 Type set to I.
ftp> get aix61def.ova
200 PORT command successful.
150 Opening data connection for aix61def.ova (1948590080 bytes).
226 Transfer complete.
1948590080 bytes received in 37.86 seconds (5.026e+04 Kbytes/s)
local: aix61def.ova remote: aix61def.ova
ftp> quit
221 Goodbye.
root@p5502p2 /mnt/OVA> ls -ltr
total 3805848
-rw-r--r--    1 root     system   1948590080 Dec 17 15:08 aix61def.ova
root@p5502p2 /mnt/OVA>
```

Click **VMControl Tab** → **Virtual Appliances** → **Common Tasks** → **Import** and provide the local absolute path to the OVA package file, as shown in Figure 4-48.

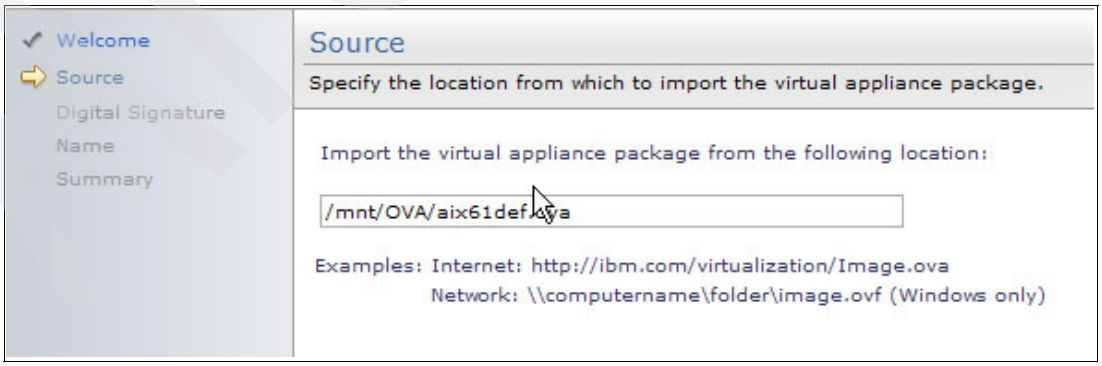

Figure 4-48 Selecting the source for the OVA import

In the next two windows, we use the same values for the Digital Signature and Name as in “Importing from OVF” on page 106. Click **Next** to access the Summary view window shown in Figure 4-49.

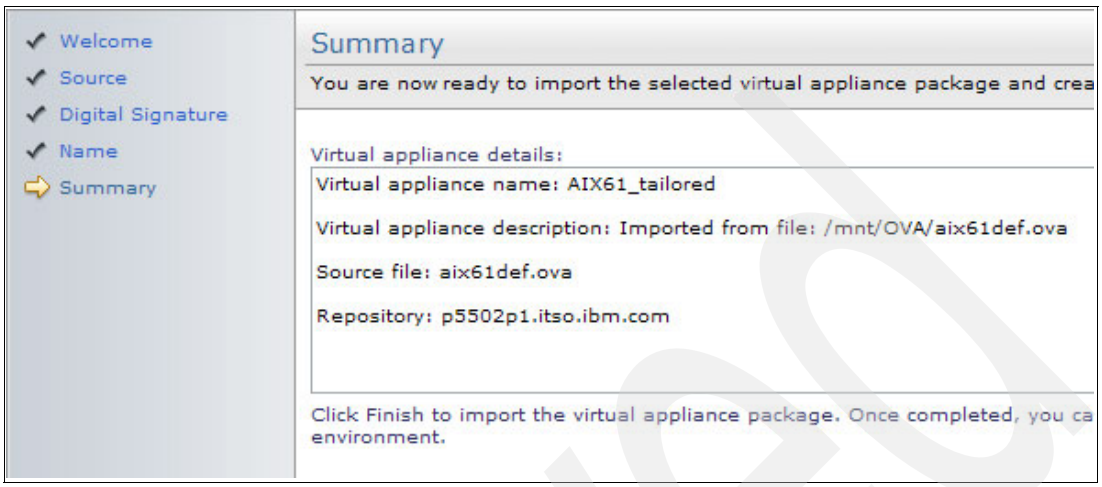

Figure 4-49 Summary view for OVA import

Example 4-18 shows the command line interface syntax to run the same import using the **smcli importva** command. In addition, we used the **smcli lsva** command to list all available virtual appliances.

Example 4-18 mcli session for import of OVA package

```
root@p5502p2 /> smcli importva -v -F /mnt/OVA/aix61def.ova -r 28586 -D "OVA
imported va"
Thu Dec 10 16:55:29 EST 2009  importva Operation started.
DNZIMC047I Validated Descriptor Envelope for Virtual Appliance OVF Package file
/mnt/OVA/aix61def.ova.
DNZIMC045I Importing Virtual Appliance OVF Package Reference ovf:fileid=vimRef1
package file name aix61def.mksysb.
Thu Dec 10 17:00:10 EST 2009  importva Operation took 282 seconds.
root@p5502p2 /> smcli lsva
aix6104_lppsource
AIX61_tailored
AIX61_ova_tailored
root@p5502p2 />
```

A more comprehensive view is available by clicking **VMControl** → **Resources** → **Virtual Appliances**, as shown in Figure 4-50.

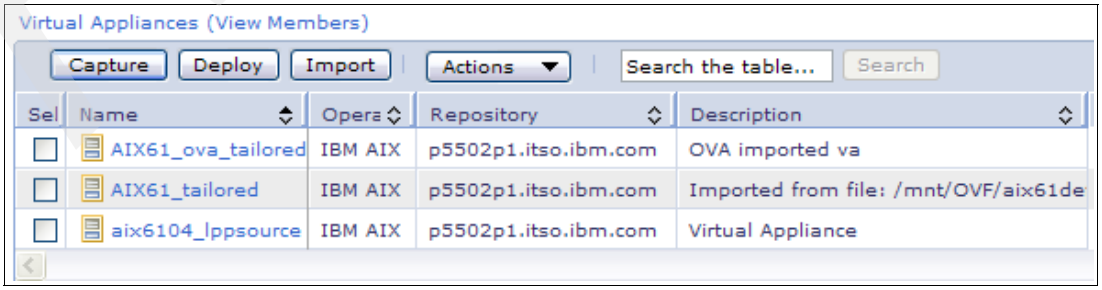

Figure 4-50 View all virtual appliances after the OVA import

4.2.7 Deploying imported virtual appliances to an existing empty virtual server

In this section, we deploy the imported virtual appliance AIX61_ova_tailored into the empty server va_p5501p8. Click **VMControl** → **Virtual Appliances** and select the virtual appliance. Click **Deploy**, as shown in Figure 4-51.

Figure 4-51 Deploying the imported virtual appliance AIX61_ova_tailored

In the target view panel, select the **Deploy to an existing virtual server** check box and select the empty server va_p5501p8. This step is shown in Figure 4-52.

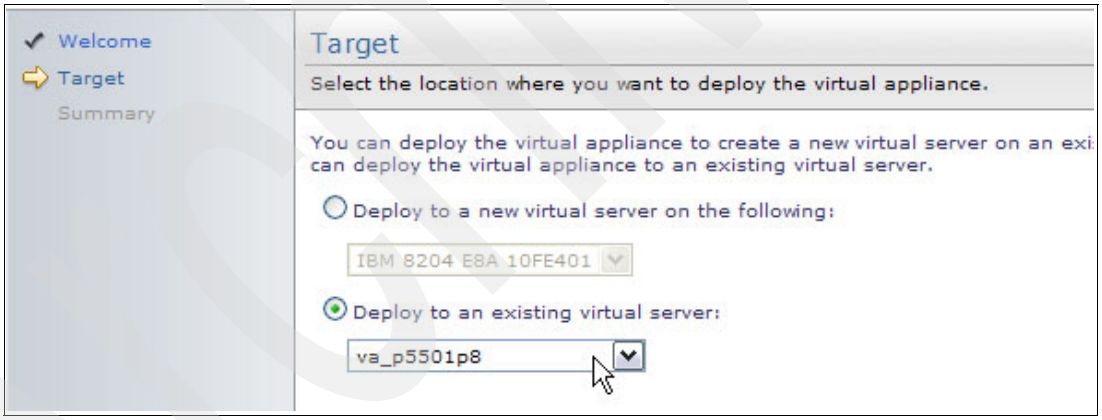

Figure 4-52 Select target va_p5501p8

Click **Next** to continue with the Network Mapping view. See Figure 4-53.

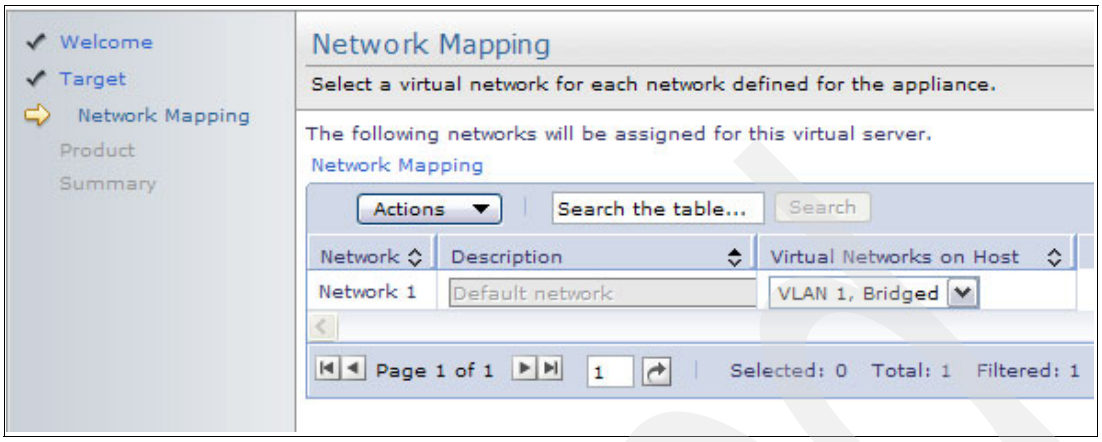

Figure 4-53 Network mapping view

Click **Next to** open the product view to provide the required TCP/IP network settings, as shown in Figure 4-54.

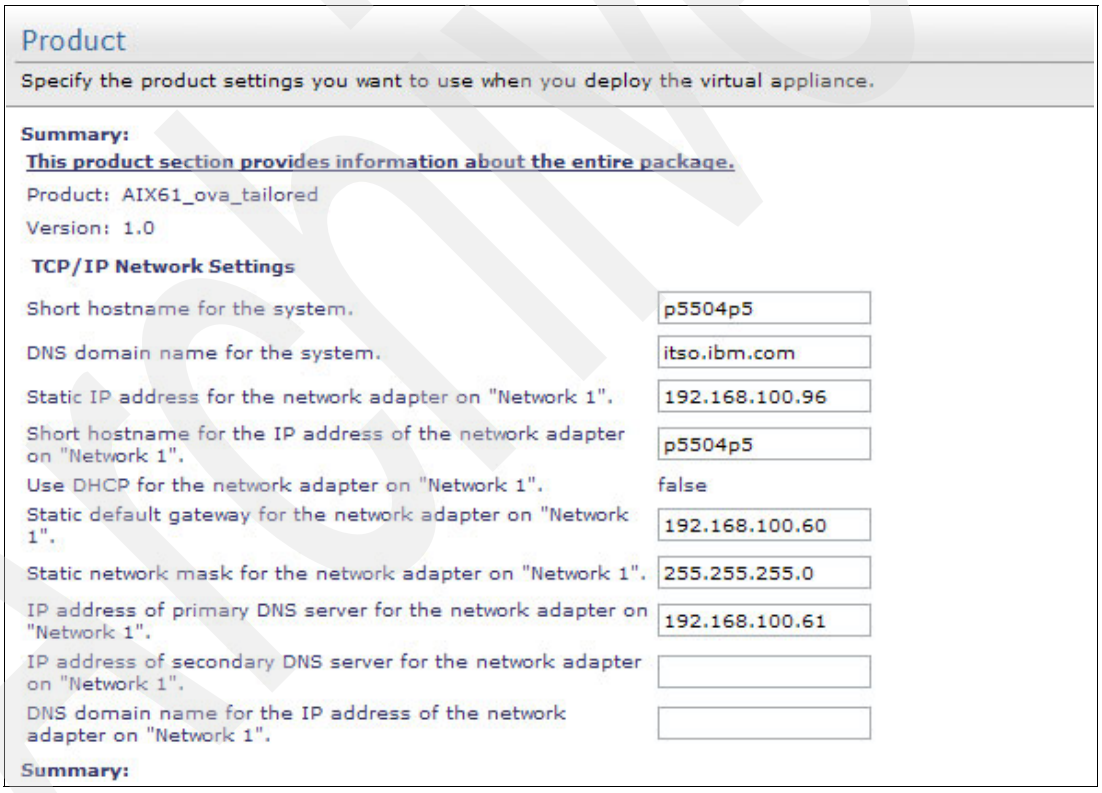

Figure 4-54 TCP/IP network settings

Click **Next** to continue to the Summary View. Click **Finish** to initiate the deployment task. In our case, as shown in Example 4-19, Error Message DNZIMN110E was logged during the deployment task.

Example 4-19 DNZIMN110E during the deployment into existing server

```
DNZIMN110E
The number of processing units needed to deploy the virtual appliance is (1.0) and
the virtual server has (0.1) processing units.
```

The solution for this error message (Error Message DNZIMN110E) is to follow one of the two steps described to reconfigure the required settings:

- Manage the virtual server settings (see 4.1.1, “Managing virtual servers” on page 76).
- Manage the imported virtual appliance settings (see 4.3, “Managing virtual appliances” on page 116).

During problem resolution, we left the **Deploy** → **Summary** view open so that re-submission of the task was possible without going through all configuration steps again. The installation progress can be monitored using the **Task Management** → **Active and Scheduled Jobs** view as captured in Figure 4-55.

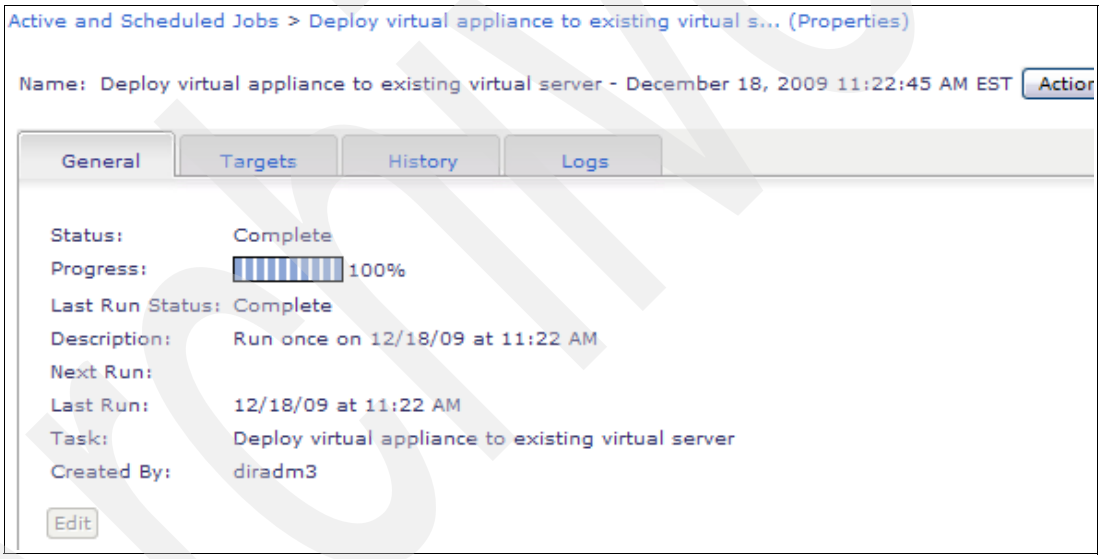

Figure 4-55 Active and Scheduled Jobs view

After the installation has finished, the activations log can be accessed through the Logs Tab. The full log entries for the deployment task is shown in Example 4-20.

Example 4-20 Full activations log

```
Fri Dec 18 11:22:49 EST 2009-Level:1-MEID:0--MSG: Job "Deploy virtual appliance to
existing virtual server - December 18, 2009 11:22:45 AM EST" activated.
Fri Dec 18 11:22:51 EST 2009-Level:200-MEID:0--MSG: Subtask "Deploy virtual appliance
to existing virtual server" activated.
Fri Dec 18 11:22:51 EST 2009-Level:200-MEID:0--MSG: No clients to start.
Fri Dec 18 11:22:51 EST 2009-Level:200-MEID:0--MSG: Subtask activation status changed
to "Active".
Fri Dec 18 11:22:51 EST 2009-Level:200-MEID:0--MSG: Subtask activation status changed
to "Active".
```

```
Fri Dec 18 11:22:51 EST 2009-Level:1-MEID:0--MSG: Job activation status changed to
"Active".
Fri Dec 18 11:22:57 EST 2009-Level:150-MEID:0--MSG: Workload, AIX61_ova_tailored, was
created.
Fri Dec 18 11:22:57 EST 2009-Level:200-MEID:0--MSG: Subtask activation status changed
to "Active".
Fri Dec 18 12:29:17 EST 2009-Level:200-MEID:0--MSG: Subtask activation status changed
to "Complete".
Fri Dec 18 12:29:17 EST 2009-Level:1-MEID:0--MSG: Job activation status changed to
"Complete".
Fri Dec 18 12:29:18 EST 2009-Level:150-MEID:0--MSG: Virtual server, va_p5501p8, added
to workload, AIX61_ova_tailored.
Fri Dec 18 12:29:23 EST 2009-Level:150-MEID:0--MSG: Workload, AIX61_ova_tailored, is
starting.
Fri Dec 18 12:29:23 EST 2009-Level:150-MEID:0--MSG: DNZIMC096I Deployed Virtual
Appliance AIX61_ova_tailored to existing server va_p5501p8, OID=40795.
Fri Dec 18 12:29:23 EST 2009-Level:200-MEID:0--MSG: Subtask activation status changed
to "Complete".
Fri Dec 18 12:29:23 EST 2009-Level:100-MEID:0--MSG: Deploy virtual server complete.
```

One major advantage of VMControl is the automated creation and control of NIM resources. Example 4-21 shows the NIM machine object and all additional resources required to deploy the virtual server. In Example 4-21, we use the **lsnim** command on the NIM server to list the virtual server NIM resources dynamically created during the VMControl deploy operation.

Example 4-21 Output of lsnim -l p5504p5 during installation

```
root@p5503p1 / > lsnim -l p5504p5
p5504p5:
   class          = machines
   type           = standalone
   comments       = <?xml version="1.0" encoding="UTF-8"?><nimrf><created>Fri Dec 18
11:24:50 EST 2009</created></nimrf>
   connect        = nimsh
   platform       = chrp
   netboot_kernel = 64
   if1            = nimnet p5504p5 C21E46EA1B03
   net_settings1  = auto auto
   cable_type1    = N/A
   mgmt_profile1  = hmc-192_168_100_110 5 cec-E8A-10FE411
   Cstate         = Base Operating System installation is being performed
   prev_state     = BOS installation has been enabled
   Mstate         = in the process of booting
   info           = BOS install 41% complete : 46% of mksysb data restored.
   boot           = boot
   bosinst_data   = nimrf-000000000000000b-bosinst_data
   image_data     = nimrf-000000000000000b-image_data
   mksysb         = appliance-1_image-1
   nim_script     = nim_script
   resolv_conf    = nimrf-000000000000000b-resolv_conf
   script         = nimrf-0000000000000009-script
   script         = vmc_config
   spot           = nimrf-000000000000000a-spot
   cpuid          = 000FE411D900
   control        = master
   Cstate_result  = success
root@p5503p1 / >
```

After the system installation is finished, the associated NIM resources are automatically removed. In Example 4-22, we verify that the NIM resource for host p5504p5 has been removed.

Example 4-22 Output of lsnim -l p5504p5 after deployment

```
root@p5503p1 / > lsnim -l p5504p5
0042-053 lsnim: there is no NIM object named "p5504p5"
root@p5503p1 / >
```

4.3 Managing virtual appliances

Depending on the type of virtual appliances that you manage in your data center, you can use the Web interface or manual methods to perform management tasks on your virtual appliances.

This section describes tasks managing virtual appliances:

- 4.3.1, “Copying a virtual appliance” on page 116.
- 4.3.2, “Modifying a virtual appliance” on page 126.
- 4.4, “Deleting a virtual appliance” on page 130.

4.3.1 Copying a virtual appliance

Copying a virtual appliance consists of a series of manual steps. It is not a task that is provided by VMControl. A virtual appliance can be copied in a NIM or z/VM® environment. For the purpose of this Redbooks publication, only the NIM environment is covered.

The virtual appliance can contain either an AIX mksysb image or an AIX lpp_source resource. Depending on the content of the virtual appliance, the following scenarios can be used for copying a virtual appliance:

- If the virtual appliance contains an AIX mksysb image:
  - The AIX mksysb image virtual appliance package is imported:
    - To a separate NIM server image repository
    - Multiple times to the same NIM server image repository
  - An AIX virtual server, workload can be captured:
    - To a separate NIM server image repository
    - Multiple times to the same NIM server image repository
- If the virtual appliance is based on an AIX lpp_source resource, create a new copy of the lpp_source resource to the same NIM server or to a separate NIM server and then capture it.

The next subsections cover these cases. Because the process itself consists of a set of manual steps, only the command line will be used.

Finding the type of resource contained in a virtual appliance

Before copying the virtual appliance resources, you need to know what the virtual appliance contains because the copy process is different. The differences and details are presented in the next two subsections.

There is only one element that defines the type of resource the virtual appliance contains. This information is stored in the <ovf:format> tag in the OVF file specification of the virtual appliance. For example, you might use this command (see Example 4-23) to find if the virtual appliance contains either an AIX mksysb file or an NIM lpp_source resource.

Example 4-23 How to find the type of resource contained in the virtual appliance

```
root@p5502p1 /export/nim/appliances > find . -type f -name *.ovf | xargs grep
diskformat | awk '{print "\n" $1 "\n\t " $7}'

./066159f8-ad2c-4e68-a3f0-02771684be8f/066159f8-ad2c-4e68-a3f0-02771684be8f.ovf:
        ovf:format="http://www.ibm.com/xmlns/ovf/diskformat/power.aix.mksysb"

./2accd91f-15f1-419f-a63c-dbeac75441f4/2accd91f-15f1-419f-a63c-dbeac75441f4.ovf:
        ovf:format="http://www.ibm.com/xmlns/ovf/diskformat/power.aix.lpp_source"

./53548736-59d0-4380-bc4a-e221a651cb7b/53548736-59d0-4380-bc4a-e221a651cb7b.ovf:
        ovf:format="http://www.ibm.com/xmlns/ovf/diskformat/power.aix.mksysb"

./5d7a7f5b-f5f7-4150-8545-0c0b83ccf3c2/5d7a7f5b-f5f7-4150-8545-0c0b83ccf3c2.ovf:
        ovf:format="http://www.ibm.com/xmlns/ovf/diskformat/power.aix.mksysb"

./8d58d6bf-3251-43a0-af60-0b8e4f849c31/8d58d6bf-3251-43a0-af60-0b8e4f849c31.ovf:
        ovf:format="http://www.ibm.com/xmlns/ovf/diskformat/power.aix.mksysb"
root@p5502p1 /export/nim/appliances >
```

Based on the output listed in Example 4-23, only the second virtual appliance with Appliance ID 2accd91f-15f1-419f-a63c-dbeac75441f4 is based on (or contains) an AIX lpp_source resource. All other virtual appliances contain an AIX mksysb file. The mapping between the Appliance ID and the name of the virtual appliance is created using the **smcli lsva -v** command.

Copying a virtual appliance that contains an AIX mksysb image

To copy a virtual appliance that contains an AIX mksysb image, follow these steps:

1. List the virtual appliances that exist in the IBM Systems Director Server repository using the **smcli lsva** command shown in Example 4-24.

   Example 4-24 List the virtual appliances

   ```
   root@p5502p2 /> smcli lsva -l
   aix6104_lppsource
          TrunkId:3
          RevisionVersion:1.1
          ChangedDate:2009-12-09T13:18:58-05:00
          TrunkName:aix6104_lppsource
          Description:
          DisplayName:aix6104_lppsource
          SpecificationId:1
          SpecificationVersion:1.1
          Id:31000
   ```

```
        OID:31000
        Guid:05A6EFFBFA2833E4BCCB11EAD1BE5998
        ApplianceId:2accd91f-15f1-419f-a63c-dbeac75441f4
        ObjectType:VirtualAppliance

va_aix61def_mksysb
        TrunkId:7
        RevisionVersion:1.1
        ChangedDate:2009-12-12T13:22:50-05:00
        TrunkName:va_aix61def_mksysb
        Description:
        DisplayName:va_aix61def_mksysb
        SpecificationId:1
        SpecificationVersion:1.1
        Id:32313
        OID:32313
        Guid:AAE51C0A69C03130ABCAB5ED525A6DC7
        ApplianceId:5d7a7f5b-f5f7-4150-8545-0c0b83ccf3c2
        ObjectType:VirtualAppliance

... (content omitted) ...

root@p5502p2 />
```

2. The virtual appliance named va_aix61def_mksysb contains an AIX mksysb image and is copied into a new virtual appliance. Based on the appliance ID attribute, the content of this virtual appliance is stored on the NIM server on the /export/nim/appliances/5d7a7f5b-f5f7-4150-8545-0c0b83ccf3c2 directory, as shown in Example 4-25.

Example 4-25 The content of the virtual appliance resource on the NIM server

```
root@p5502p1 / > ls -l
/export/nim/appliances/5d7a7f5b-f5f7-4150-8545-0c0b83ccf3c2
total 3805824
-rw-r--r--    1 root     system        10073 Dec 12 13:22
5d7a7f5b-f5f7-4150-8545-0c0b83ccf3c2.ovf
-rw-r--r--    1 root     system   1948569600 Dec 12 13:22 aix61def.mksysb
drwxr-xr-x    2 root     system          256 Dec 12 13:22 vmcontrol
root@p5502p1 / >
```

3. Copy the mksysb image file and the OVF file into a temporary location, as shown in Example 4-26.

Example 4-26 Make a copy of the virtual appliance package files to NIM server

```
root@p5502p1 /export/nim > mkdir temp_va_copy ; cd temp_va_copy
root@p5502p1 /export/nim/temp_va_copy >
root@p5502p1 /export/nim/temp_va_copy > cp
/export/nim/appliances/5d7a7f5b-f5f7-4150-8545-0c0b83ccf3c2/aix61def.mksysb .
root@p5502p1 /export/nim/temp_va_copy > cp
c0b83ccf3c2/5d7a7f5b-f5f7-4150-8545-0c0b83ccf3c2.ovf .
root@p5502p1 /export/nim/temp_va_copy >
root@p5502p1 /export/nim/temp_va_copy > ls
5d7a7f5b-f5f7-4150-8545-0c0b83ccf3c2.ovf  aix61def.mksysb
root@p5502p1 /export/nim/temp_va_copy >
```

4. Return to the IBM Systems Director Server (in our case p5502p2) and change the path to the mksysb file that is specified in the OVF file. Use an ASCII editor to open and edit the file to include the correct path to the AIX mksysb file. Example 4-27 illustrates the changes required in this case.

Example 4-27 Specify the correct path to the mksysb file after copying the two files

```
root@p5502p2 /> grep aix61def.mksysb
/mnt/temp_va_copy/5d7a7f5b-f5f7-4150-8545-0c0b83ccf3c2.ovf | grep file
    <ovf:File ovf:href="file:///mnt/temp_va_copy/aix61def.mksysb"
ovf:id="vimRef1" ovf:size="1948569600"/>
root@p5502p2 />
```

5. Delete the name of the virtual appliance as specified in the <ovf:Product> tag of <ovf:ProductSection ovf:class="com.ibm.ovf.vim.2"> section in the OVF file.

   Example 4-28 shows the part of the OVF file that include this section before the removal of the <ovf:Product> tag.

Example 4-28 The section containing the name of the virtual appliance before the change

```
root@p5502p2 /> cat /mnt/temp_va_copy/5d7a7f5b-f5f7-4150-8545-0c0b83ccf3c2.ovf

... (content omitted) ...

<ovf:ProductSection ovf:class="com.ibm.ovf.vim.2">
      <ovf:Info>This product section provides information about the entire
package.</ovf:Info>
      <ovf:Product>va_aix61def_mksysb</ovf:Product>
      <ovf:Vendor>IBM</ovf:Vendor>

... (content omitted) ...

root@p5502p2 />
```

   After the removal of the <ovf:Product> tag, the part of the OVF file that includes this section looks similar to Example 4-29.

Example 4-29 The section containing the name of the virtual appliance after the change

```
root@p5502p2 /> cat /mnt/temp_va_copy/5d7a7f5b-f5f7-4150-8545-0c0b83ccf3c2.ovf

... (content omitted) ...

<ovf:ProductSection ovf:class="com.ibm.ovf.vim.2">
      <ovf:Info>This product section provides information about the entire
package.</ovf:Info>
      <ovf:Vendor>IBM</ovf:Vendor>

... (content omitted) ...

root@p5502p2 />
```

6. Import the virtual appliance definition into the IBM Systems Director Server repository.

   a. The Director Server has access to the virtual appliance packages (the file systems are mounted from NIM using NFS) saving the need to manually copy them to the Director Server repository, as shown in Example 4-30.

Example 4-30 /export/nim file system is mounted on Director Server using NFS

```
root@p5502p2 /> mount
  node       mounted        mounted over    vfs       date        options
-------- --------------  --------------  ------ ------------ ---------------

... (content omitted) ...

p5502p1  /export/nim/     /mnt            nfs3   Dec 10 14:32
root@p5502p2 />
```

   b. Besides checking the files' accessibility, the repository object ID needs to be provided. Use the **smcli lsrepos** command to get the specific repository that is needed to handle the file that you want to import as shown in Example 4-31.

Example 4-31 List the repositories available for importing the virtual appliance package

```
root@p5502p2 /> smcli lsrepos -o -a import -F
/mnt/temp_va_copy/5d7a7f5b-f5f7-4150-8545-0c0b83ccf3c2.ovf
p5502p1.itso.ibm.com, 28586
root@p5502p2 />
```

   c. Use the **importva** command to import the virtual appliance into the VMControl Image Manager as shown in Example 4-32.

Example 4-32 Importing the virtual appliance into the VMControl Image Manager

```
root@p5502p2 /> smcli importva -F
/mnt/temp_va_copy/5d7a7f5b-f5f7-4150-8545-0c0b83ccf3c2.ovf -r 28586 -D "Copy of
va_aix61def_mksysb" -n va_aix61def_mksysb_copy1
root@p5502p2 />
```

7. Verify the result by checking the list of virtual appliances stored in the repository. The new virtual appliance must be also included in the list as shown in Example 4-33.

Example 4-33 The list of the virtual appliances stored in the repository (using CLI)

```
root@p5502p2 /> smcli lsva | sort

... (content omitted) ...

va_aix61def_mksysb
va_aix61def_mksysb_copy1
root@p5502p2 />
```

Tip: You can filter the output of the **smcli lsva** command by providing a query parameter, for example:

```
root@p5502p2 /> smcli lsva -q "name starts-with va_"
va_aix61def_mksysb_copy1
va_aix61def_mksysb
root@p5502p2 />
```

8. Use **smcli lsva** command to see the differences between the two copies of the virtual appliances, as shown in Example 4-34.

Example 4-34 Complete descriptions of the two copies of the virtual appliances

```
root@p55O2p2 /> smcli lsva -l -q "name starts-with va_"
va_aix61def_mksysb_copy1
        TrunkId:9
        RevisionVersion:1.1
        ChangedDate:2009-12-14T10:18:36-05:00
        TrunkName:va_aix61def_mksysb_copy1
        Description:Copy of va_aix61def_mksysb
        DisplayName:va_aix61def_mksysb_copy1
        RevisionComment:No User Input: Automatically added as new trunk
        SpecificationId:1
        SpecificationVersion:1.1
        Id:32403
        OID:32403
        Guid:479F5A4E36B23EE8AA9F786E27CD2713
        ApplianceId:066159f8-ad2c-4e68-a3f0-02771684be8f
        ObjectType:VirtualAppliance

va_aix61def_mksysb
        TrunkId:7
        RevisionVersion:1.1
        ChangedDate:2009-12-12T13:22:50-05:00
        TrunkName:va_aix61def_mksysb
        Description:
        DisplayName:va_aix61def_mksysb
        SpecificationId:1
        SpecificationVersion:1.1
        Id:32313
        OID:32313
        Guid:AAE51C0A69C03130ABCAB5ED525A6DC7
        ApplianceId:5d7a7f5b-f5f7-4150-8545-0c0b83ccf3c2
        ObjectType:VirtualAppliance

root@p55O2p2 />
```

9. Perform the cleanup by deleting the temporary space used during the import of the virtual appliance package, as shown in Example 4-35.

Example 4-35 Deleting the temporary space after the import

```
root@p55O2p1 /export/nim/temp_va_copy > cd ..
root@p55O2p1 /export/nim >
root@p55O2p1 /export/nim > rm -rf temp_va_copy
root@p55O2p1 /export/nim >
```

The list of the virtual appliances containing this new mksysb copy is also available on the Web interface in the Virtual Appliances tab of VMControl summary page, as shown in Figure 4-56.

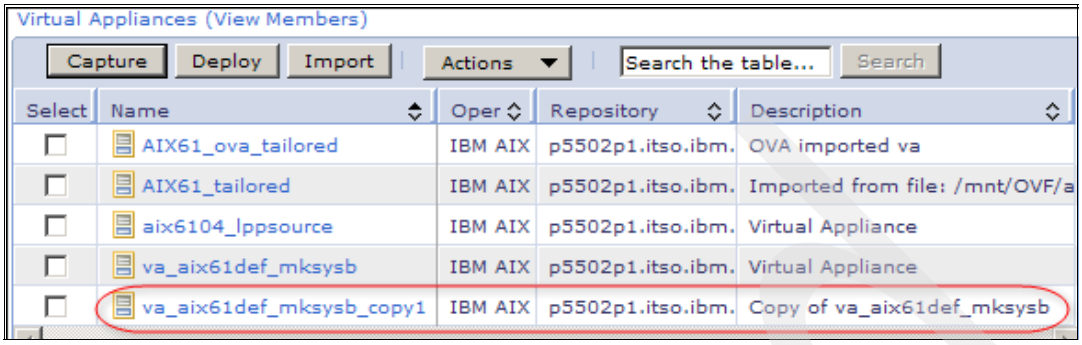

Figure 4-56 List of the virtual appliances stored in the repository (using Web interface)

Copying a virtual appliance that is based on an AIX lpp_source resource

If the virtual appliance is based on an AIX lpp_source resource, create a new copy of the lpp_source resource in the same NIM server or in a separate NIM server and capture it. In our case, the same NIM server is used.

Note: In this environment, based on the results obtained using the **`smcli lsva -l`** command and the **`find . -type f -name *.ovf | xargs grep diskformat | awk '{print "\n" $1 "\n\t " $7}'`** command on the NIM server, the virtual appliance named aix6014_lppsource is based on an AIX lpp_source.

Therefore, the steps that illustrated the virtual appliance copy process refers to aix6104_lppsource virtual appliance.

For more details, review “Finding the type of resource contained in a virtual appliance” on page 117.

To copy a virtual appliance that is based on an AIX lpp_source resource, follow these steps:

1. In the navigation area of IBM Systems Director Web interface, click **System Configuration** → **VMControl** to open the VMControl summary page.
2. Click **Virtual Appliances** to see the list of the virtual appliances available, as shown in Figure 4-57.

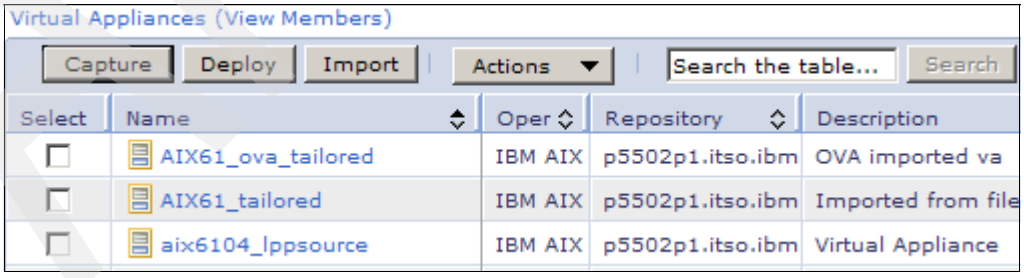

Figure 4-57 The list of virtual appliances available

3. Right click **Virtual Appliance** and select **Related Resources** → **Software Image**, as shown in Figure 4-58.

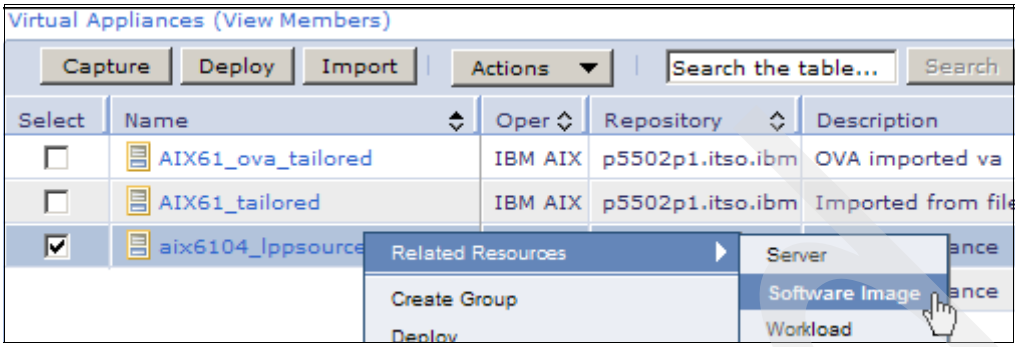

Figure 4-58 Find the software image file of the virtual appliance

4. Right click **Software Image** and select **Related Resources** → **Image Container**, as shown in Figure 4-59.

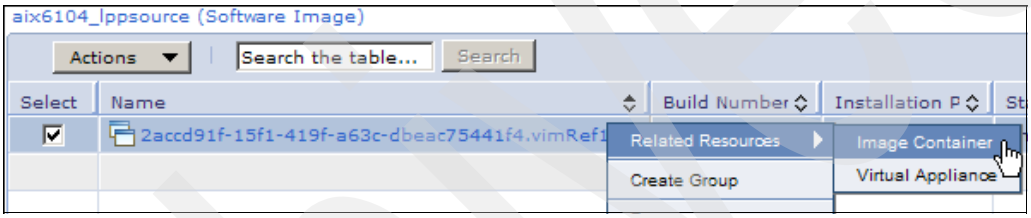

Figure 4-59 Find the image repository for the software image file of the virtual appliance

5. The image container (Figure 4-60) is the NIM server that is used as the image repository for this virtual appliance. The same NIM server is used for the copy of the virtual appliance that is created in the next steps.

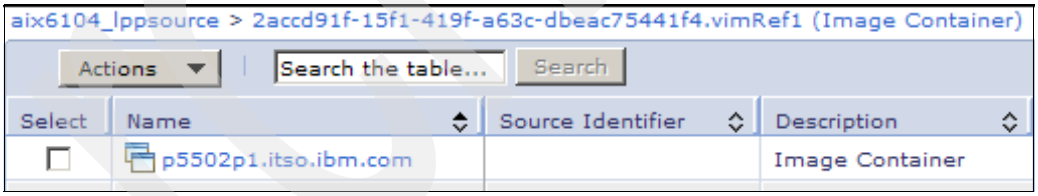

Figure 4-60 NIM server repository for the aix6104_lppsource virtual appliance

6. On the NIM server, find the name of the lpp_source resource contained in the virtual appliance. Based on Figure 4-59 on page 123, the Appliance ID of the virtual appliance is `2accd91f-15f1-419f-a63c-dbeac75441f4`. This is found on the NIM server in `/export/nim/appliances`. The vmcontrol subdirectory contains a file that includes the name of the lpp_source that is used in this case. See Example 4-36 for instructions on how to find the lpp_source.

Example 4-36 The name of the lpp_source used is included in the OVF file

```
root@p5502p1 / > cd /export/nim/appliances/2accd91f-15f1-419f-a63c-dbeac75441f4
root@p5502p1 /export/nim/appliances/2accd91f-15f1-419f-a63c-dbeac75441f4 >
root@p5502p1 /export/nim/appliances/2accd91f-15f1-419f-a63c-dbeac75441f4 > ls
2accd91f-15f1-419f-a63c-dbeac75441f4.ovf  vmcontrol
root@p5502p1 /export/nim/appliances/2accd91f-15f1-419f-a63c-dbeac75441f4 > ls -l
vmcontrol
total 0
-rw-r--r--    1 root     system            0 Dec  9 13:18 lpp_source.lpp_aix6104
-rw-r--r--    1 root     system            0 Dec  9 14:39
spot.lpp_aix6104.nimrf-0000000000000005-spot
root@p5502p1 /export/nim/appliances/2accd91f-15f1-419f-a63c-dbeac75441f4 >
```

7. Copy the lpp_source used when the virtual appliance you want to copy was created. In this case, the lpp_aix6104 lpp_source is copied into a new lpp_source, as shown in Example 4-37.

Example 4-37 Creating a copy of the lpp_source

```
root@p5502p1 / > lsnim -t lpp_source
lpp_aix6104          resources       lpp_source
lpp_aix5311          resources       lpp_source
root@p5502p1 / >
root@p5502p1 / > nim -o define -t lpp_source  \
                 -a source=/export/nim/lpp_source/aix6104  \
                 -a server=master  \
                 -a packages=all
                 -a location=/export/nim/lpp_source/aix6104_copy1  \
                 lpp_aix6014_copy1

Preparing to copy install images (this will take several minutes)...


/export/nim/lpp_source/aix6104_copy1/RPMS/ppc/cdrecord-1.9-7.aix5.2.ppc.rpm
/export/nim/lpp_source/aix6104_copy1/RPMS/ppc/conserver-8.1.aix5.2.ppc.rpm
/export/nim/lpp_source/aix6104_copy1/RPMS/ppc/expect-5.42.1-3.aix6.1.ppc.rpm

... (content omitted) ...

/export/nim/lpp_source/aix6104_copy1/installp/ppc/DirectorCommonAgent.6.1.0.4.I
Now checking for missing install images...
All required install images have been found. This lpp_source is now ready.

root@p5502p1 / >
```

8. Capture a new virtual appliance from the new NIM lpp_source resource.

   a. Find the object ID of the targeted repository object, as shown in Example 4-38.

Example 4-38 Find the object ID of the repository

```
root@p5502p2 /> smcli lsrepos -ol
p5502p1.itso.ibm.com
        ImageRepositoryType:1
        ChangedDate:2009-12-14T18:18:29-05:00
        Guid:39454B7F60363A8DAD8A8D750B845220
        OID:28586
        DisplayName:p5502p1.itso.ibm.com
        UniqueID:fa1abde1-bd11-4767-988e-66011c05fa99
        Id:28586
        ImagingTool:DISCOVERY_NIM_REPOSITORY
        ObjectType:ImageRepository

root@p5502p2 />
```

9. Capture the new virtual appliance from the new lpp_source created before, as shown in Example 4-39.

Example 4-39 Capture the virtual appliance from the new lpp_source

```
root@p5502p2 /> smcli captureva -r 28586 -F repos:lpp_aix6104_copy1 -n
aix6104_lppsource_copy1
root@p5502p2 />
```

Example 4-40 lists the virtual appliances to see the results.

Example 4-40 Listing the virtual appliances

```
root@p5502p2 /> smcli lsva -ol -q "name starts-with aix6104"
aix6104_lppsource
        TrunkId:3
        RevisionVersion:1.1
        ChangedDate:2009-12-09T13:18:58-05:00
        TrunkName:aix6104_lppsource
        Description:
        DisplayName:aix6104_lppsource
        SpecificationId:1
        SpecificationVersion:1.1
        Id:31000
        OID:31000
        Guid:05A6EFFBFA2833E4BCCB11EAD1BE5998
        ApplianceId:2accd91f-15f1-419f-a63c-dbeac75441f4
        ObjectType:VirtualAppliance

aix6104_lppsource_copy1
        TrunkId:10
        RevisionVersion:1.1
        ChangedDate:2009-12-14T18:32:55-05:00
        TrunkName:aix6104_lppsource_copy1
        Description:
        DisplayName:aix6104_lppsource_copy1
        SpecificationId:1
        SpecificationVersion:1.1
```

```
        Id:32407
        OID:32407
        Guid:73703E017ED43B3A801A1F7133467FF4
        ApplianceId:0e68dc34-2f94-4527-904d-7304ebbc04f2
        ObjectType:VirtualAppliance

root@p5502p2 />
```

The new virtual appliance can also be inspected using the IBM Systems Director Web interface. As previously mentioned, the Virtual Appliances tab of the VMControl summary page shows the list of all the virtual appliances that are defined on the IBM Systems Director VMControl Image Manager repository.

4.3.2 Modifying a virtual appliance

Modifying a virtual appliance means changing the OVF descriptor of the virtual appliance and running a discovery of the virtual appliances again, so that the changes are applied and the IBM Systems Director Server is aware of it.

To modify the OVF descriptor for a virtual appliance that contains an AIX image, complete the following steps:

1. Learn the Appliance ID attribute of the virtual appliance you want to modify. Use the following steps to find it:
   a. If using the Web interface of the IBM Systems Director:
      i. In the navigation area, click **System Configuration** → **VMControl** to open the VMControl summary page.
      ii. On the VMControl summary page, click **Virtual Appliances** tab and click the name of the virtual appliance you want to modify.

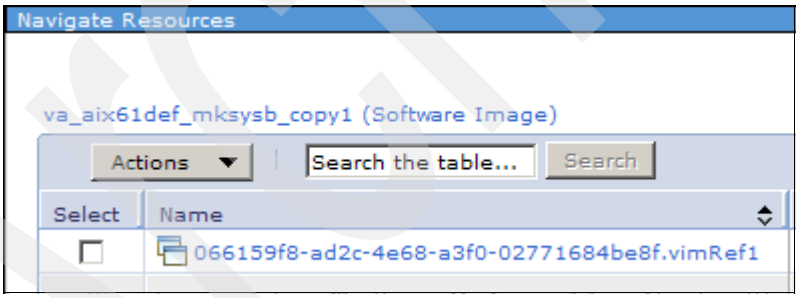

Figure 4-61 The Appliance ID and file ID contained in the virtual appliance

      iii. Make note of the leading characters of the software image name that comprise the Appliance ID. In this case, the Appliance ID attribute has the value of 066159f8-ad2c-4e68-a3f0-02771684be8f as shown in Figure 4-61.

   b. If using the command line on the IBM Systems Director Server, run the command shown in Example 4-41.

Example 4-41 Find the Appliance ID of the virtual appliance you need to modify

```
root@p5502p2 /> smcli lsva -l -q "name=va_aix61def_mksysb_copy1" | grep
ApplianceId
        ApplianceId:066159f8-ad2c-4e68-a3f0-02771684be8f
root@p5502p2 />
```

2. As the root user, on the NIM server used as the repository for the IBM Systems Director VMControl, perform the following steps:

   a. Go to the directory where the virtual appliance is stored, as shown in Example 4-42.

Example 4-42 Go to the location of the virtual appliance

```
root@p550p1 / > cd /export/nim/appliances/066159f8-ad2c-4e68-a3f0-02771684be8f
root@p550p1 /export/nim/appliances/066159f8-ad2c-4e68-a3f0-02771684be8f >
root@p550p1 /export/nim/appliances/066159f8-ad2c-4e68-a3f0-02771684be8f > ls -l
total 3805824
-rw-r--r--    1 root     system        10122 Dec 14 10:18
066159f8-ad2c-4e68-a3f0-02771684be8f.ovf
-rw-r--r--    1 root     system   1948569600 Dec 14 10:18 aix61def.mksysb
drwxr-xr-x    2 root     system          256 Dec 14 10:18 vmcontrol
root@p550p1 /export/nim/appliances/066159f8-ad2c-4e68-a3f0-02771684be8f >
```

   b. Make a copy of the OVF file and store it in a safe location in case you need to retract your changes.

   c. Manually edit the OVF file to reflect the changes you need to include.

      For example, you might want to change the size of the memory that is assigned to the virtual server when the virtual appliance is deployed. This setting is found on the Virtual Hardware Section specified with <ovf:VirtualHardwareSection> tag. Example 4-43 shows the settings before the change.

Example 4-43 Memory allocation specification included in the OVF file

```
root@p550p1 /export/nim/appliances/066159f8-ad2c-4e68-a3f0-02771684be8f > cat
066159f8-ad2c-4e68-a3f0-02771684be8f.ovf

... (content omitted) ...

<ovf:VirtualHardwareSection
ovf:transport="http://www.ibm.com/xmlns/ovf/transport/filesystem/etc/ovf-transport">
   <ovf:Info>This section describes the virtual hardware requirements on the target
virtual system</ovf:Info>

... (content omitted) ...

<ovf:Item>
   <rasd:AllocationUnits>byte * 2^10</rasd:AllocationUnits>
   <rasd:Caption>Memory Allocation</rasd:Caption>
   <rasd:ConsumerVisibility>2</rasd:ConsumerVisibility>
   <rasd:Description>Memory Allocation</rasd:Description>
   <rasd:ElementName>Allocation of 1024 MB of dedicated memory.</rasd:Elemen tName>
   <rasd:InstanceID>2</rasd:InstanceID>
   <rasd:ResourceType>4</rasd:ResourceType>
   <rasd:VirtualQuantity>1048576</rasd:VirtualQuantity>
   <vimphyprasd:VirtualLimit>1048576</vimphyprasd:VirtualLimit>
   <vimphyprasd:VirtualReservation>1048576</vimphyprasd:VirtualReservation>
      </ovf:Item>
      <ovf:Item>

... (content omitted) ...

root@p550p1 /export/nim/appliances/066159f8-ad2c-4e68-a3f0-02771684be8f >
```

In our case (see example Example 4-43 on page 127), the memory allocated is 1048576 KB, which means 1 GB. To change the size of the memory that is allocated from 1 GB to 2 GB, you have to at least double the size of the last three elements: VirtualQuantity, VirtualLimit and VirtualReservation.

In our case, Example 4-44 shows the values changed, which are highlighted in bold.

Example 4-44 The change to the memory allocation specification in the OVF file

```
root@p5502p1 /export/nim/appliances/066159f8-ad2c-4e68-a3f0-02771684be8f > cat
066159f8-ad2c-4e68-a3f0-02771684be8f.ovf

... (content omitted) ...

<ovf:Item>
   <rasd:AllocationUnits>byte * 2^10</rasd:AllocationUnits>
   <rasd:Caption>Memory Allocation</rasd:Caption>

... (content omitted) ...

   <rasd:VirtualQuantity>2097152</rasd:VirtualQuantity>
   <vimphyprasd:VirtualLimit>3145728</vimphyprasd:VirtualLimit>
   <vimphyprasd:VirtualReservation>2097152</vimphyprasd:VirtualReservation>
</ovf:Item>

... (content omitted) ...

root@p5502p1 /export/nim/appliances/066159f8-ad2c-4e68-a3f0-02771684be8f >
```

Tip: The description of the VirtualReservation and the VirtualLimit attributes can be found on the ibm-vim2-phyp3-rasd_2.1.0.xsd XML schema file. In this case, the VirtualLimit specifies the maximum virtual memory that will be granted and the VirtualReservation represents the minimum virtual memory guaranteed to be available for the system.

More details can be found on the OVF description file specifications that is available at:

http://publib.boulder.ibm.com/infocenter/director/v6r1x/topic/vim_220/fsd0_vim_r_ovf_descriptor.html

You might want to change the description of the virtual appliance. This is one of the elements that can be changed and seen in the Web interface also. The description is specified on the <vim:Description> tag that can be found in <ovf:ProductSection ovf:class="com.ibm.ovf.vim.2"> section of the OVF file. Example 4-45 shows the changes performed.

Example 4-45 The description of the virtual appliance was also changed

```
root@p5502p1 /export/nim/appliances/066159f8-ad2c-4e68-a3f0-02771684be8f > cat
066159f8-ad2c-4e68-a3f0-02771684be8f.ovf

... (content omitted) ...

<ovf:ProductSection ovf:class="com.ibm.ovf.vim.2">
      <ovf:Info>This product section provides information about the entire
package.</ovf:Info>
```

```
... (content omitted) ...

<vim:Description>Copy1 of va_aix61def_mksysb</vim:Description>
    </ovf:ProductSection>

... (content omitted) ...

root@p5502p1 /export/nim/appliances/066159f8-ad2c-4e68-a3f0-02771684be8f >
```

d. After the changes are completed in the OVF file, from the IBM Systems VMControl summary page in the Web interface, perform the following steps:

   i. Click **Discover Virtual Appliances**, specify the NIM server as the target, and click **OK**.

   ii. Click **Virtual Appliances**. The virtual appliance you changed must still be included. If not, then your changes to the OVF file have rendered it non-compliant and Systems Director VMControl does not recognize it as a valid virtual appliance. If this happens, restore the original OVF file that you saved before doing the changes.

   In this case, the description change is reflected in the Web interface also as shown in Figure 4-62.

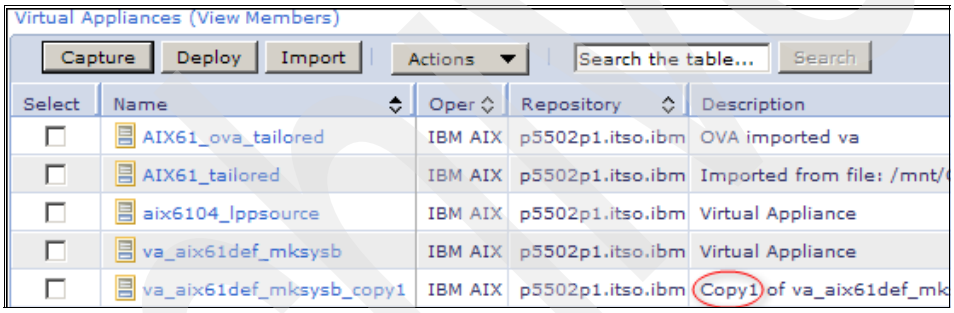

Figure 4-62 The description change is reflected on the Web interface

The command line interface (CLI) can also be used to get the details about the virtual appliance as shown in Example 4-46.

Example 4-46 Verify the change of virtual appliance using CLI mode

```
root@p5502p2 /kits> smcli lsva -l -q "name=va_aix61def_mksysb_copy1"
va_aix61def_mksysb_copy1
        TrunkId:9
        RevisionVersion:1.1
        ChangedDate:2009-12-14T16:00:19-05:00
        TrunkName:va_aix61def_mksysb_copy1
        Description:Copy1 of va_aix61def_mksysb
        DisplayName:va_aix61def_mksysb_copy1

... (content omitted) ...

root@p5502p2 /kits>
```

4.4 Deleting a virtual appliance

To delete a virtual appliance from IBM Systems Director VMControl, perform the following steps:

- Using CLI mode:

  Run the **smcli rmva -V <ApplianceID>** command, where the value of the ApplianceID can be obtained using **smcli lsva -l** command.

- Using the Web interface:

  a. In the navigation area of the Web interface, click **System Configuration** → **VMControl** to open the VMControl summary page.

  b. Click **Virtual Appliances** to get the list of all the virtual appliances that are available on the IBM Systems Director VMControl Image Manager repository.

  c. Right click the virtual appliance you want to delete and click **Permanently Delete**.

4.5 Working with workloads

A workload represents one or more virtual servers that can be monitored and managed as a single entity. For example, you can start and stop a workload, and thus the virtual servers it contains, as one entity. A workload can contain virtual servers that comprises, for example, both a web server and a database server. You can monitor the health of a workload by viewing the workloads dashboard. A workload is automatically created when you deploy a virtual appliance. You can also create a workload by grouping together one or more virtual servers that are not already part of an existing workload.

In this section, we discuss the following topics:

- 4.5.1, “Creating a workload” on page 131.
- 4.5.3, “Removing a workload” on page 136.
- 4.5.4, “Monitoring a workload” on page 137.
- 4.5.5, “Capturing a virtual appliance from a workload” on page 143.

4.5.1 Creating a workload

In this section, we describe the steps to create a new workload. Click **System Configuration** → **VMControl** → **Workloads** and click **Create Workload**, as indicated in Figure 4-63.

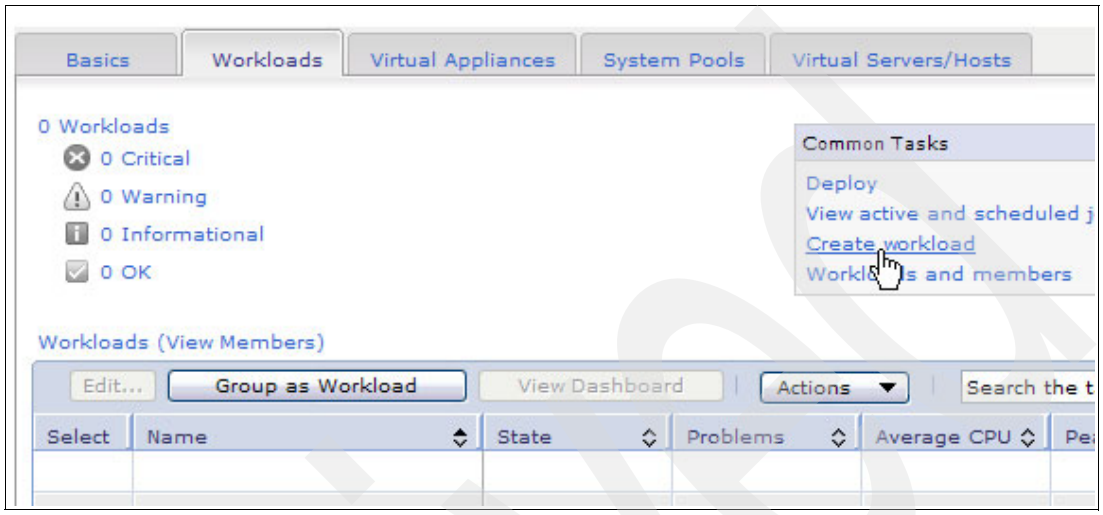

Figure 4-63 Create workload main view

Next, follow the workload wizard and provide a name for the workload. We used `p550_1_workload_1`, as shown in Figure 4-64. Optionally, we provided a description for the workload.

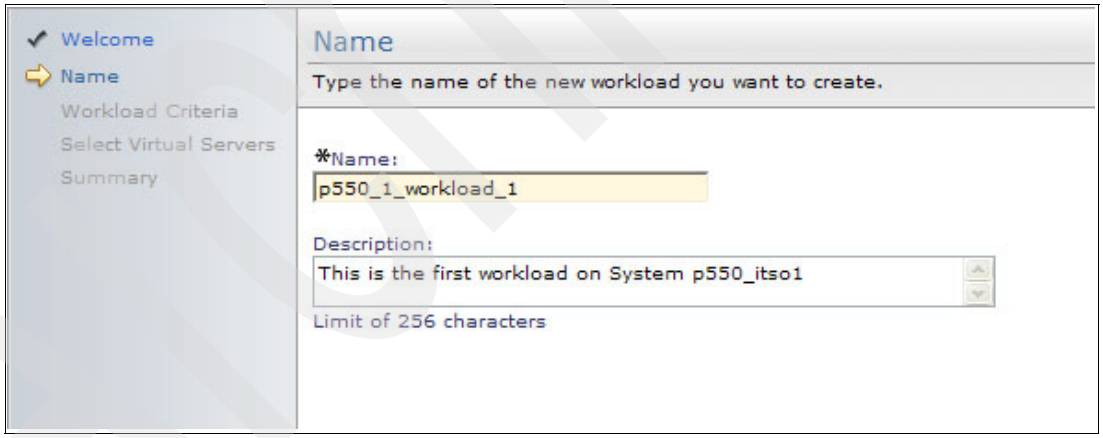

Figure 4-64 Workload wizard and adding a workload name

Click **Next** to open the Workload Criteria view. As this is a new workload, the only criteria available is to enable future workloads to be captured. The selection view is shown in Figure 4-65.

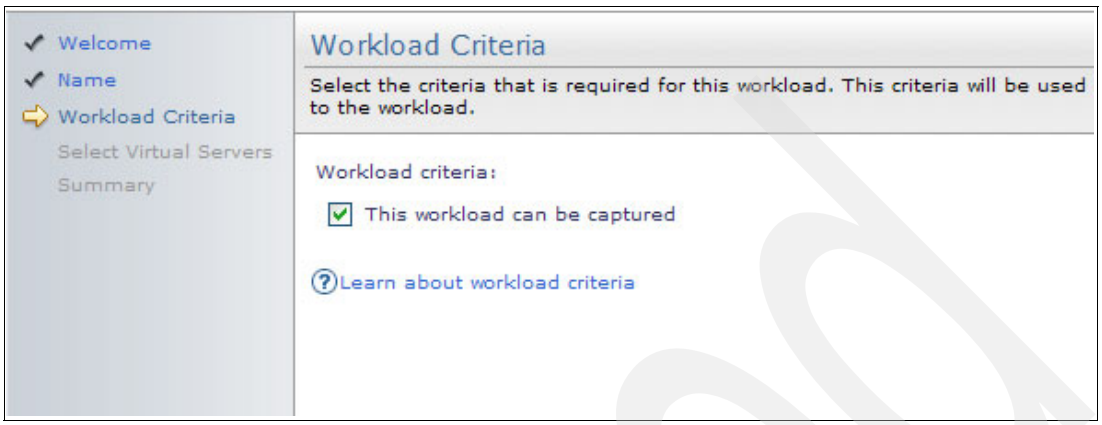

Figure 4-65 Workload wizard - workload criteria view

Note: If you enable workload capture only, one Virtual Server can be added as member. If you intend to create a workload with more than one virtual server as members, you need to leave this option cleared.

Click **Next** to access the virtual server selection view. As shown in Figure 4-66, we added server p5501p3 to the list of selected servers for the workload.

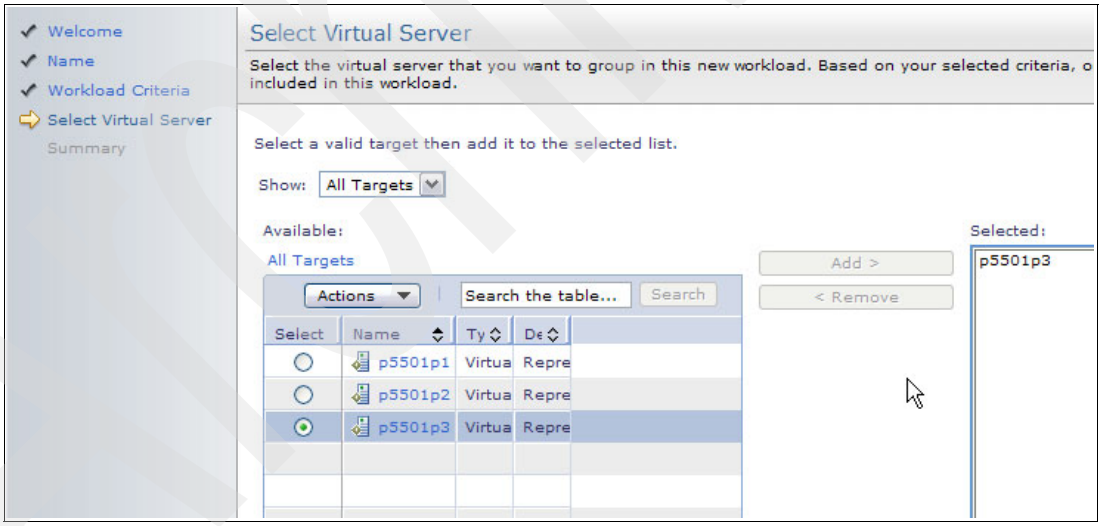

Figure 4-66 Workload wizard - select virtual server

Note: Only virtual servers are listed that are not member of another workload, and for which the inventory has been collected.

Click **Next** to open the summary view and click **Finish** to create the p550_1_workload_1 workload, as shown in Figure 4-67.

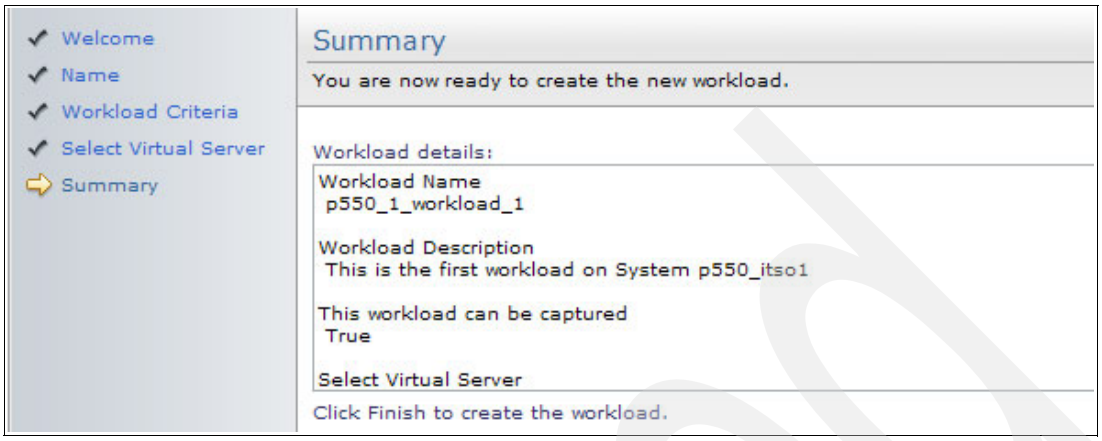

Figure 4-67 Workload wizard - Summary view

After the workload is created, VMControl switches to the workload view and shows all available workloads. In our case, only one workload is shown, as in Figure 4-68.

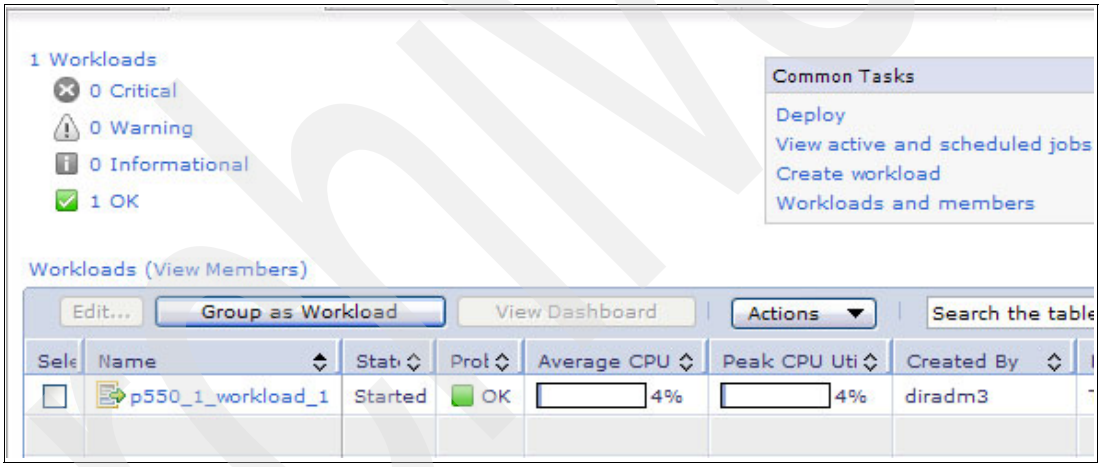

Figure 4-68 Summary of all available workloads

The status and properties of workload p550_1_workload_1 can be accessed using the **smcli lsworkloads** commands, as shown in Example 4-47:

- **smcli lsworkloads** without options.
- **smcli lsworkloads** with option **-vl**.

Example 4-47 smcli lsworkloads sample output

```
p5501p2(root)/> smcli lsworkloads
p550_1_workload_1
p5501p2(root)/>
p5501p2(root)/> smcli lsworkloads -vl
Wed Dec 16 11:15:27 EST 2009  lsworkloads Operation started.
p550_1_workload_1 (p550_1_workload_1)
        Description:This is the first workload on System p550_itso1
        ChangedDate:2009-12-15T18:21:46-05:00
        DisplayName:p550_1_workload_1
        CreatedBy:diradm3
```

```
        CreationMechanism:GroupAs
        OperatingState:8
        Id:51346
        OID:51346
        Guid:6098A9861ACE3B6592C7C6F31D276E28
        SystemId:e0df03df-8da9-4e22-afbe-4b54f06ab35b
        DetailedState:0
        ObjectType:WorkloadInstance
        ApprovalRequired:Yes
        Resilience:Not active

The state for 51346 (0xc892) is STARTED.
Wed Dec 16 11:15:27 EST 2009  lsworkloads Operation took 0 seconds.
p5501p2(root)/>
```

Note: After creation of the workload, it is recommended to collect the inventory.

As shown in Figure 4-69, mark the workload by clicking **Actions** → **Workloads** → **Inventory** → **View and Collect inventory**.

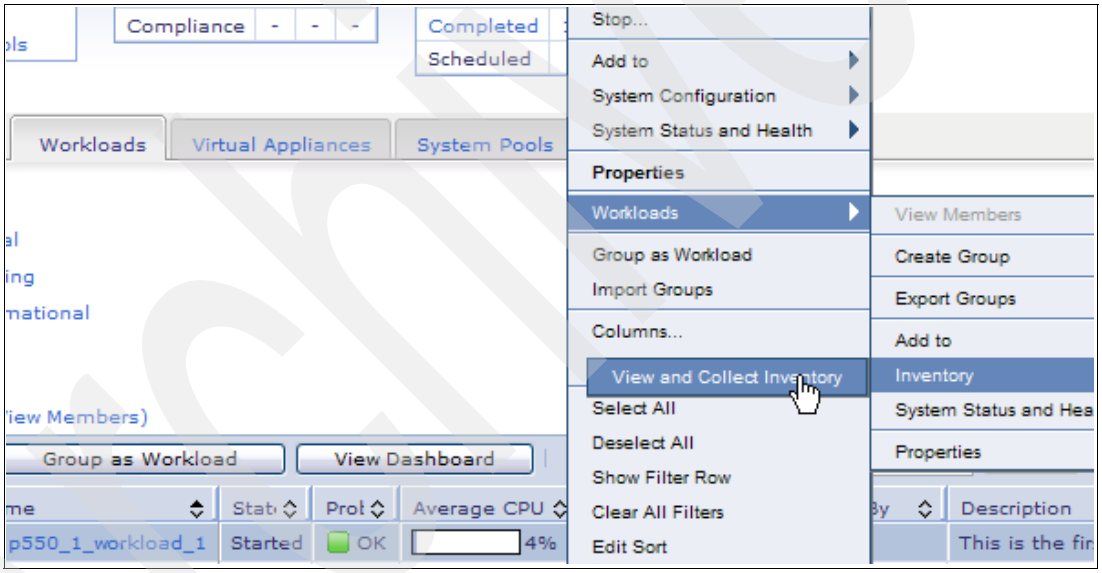

Figure 4-69 Collect inventory for workload p550_1_workload_1

4.5.2 Editing a workload

In this section, we detail the steps required to edit a workload. As shown in Figure 4-70, we click **System Configuration** → **VMControl** → **Workloads** and mark the workload p550_1_workload_1.

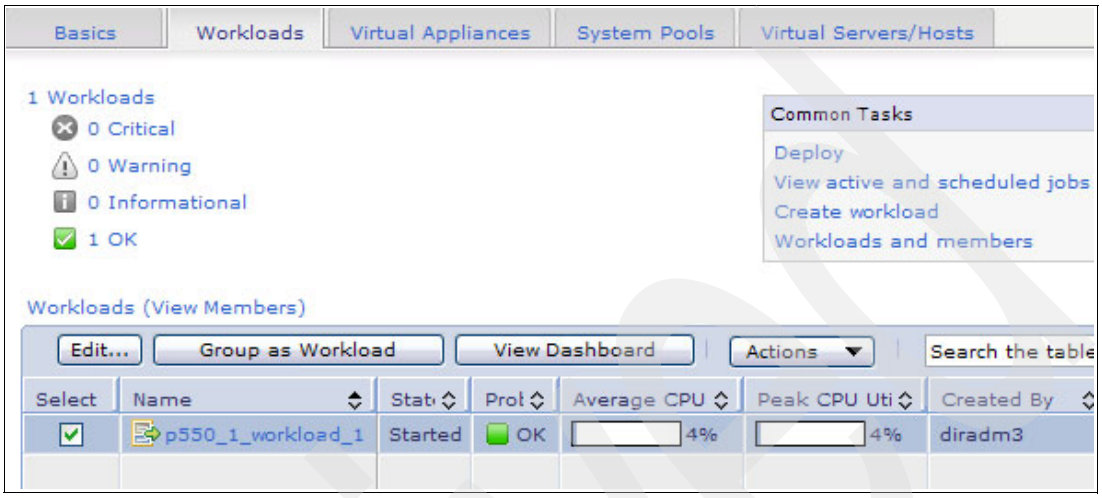

Figure 4-70 Workloads main view with marked workload

Click **Edit** to open the Edit Workload View (Figure 4-71).

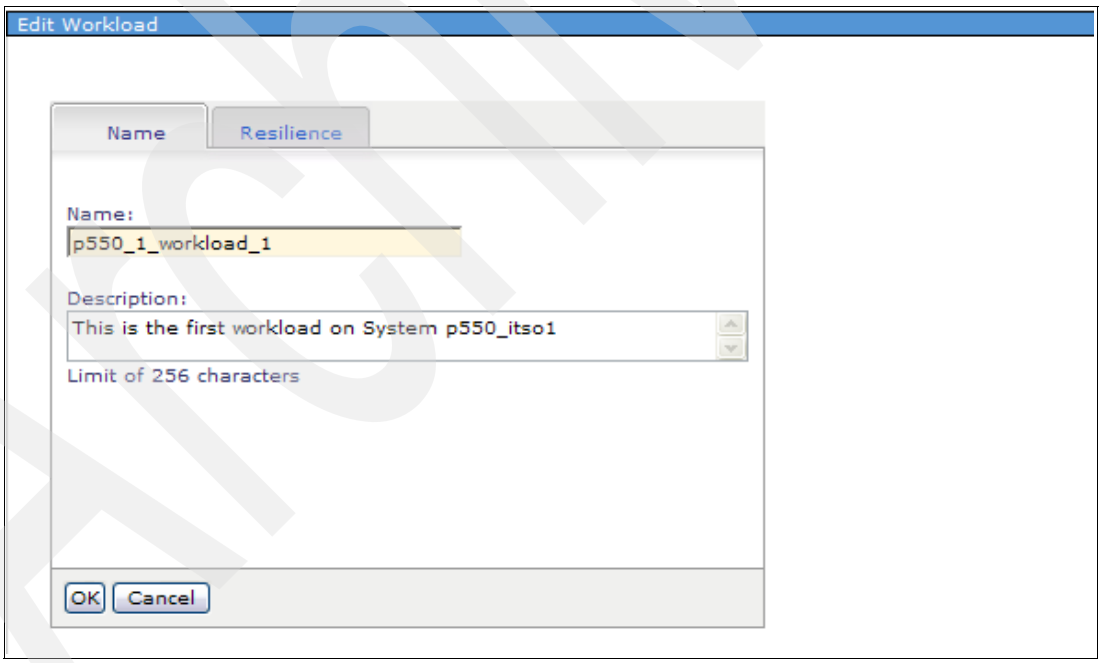

Figure 4-71 Edit Workload view

Within the Edit Workload view, you have the option to change the settings for:

- The name of the workload.
- Resilience policies if the workload supports resilience.

This workload (p550_1_workload_1) was not created with relocation or system pools activated, so editing the Resilience options is not available. (It is greyed out.)

4.5.3 Removing a workload

In this section, we describe the steps to remove a workload.

Click **System Configuration** → **VMControl** → **Workloads**, then mark the workload p550_1_workload_1 (as shown in Figure 4-72) and click **Actions** → **Remove**.

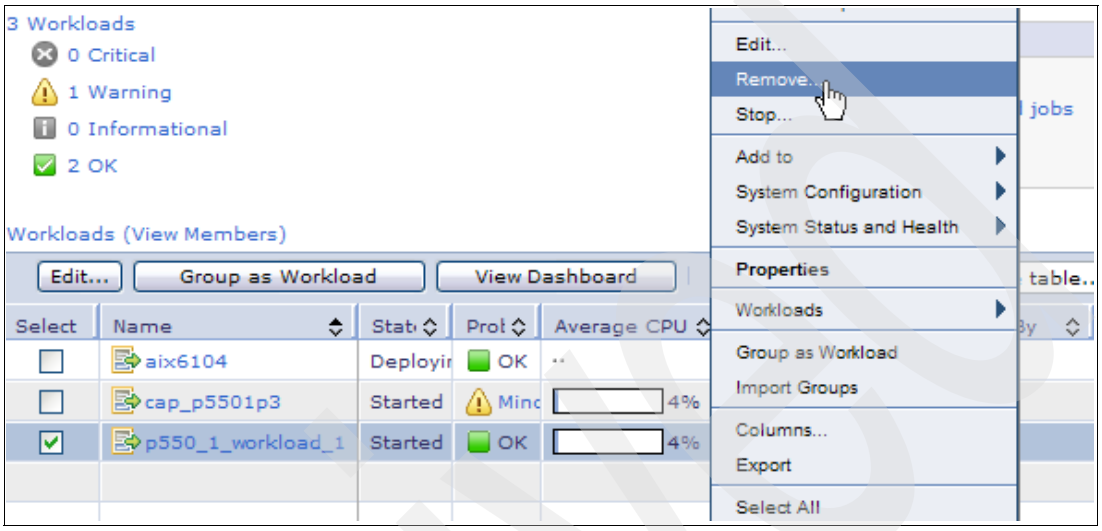

Figure 4-72 Action tab to remove a workload

Confirm by clicking **OK**, as shown in Figure 4-73.

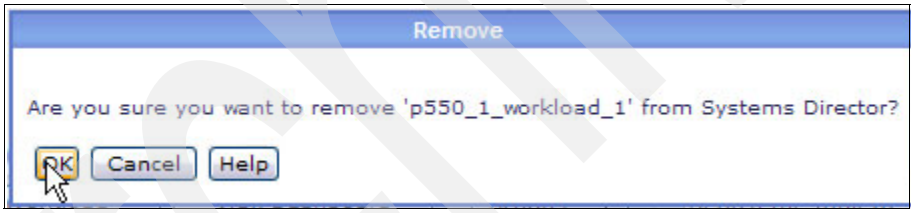

Figure 4-73 Remove workload confirmation window

The workload is removed from the inventory database in the workloads summary view (Figure 4-74).

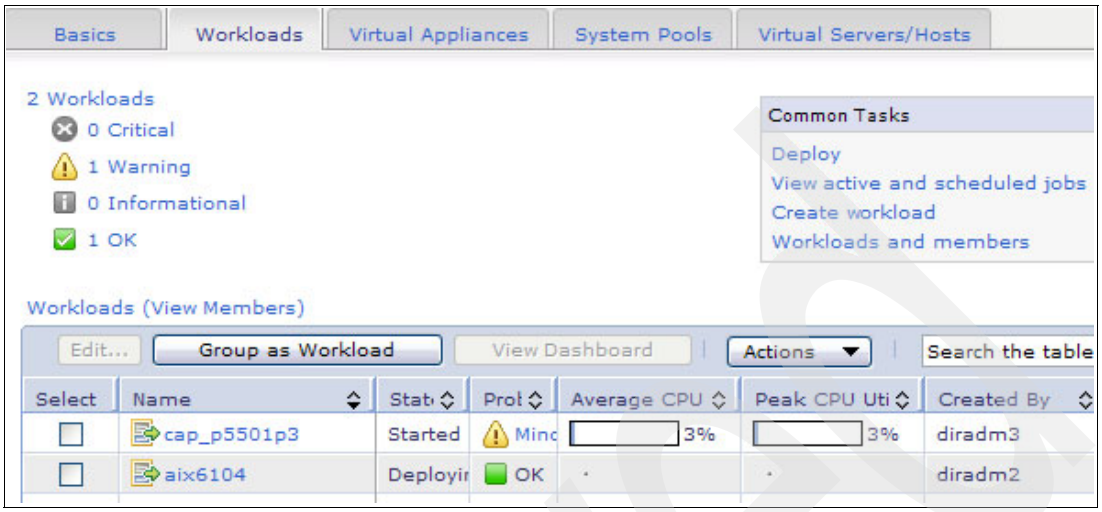

Figure 4-74 Workload summary view with after removing a workload

4.5.4 Monitoring a workload

The virtualization manager monitors are supported by the IBM Systems Director VMControl. After creation of a new workload, the default monitors for the workload can be accessed by clicking **System Configuration** → **VMControl** → **Workloads** and clicking **View Dashboard**. In Figure 4-75, the default dashboard compiled by the initial monitors is shown for workload p550_1_workload_2.

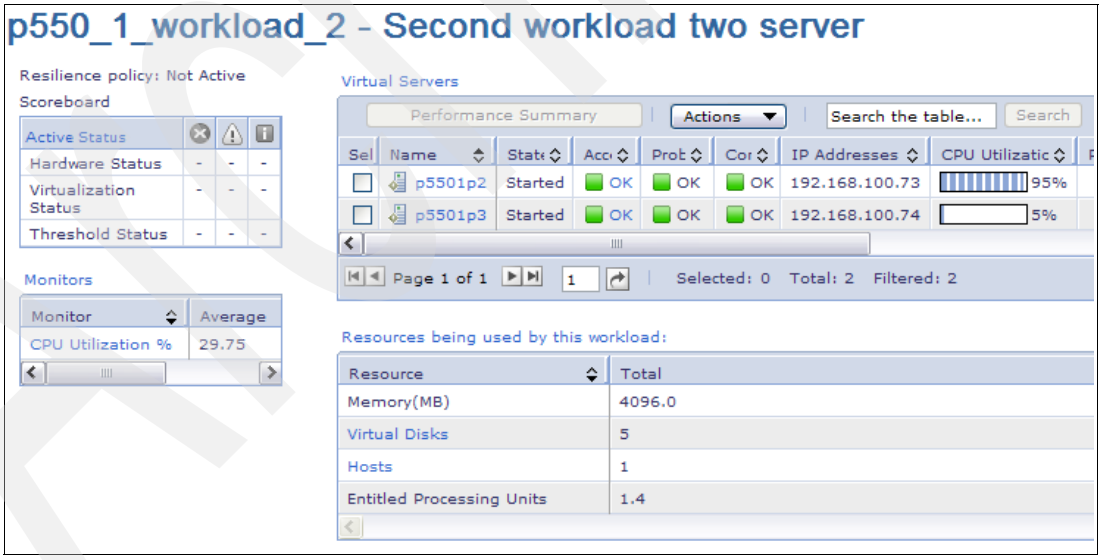

Figure 4-75 Dashboard view for workload p550_1_workload_2

Select the virtual servers to monitor and click **Performance Summary** within the Dashboard view. This opens the predefined Virtualization Manager Monitors view for VMControl (Figure 4-76).

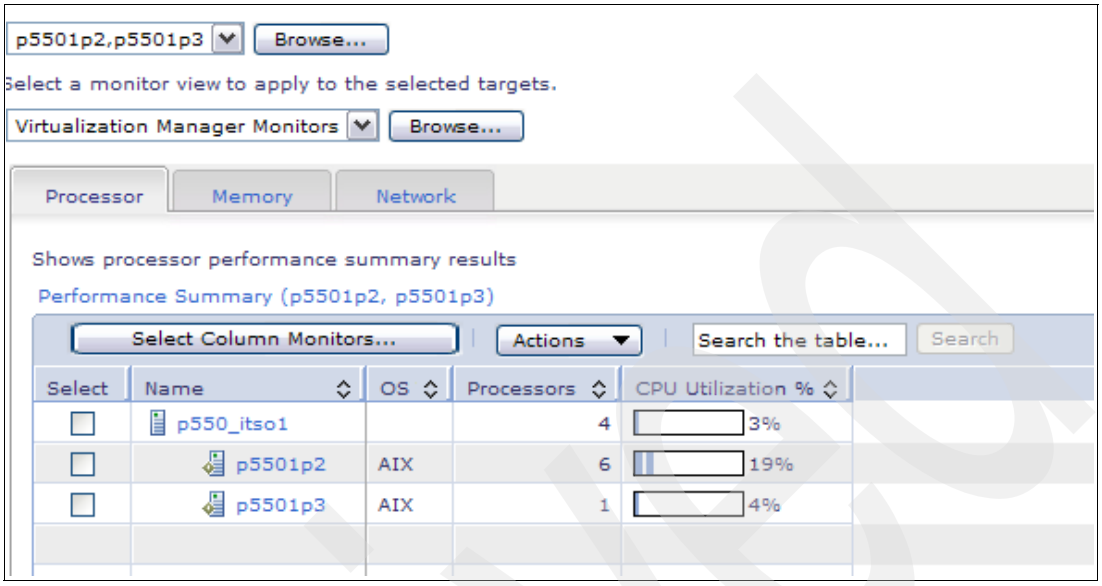

Figure 4-76 Performance summary view for members of workload p550_1_workload_2

For more details on monitoring the status and health of your systems with IBM Systems Director see the section on monitoring system status and health on the following Web page:

`http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp?topic=/director_6.1/fqm0_main.html`

Setting up an event automation plan for a workload

When monitoring a workload, you might want to set up additional event triggers for notification. To achieve e-mail notification, for example, on event action or policy-based actions, create an automation plan. In this section, we describe the initial set up of an automation plan for a workload.

In the **System View** → **Automation** → **Event Automation Plans** panel, click **Create** to open the Create Event Automation Plan Wizard (Figure 4-77). We entered `VMC workload` for the name of the automation plan.

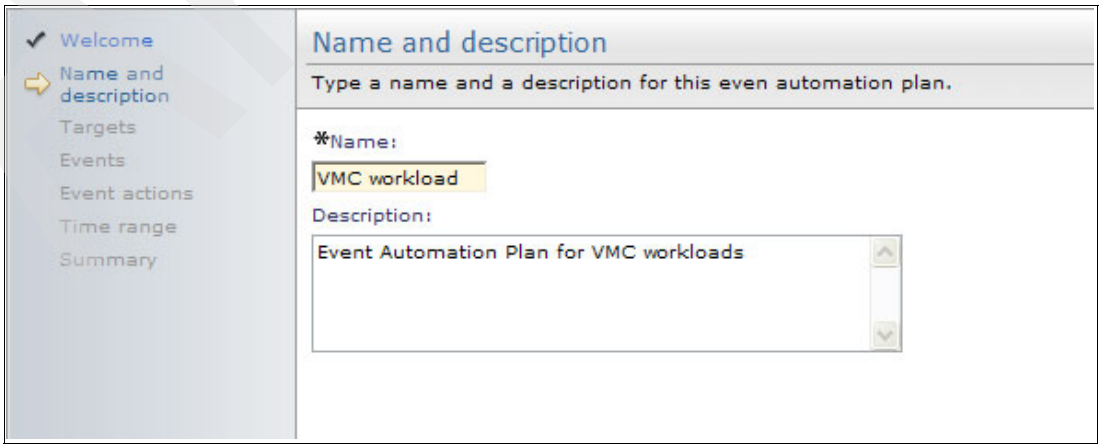

Figure 4-77 Event automation plan wizard view

Click **Next** to continue with the target selection. Search for the virtualization groups, as shown in Figure 4-78.

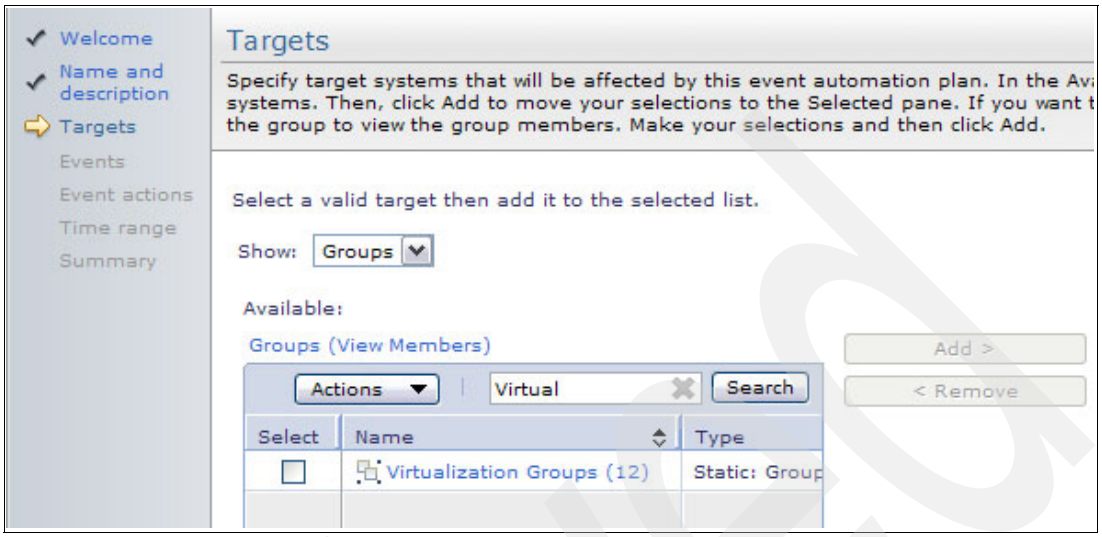

Figure 4-78 Event automation plan wizard group selection view

In our case, the predefined virtualization group contain 12 members. Open the Virtualization Group view and search for workloads. The search results in two workload groups available. We select Workloads, which contains one member and we add it as target to the selected list. See Figure 4-79.

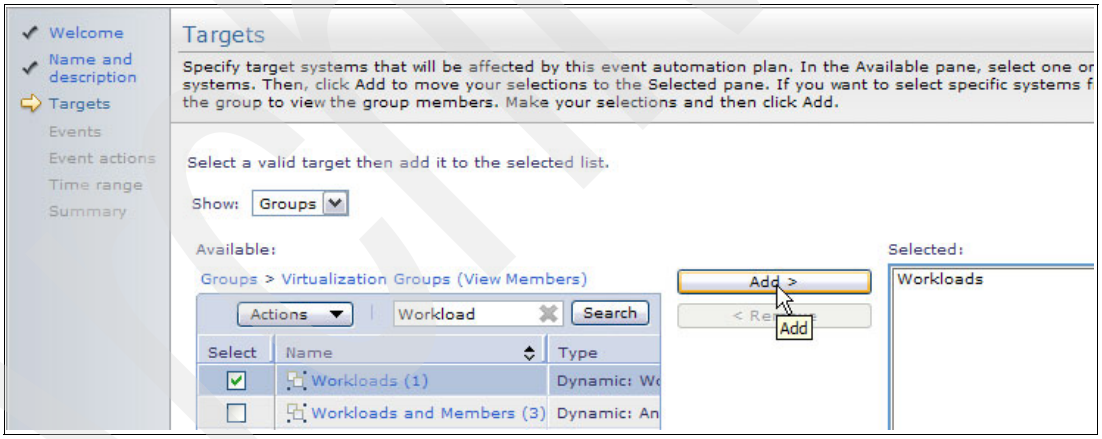

Figure 4-79 Event automation plan wizard group member selection view

Click **Next** to continue with the event type selection view. In this example, we only use the CPU Utilization threshold event. We set the Critical value to 90% and Warning to 80%, as shown in Figure 4-80.

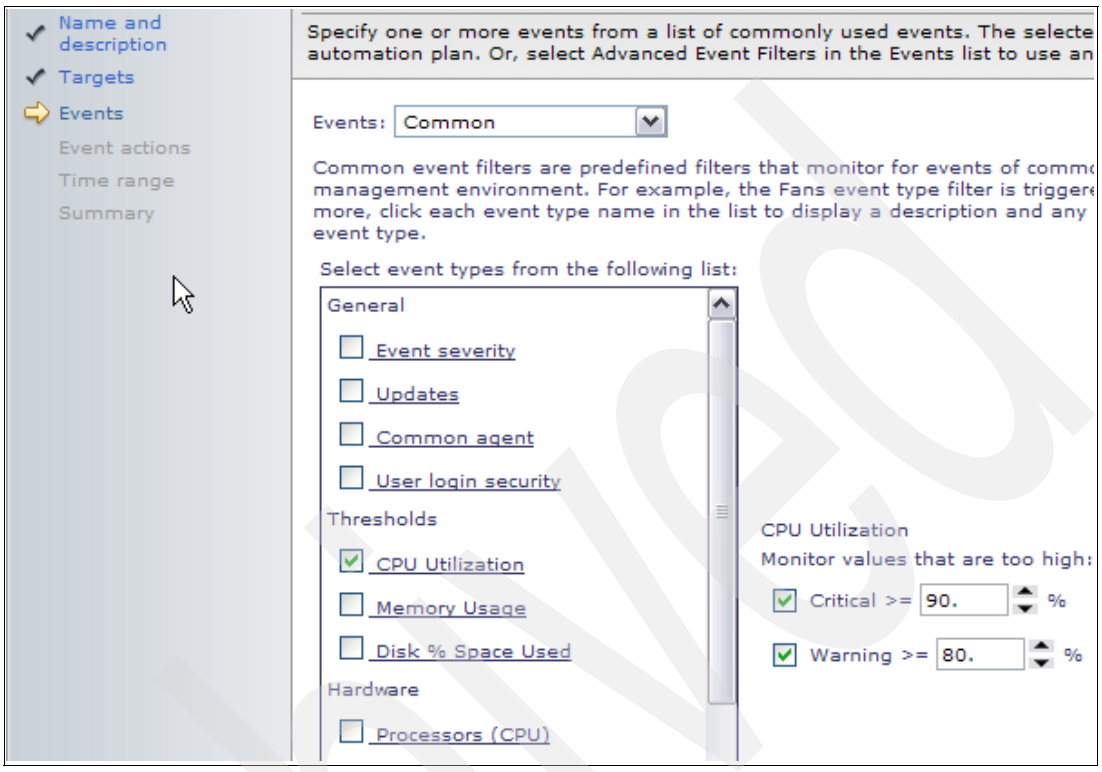

Figure 4-80 Event automation plan wizard group CPU use threshold view

Click **Next** to define the event actions. By default no e-mail event action is available. Click **Create** and choose **Send an e-mail**, as indicated in Figure 4-81.

Figure 4-81 Event automation plan wizard create event action view

Confirm the event action by clicking **OK**. Next, provide details for the e-mail notification. We input the mandatory data, as shown in Figure 4-82.

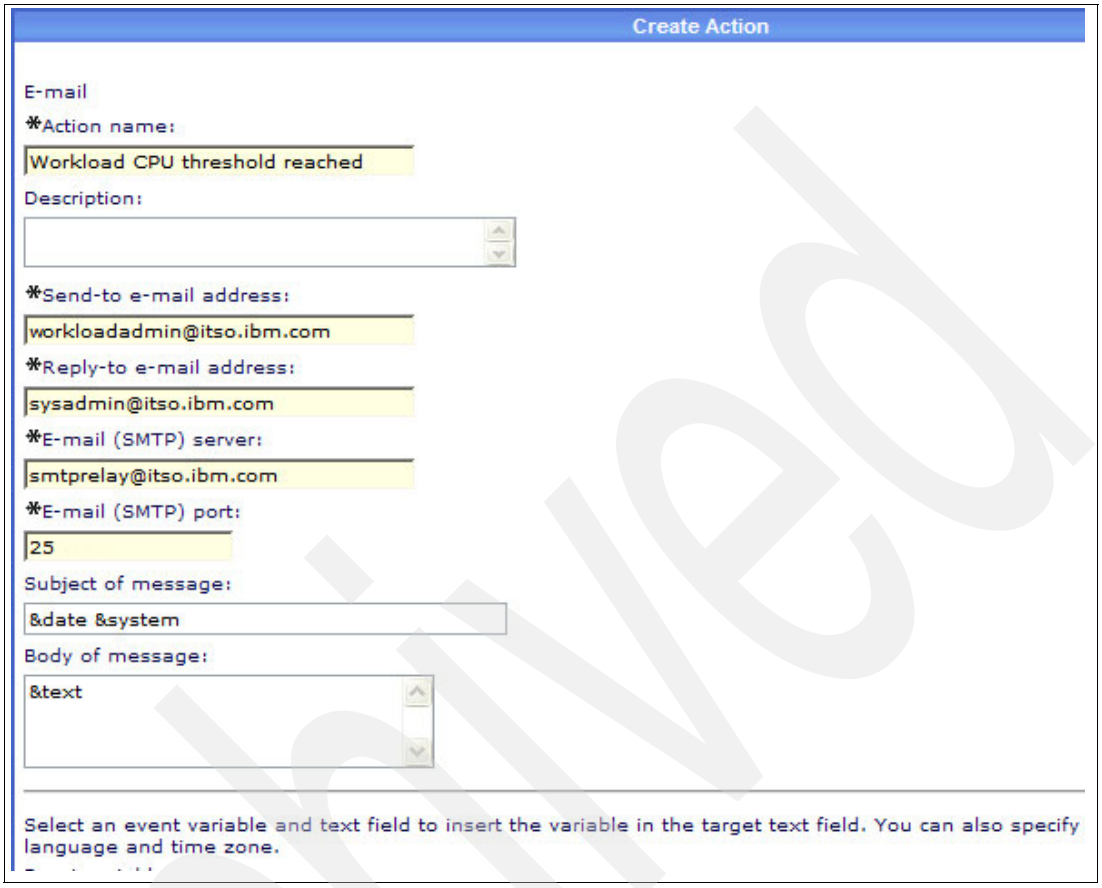

Figure 4-82 Event automation plan wizard create event action e-mail setup view

Using the **Test** button at the bottom of this view, it is possible to check the event e-mail creation and delivery. Click **OK** to confirm and continue with the Event Action creation. In Figure 4-83, we show the Event Actions view, select the new created event, and click **Next** to continue.

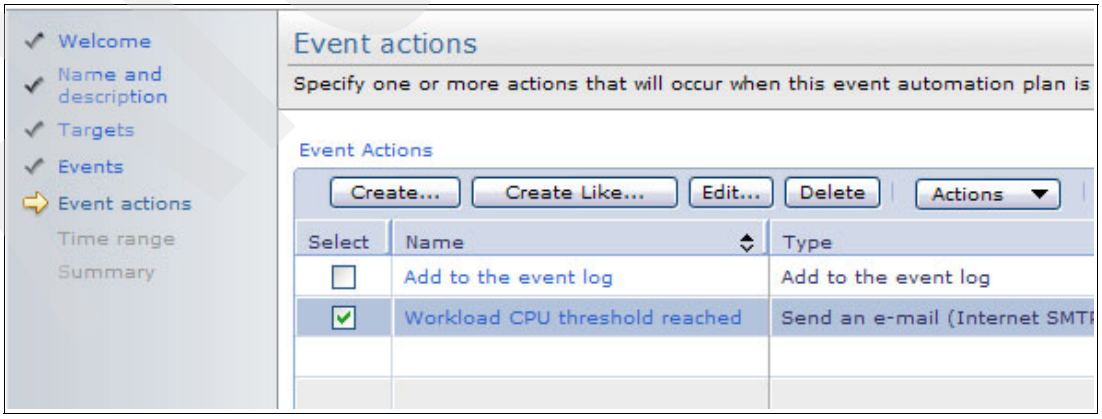

Figure 4-83 Event automation plan wizard add e-mail event view

For a time range, we use `All the time (24x7)` which is the default. On the “Summary” page, click **Finish** to create the event automation plan, as shown in Figure 4-84.

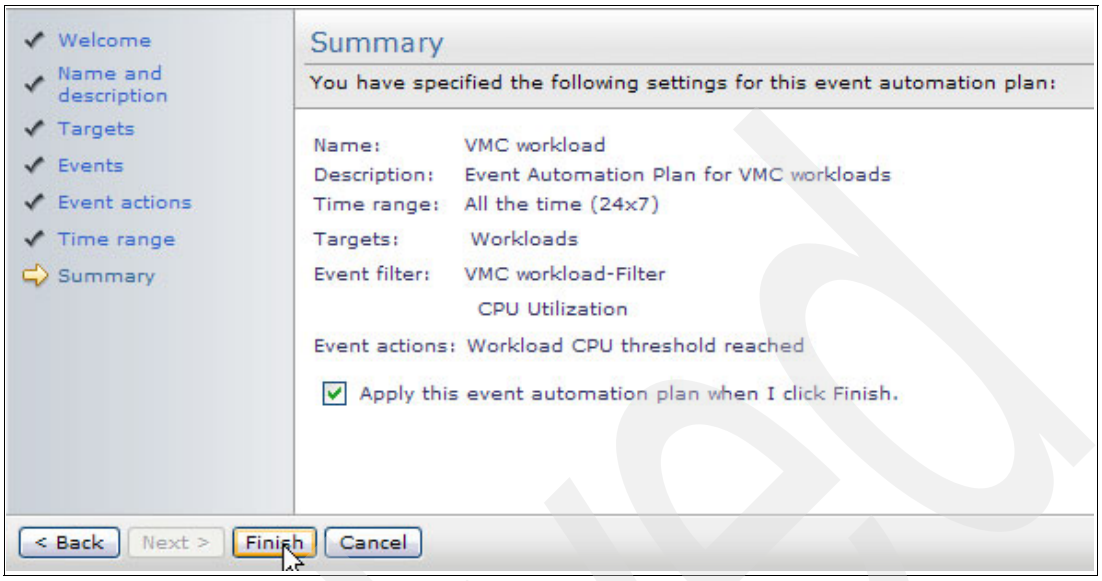

Figure 4-84 Event automation plan wizard summary view

The created automation plan is now in active state and the e-mail notification based on the defined threshold trigger is enabled. The status can be checked using the **System View** → **System Status and Health** → **Thresholds** view, as in Figure 4-85.

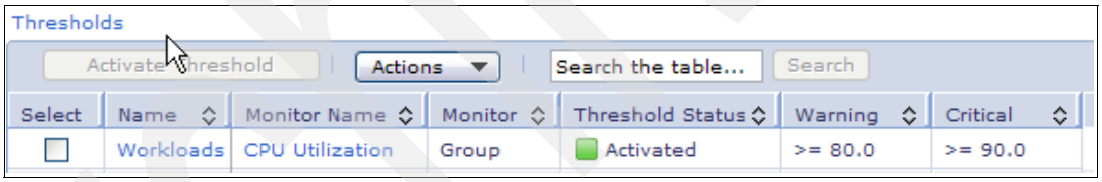

Figure 4-85 System status and health - thresholds workload automation plan view

4.5.5 Capturing a virtual appliance from a workload

In this section, we describe the steps to capture a virtual appliance from a VMControl workload. As shown in Figure 4-70 on page 135, we click **System Configuration** → **VMControl** → **Workloads** and marked the workload p550_1_workload_1. Next, click **Actions** → **System Configuration** → **Capture** to open the capture virtual appliance view shown in Figure 4-86.

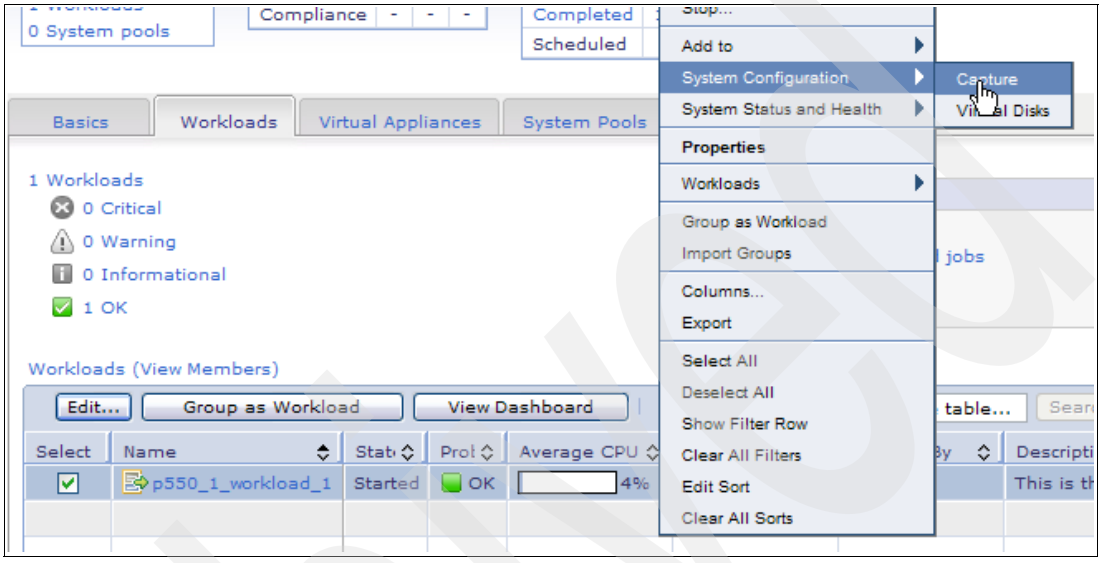

Figure 4-86 Capture virtual appliance from workload

Note: Only workloads which have been created with the “enable future workload capture” setting and contain a single virtual server are eligible for capture.

Click **Capture**. The capture wizard view displays. Use the name `va_1_waix6104`, as shown in Figure 4-87. Optionally, we provided a description but no Search tags are specified.

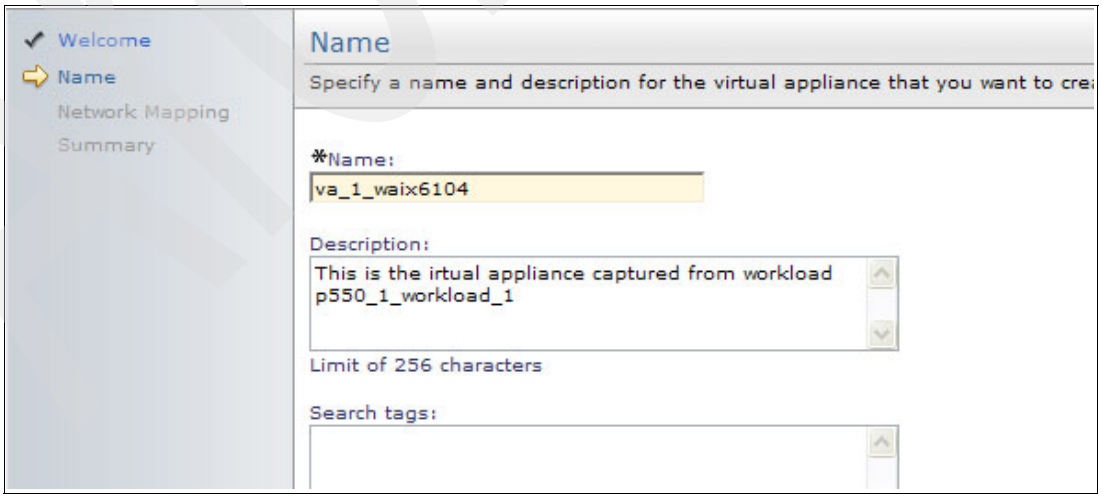

Figure 4-87 Capture virtual appliance from workload name

Click **Next** to continue with the Network Mapping in which you can describe the use of each available network. We select the default value, as shown in Figure 4-88.

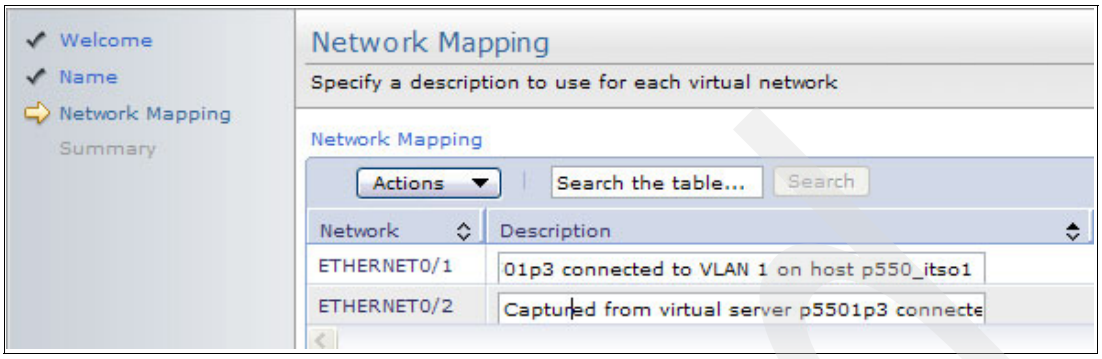

Figure 4-88 Capture virtual appliance from workload network mapping

Click **Next** to open the summary page (Figure 4-89).

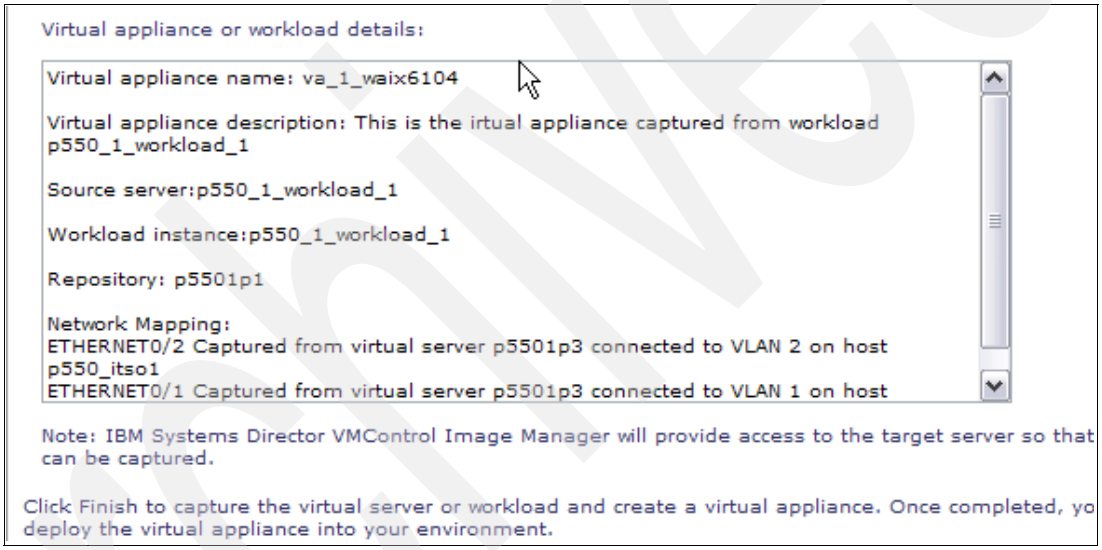

Figure 4-89 Capture virtual appliance summary page

To start the virtual appliance capture job, click **Finish** on the Summary page. On the Run Capture virtual appliance page, change the job name and click **Run Now**, as shown in Figure 4-90.

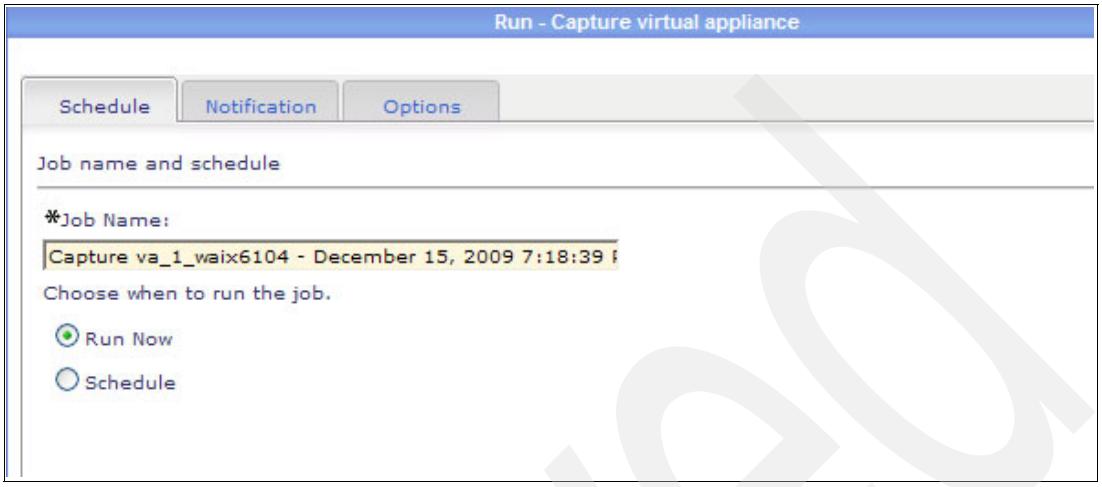

Figure 4-90 Capture virtual appliance - run now page view

Click **Display Properties** in the capture confirmation window to open up the job control view. For details on the job control view, see Figure 4-91.

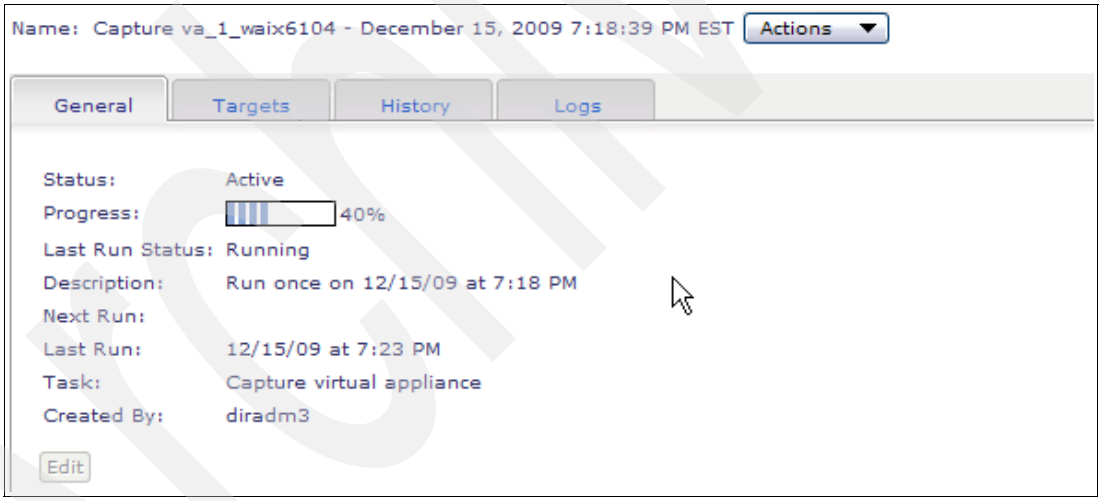

Figure 4-91 Capture virtual appliance - job control view

After the job has finished, the result can be accessed through the **Task Management** → **Active and Scheduled Jobs** panel shown in Figure 4-92.

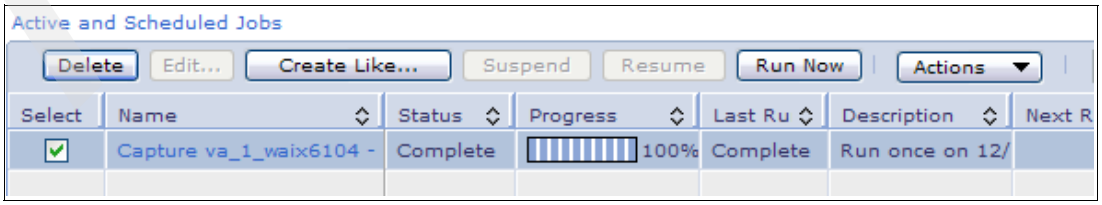

Figure 4-92 Capture virtual appliance - job summary view

In Figure 4-93, the new created virtual appliance va_1_waix6104 is available and shown by clicking **System Configuration** → **VMControl** → **Virtual Appliances**.

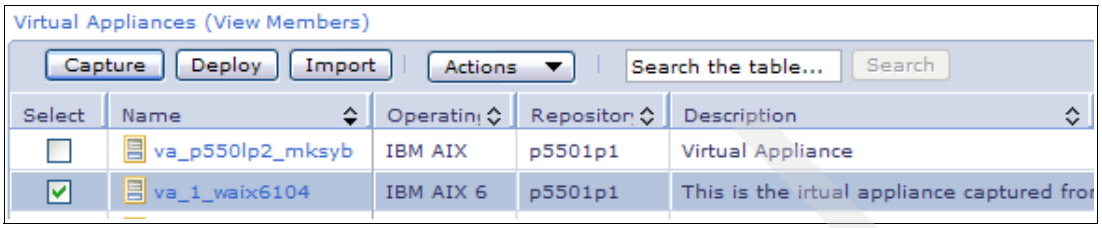

Figure 4-93 Virtual appliance va_1_waix6104

The virtual appliance properties can be accessed using the **smcli lsva** command shown in Example 4-48. In this case, we use the **-q** (query) option to limit the output.

Example 4-48 smcli lsva for Virtual appliance va_1_waix6104

```
p5501p2(root)/> smcli lsva -vlo -q "name = va_1_waix6104"
Wed Dec 16 11:08:41 EST 2009  lsva Operation started.
va_1_waix6104 (va_1_waix6104)
        TrunkId:5
        RevisionVersion:1.1
        ChangedDate:2009-12-15T19:33:39-05:00
        TrunkName:va_1_waix6104
        Description:This is the irtual appliance captured from workload
p550_1_workload_1
        DisplayName:va_1_waix6104
        RevisionComment:No User Input: Automatically added as new trunk
null
        SpecificationId:1
        SpecificationVersion:1.1
        Id:51600
        OID:51600
        Guid:5A5BAEC6F67936FDB1C80F80130BC8F0
        ApplianceId:dc657033-33c9-48e7-9b32-ea6770e9de24
        ObjectType:VirtualAppliance

Wed Dec 16 11:08:43 EST 2009  lsva Operation took 2 seconds.
p5501p2(root)/>
```

4.6 System pools

This section describes how to manage system pools as part of the VMControl Enterprise Edition feature.

4.6.1 Creating a System pool

To create a system pool, in the VMControl section of the IBM Systems Director Web interface, click **System Pools** and click **Create**, as shown on Figure 4-94.

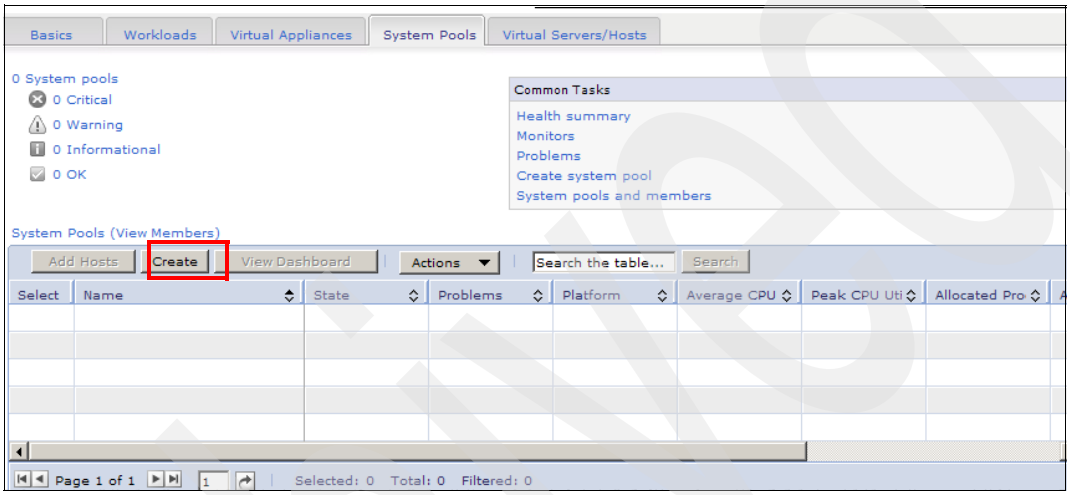

Figure 4-94 VMControl system pools tab view

The Create System Pool wizard requests the name for the new system pool, as shown in Figure 4-95.

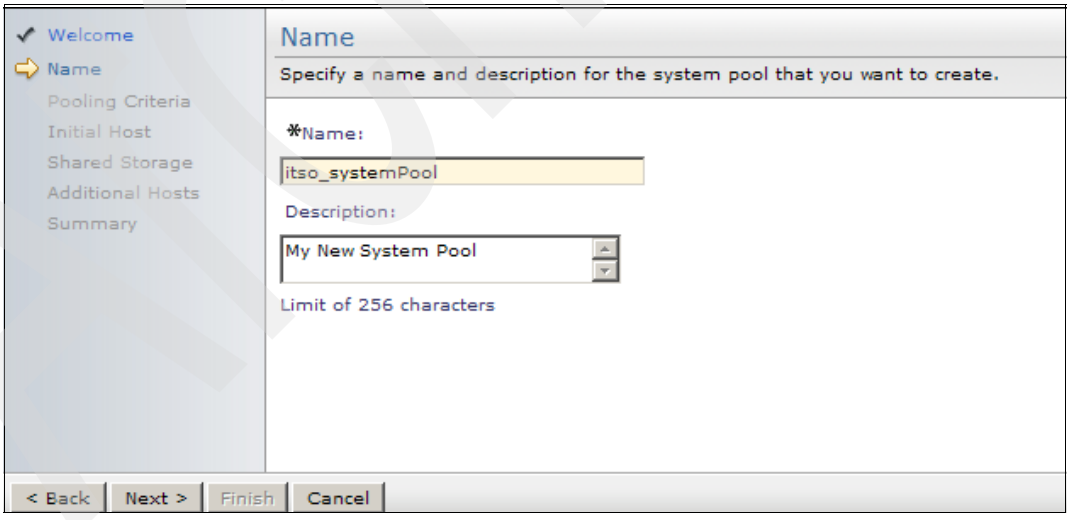

Figure 4-95 Create system pool wizard - system pool name

Click **Next**. The pooling criteria has to be defined. This defines what kind of hosts can be added to the system pool. It can either be built with hosts capable of live relocation, or mixing capable and non-capable hosts together. Making use only of hosts capable of live relocation increases the system pool resilience. Figure 4-96 shows the option related to the pooling criteria requirements.

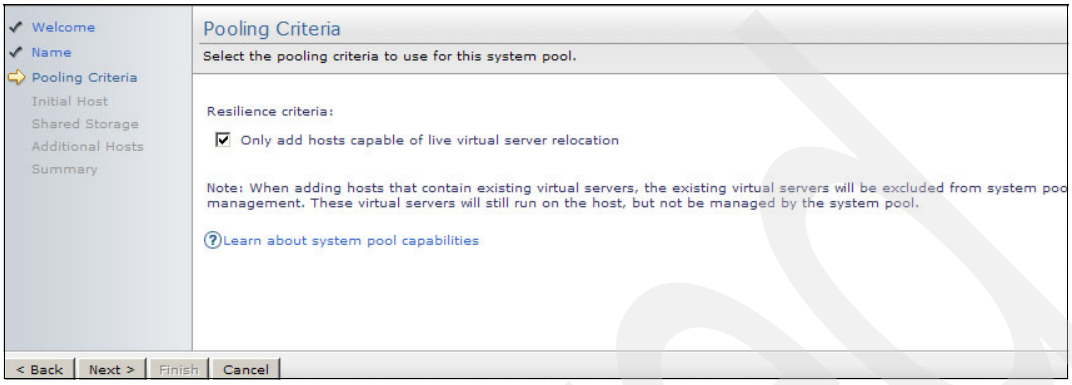

Figure 4-96 Create system pool wizard - pooling criteria view

Depending on the pooling criteria selection, hosts are available for selection as in Figure 4-97. If only hosts capable of live relocation are selected, then only the physical managed systems capable of it are shown in the targets list. Only one host has to be selected, VMControl then finds similar hosts with similar capabilities and features.

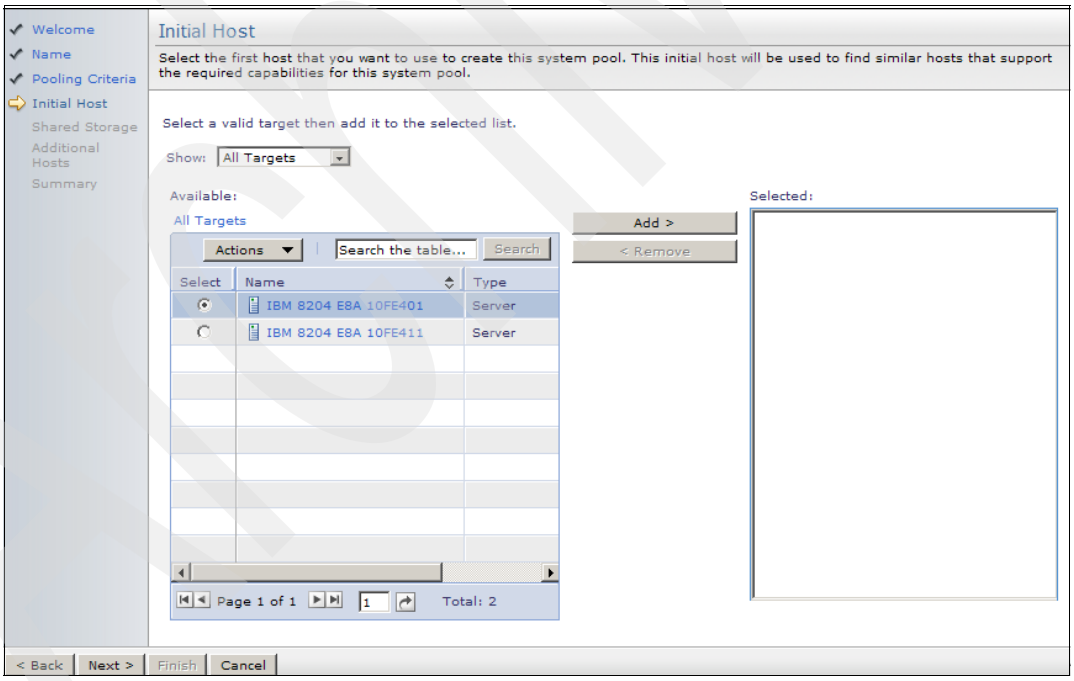

Figure 4-97 Create system pool wizard - systems selection view

After the host selection, a shared storage must be added to the system pool. VMControl detects which storage systems are used by the initial selected system and displays it for selection, as shown in Figure 4-98.

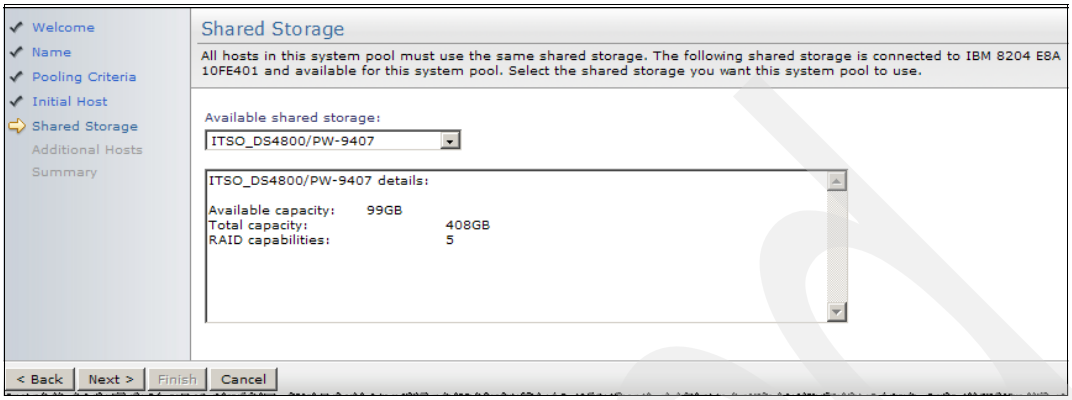

Figure 4-98 Create system pool wizard - shared storage selection view

Following the shared storage selection, VMControl detects and lists which additional hosts are using that same storage, and have similar resources and capabilities that can be members of the same shared pool. See Figure 4-99.

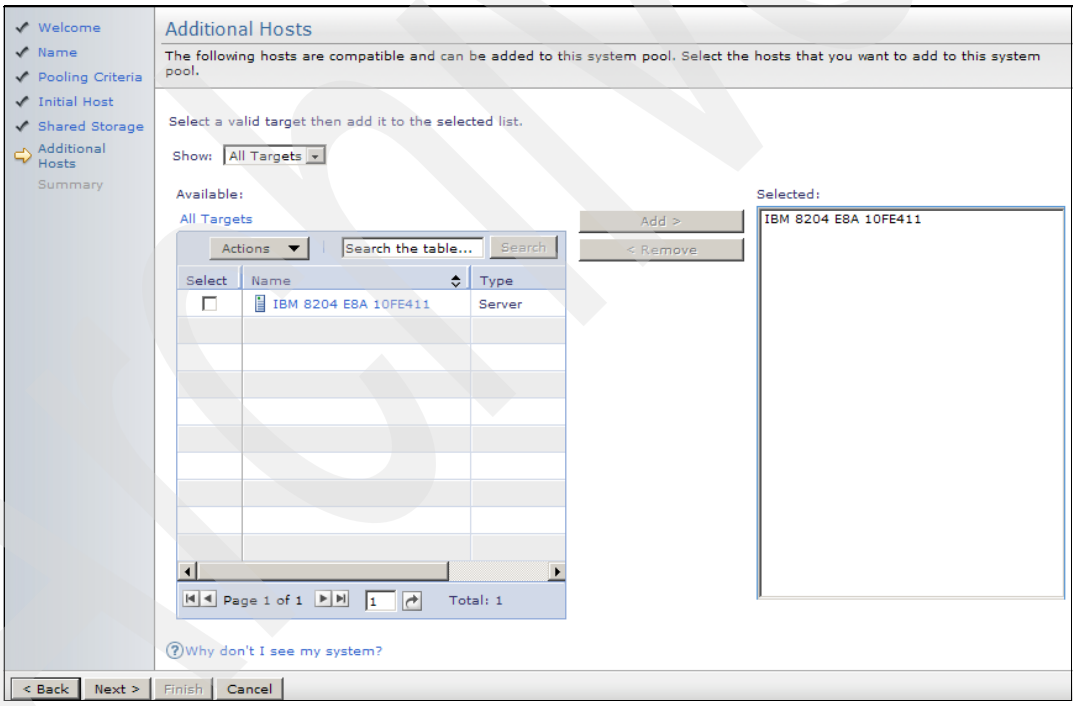

Figure 4-99 Create system pool wizard - additional hosts selection view

Click **Next**. The System Pool is created. Click **Finish** to display the Summary view shown in Figure 4-100.

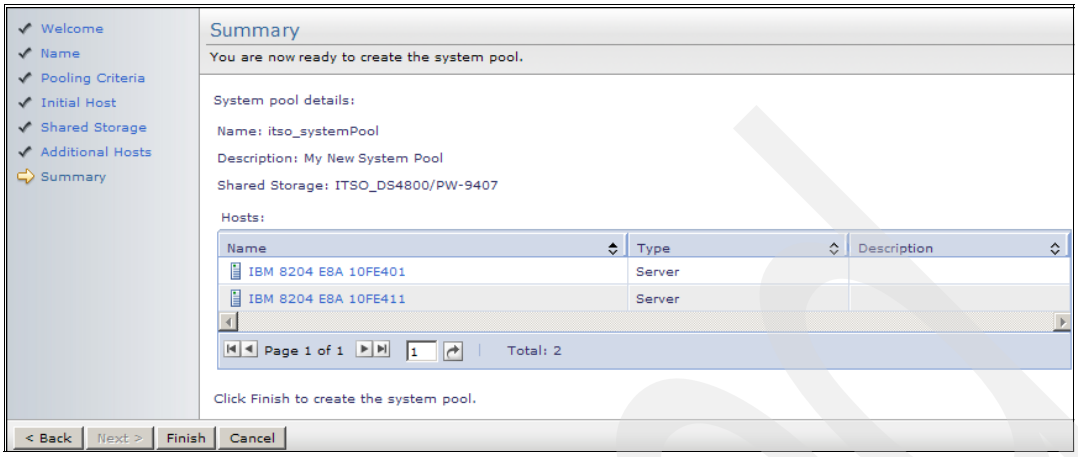

Figure 4-100 Create system pool wizard - summary view

After the system pool has been created, it appears on the VMControl's system pools tab as in Figure 4-101.

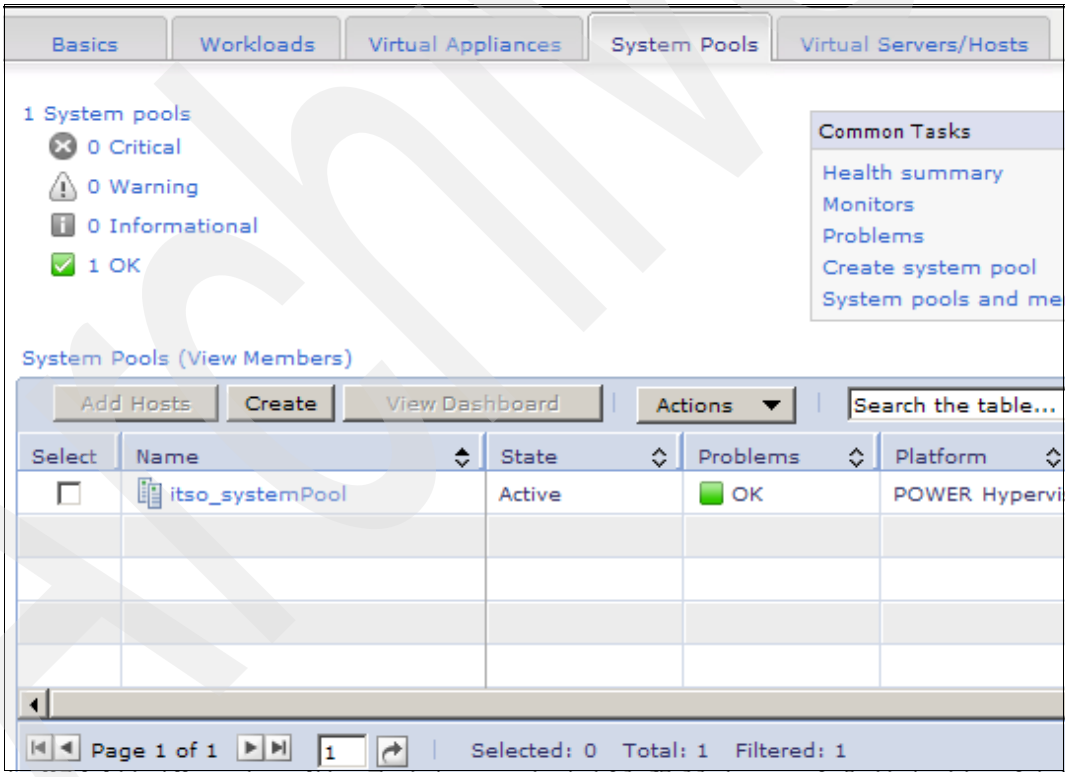

Figure 4-101 VMControl's system pools tab - new system pool view

System pools can also be created from the command-line using the **`smcli mksyspool`** command.

4.6.2 Managing System Pools

The following sections describe how to manage systems pools with IBM Systems Director VMControl.

Adding hosts to a System Pool

Hosts with an existing virtual server can be added to a system pool. If hosts with virtual servers are added to the system pool, only host resources that are not allocated, such as memory, processor, and storage are added and available to the system pool.

To add a host to a system pool, follow these steps:

1. In the system pools and members view, select a system pool, and click **Add Hosts** (Figure 4-102).

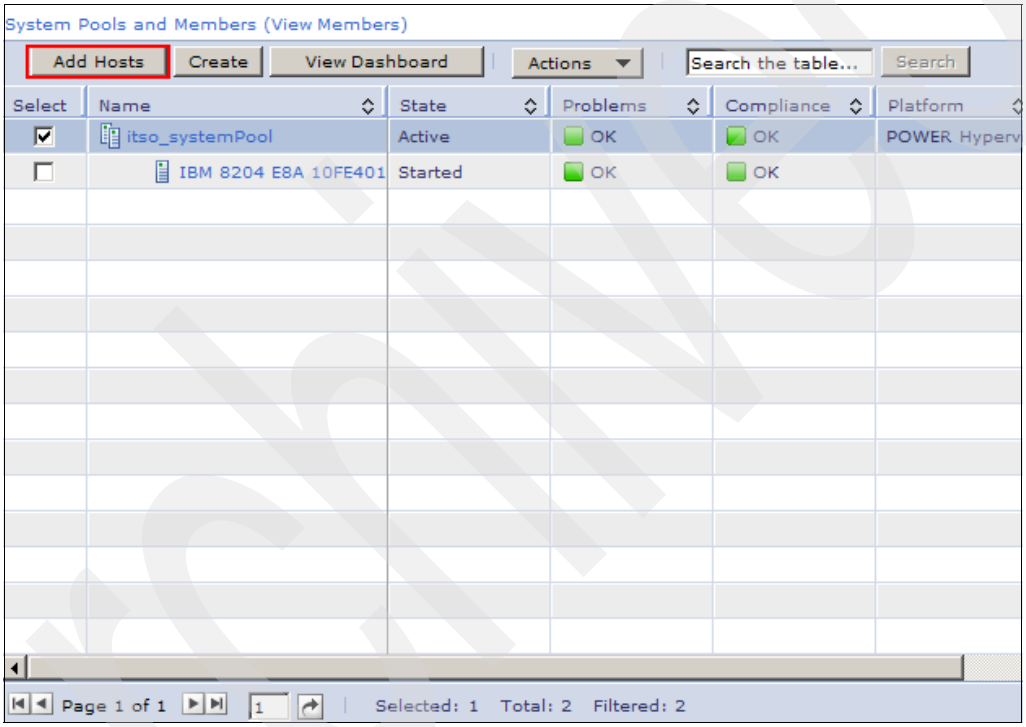

Figure 4-102 Adding hosts to a system pool

2. Follow the instructions from the Add Hosts wizard to add one or more hosts to a system pool. The Add Hosts wizard filters the hosts that can selected for addition into the systems pool. Only hosts that are compatible with the existing hosts are displayed, as in Figure 4-103.

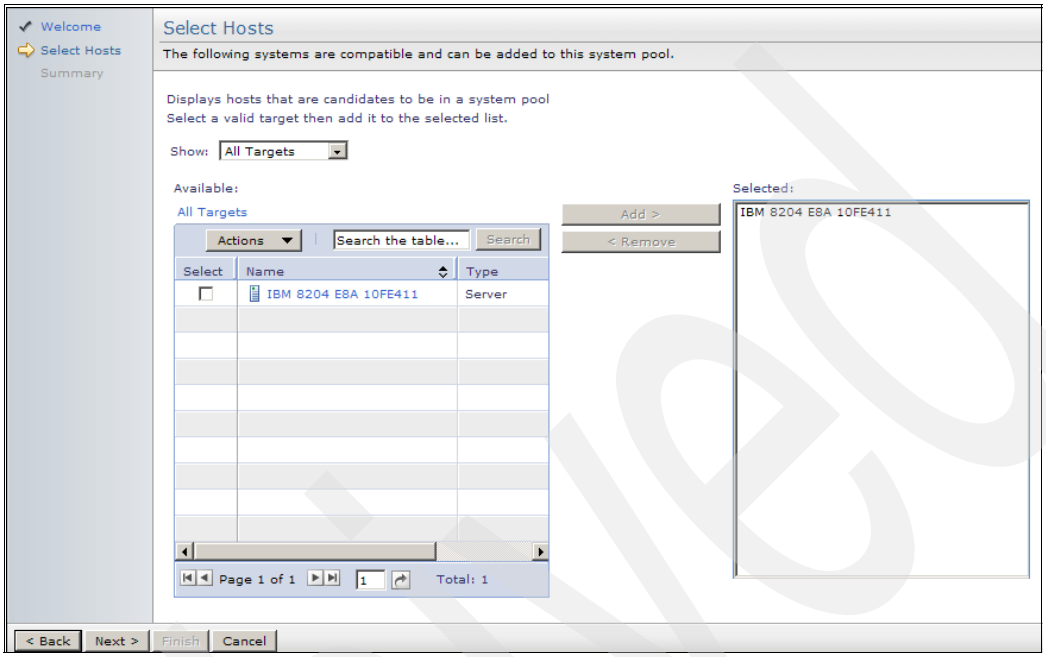

Figure 4-103 Adding hosts wizard - select hosts to add to a system pool

3. In the summary section, click **Finish** to add the host to the system pool, as Figure 4-104.

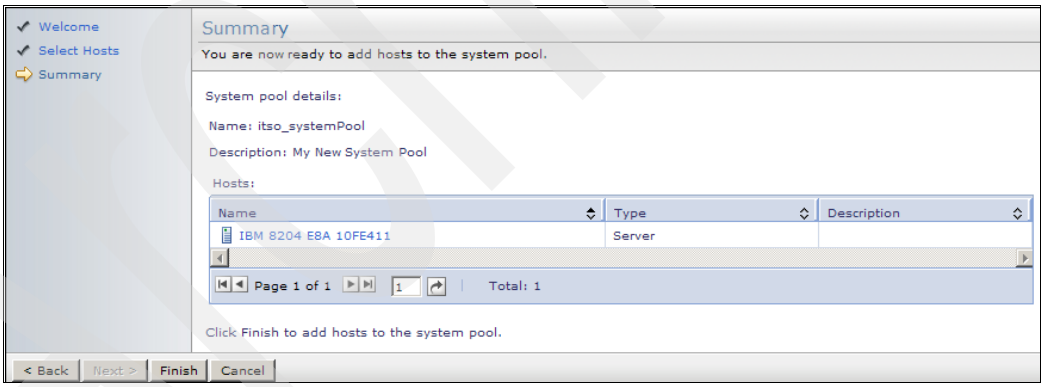

Figure 4-104 Adding Hosts wizard summary pane

Removing hosts from a system pool

When a host is removed from a system pool, the system pool can relocate any virtual servers that are associated with the host and managed by the system pool. The system pool determines where the virtual servers must be relocated within the system pool and displays a placement plan. A host can also be removed without doing any kind of relocations.

To remove a host from the system pool click **Inventory** → **Views** → **System Pools and Members**, and select the host you want to remove from the system pool. Figure 4-105 on page 153 shows the system pool and members view.

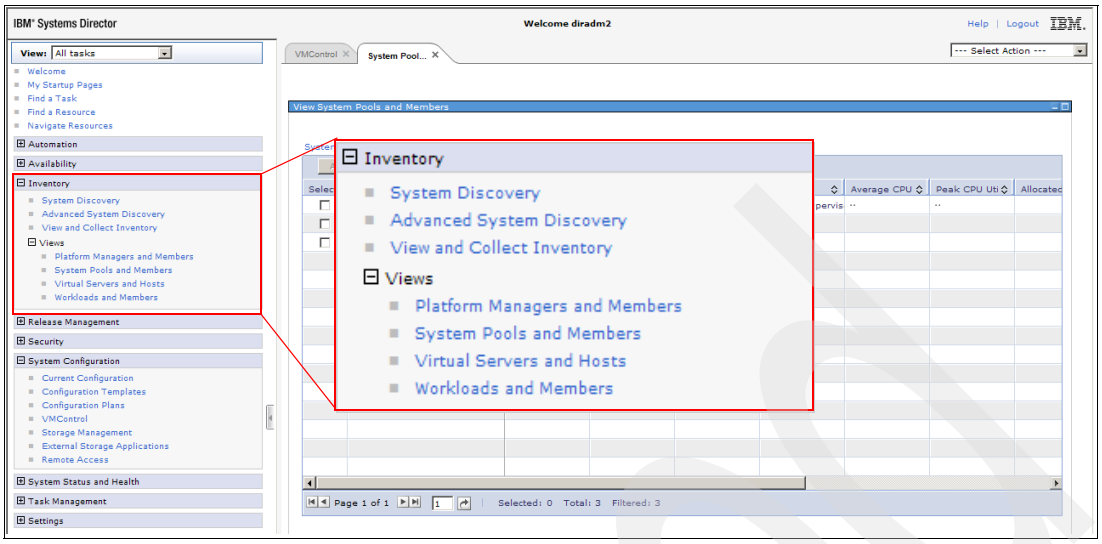

Figure 4-105 System pools and members view

After selecting the host to be removed from the system pool, click **Actions**. From the menu, select **Remove from System Pool**, as seen in Figure 4-106.

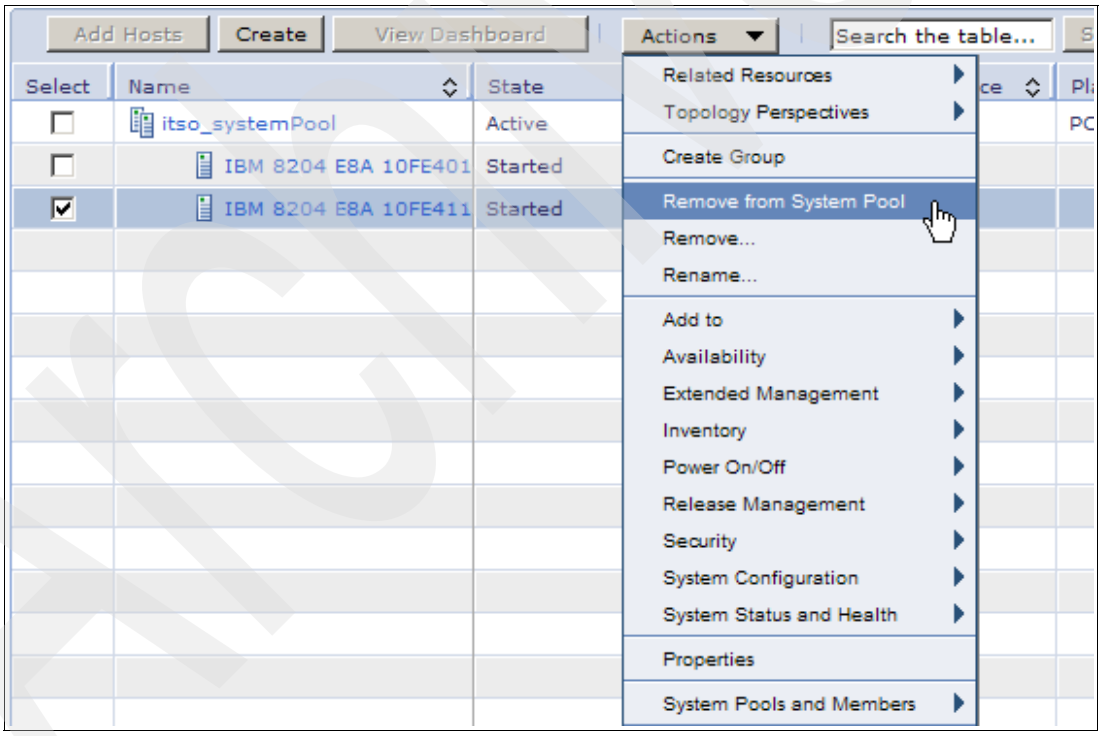

Figure 4-106 Remove from System Pool view

The remove host wizard guides you through the host removal from the system pool. During the host removal process, existing virtual servers can be chosen to be relocated to another hosts within the system pool.

Note: Only virtual servers managed and created by VMControl on the system pools can be relocated while removing a server from the system pool. However, an individual server can still be relocated using Live Partition Mobility.

Maintenance mode

Maintenance mode allows hosts in a system pool to be unavailable without activating the resilience policy or disrupting the system pool hosted service. It allows the hosts to be taken offline for service and repair tasks.

Placing hosts in maintenance mode

Hosts in maintenance mode are suspended from system pool activity and cannot be targeted with the deploy task. When a host is placed into maintenance mode, the system pool relocates any virtual servers that are associated with the host and managed by the system pool. The system pool determines where the virtual servers must be relocated within the system pool and display as placement.

To put a host in maintenance mode, click **Inventory** → **Views** → **System Pools and Members** and select the host to be place into maintenance mode.

After the host is selected, click **Actions** → **Availability** → **Enter Maintenance Mode** as shown Figure 4-107.

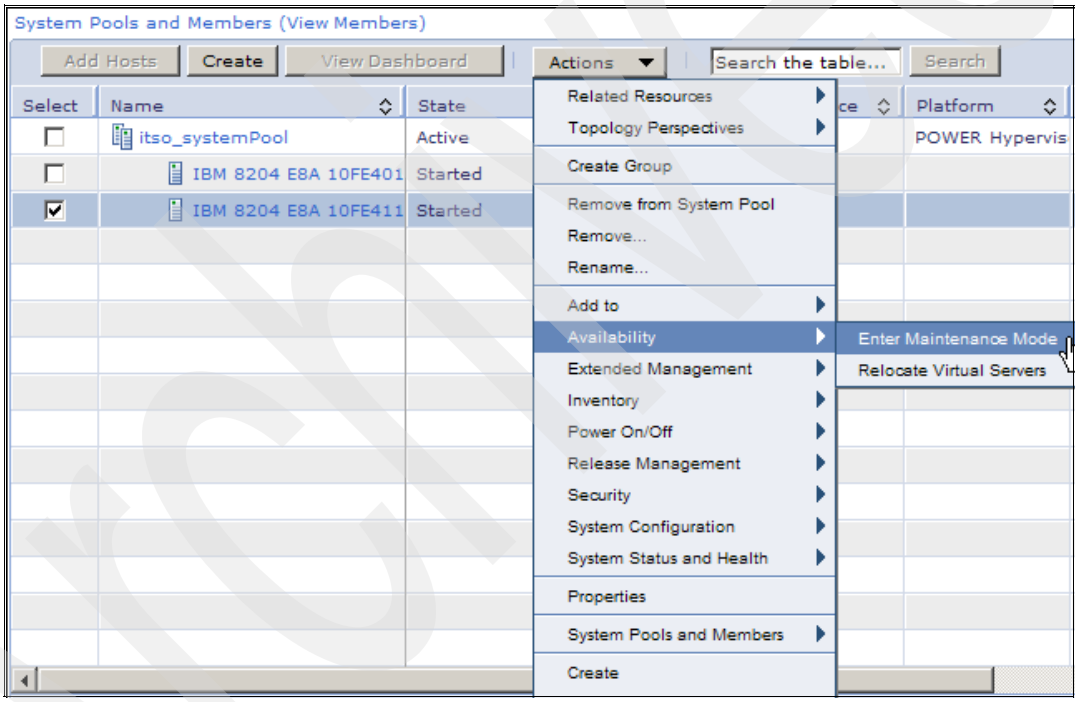

Figure 4-107 Placing a host in maintenance mode

VMControl suggests a relocation plan as well as any problems related to this activity, as seen in Figure 4-108.

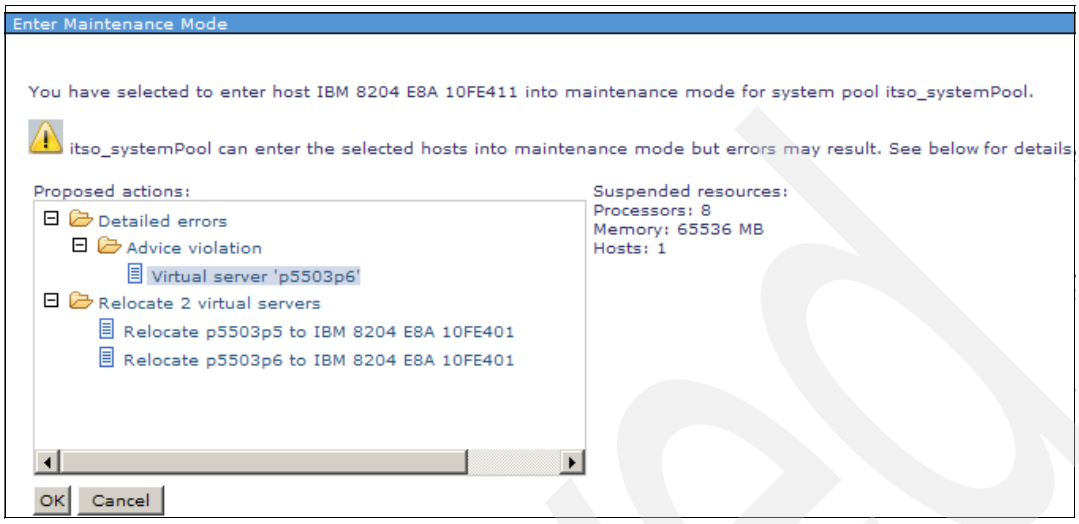

Figure 4-108 Relocation plan suggested by VMControl

After the host enters maintenance mode, its state changes from Started to In Service (see Figure 4-109.

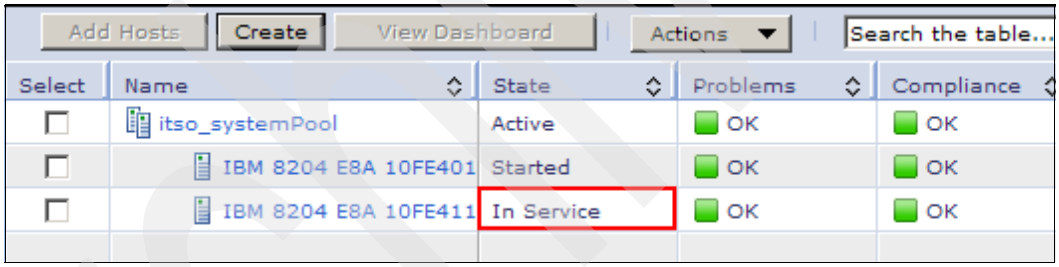

Figure 4-109 Host in maintenance mode showing In Service

Removing hosts from maintenance mode

When a host is removed from maintenance mode, the host resumes its system pool activity. For example, the hosts can again be targeted by the IBM Systems Director VMControl for tasks such as deploy.

To take a host out of maintenance mode, click **Inventory** → **Views** → **System Pools and Members** and select the host to be removed from maintenance mode.

After the host is selected, click **Actions** → **Availability** → **Exit Maintenance Mode**, as shown in Figure 4-110, to take the server out of maintenance mode.

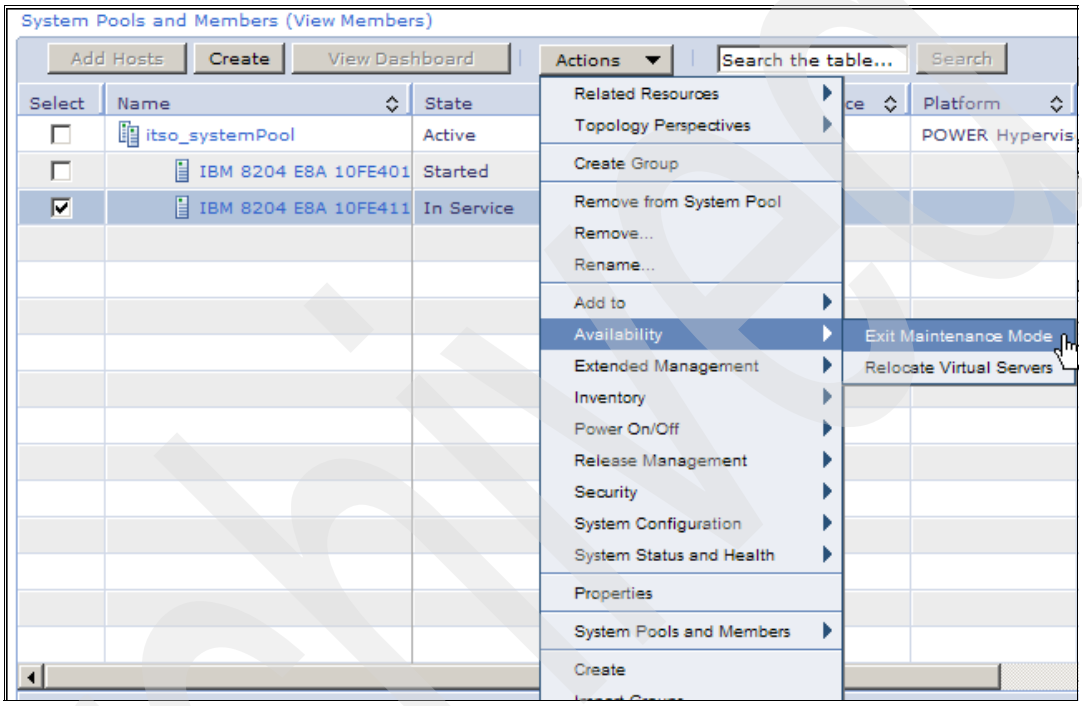

Figure 4-110 Removing a server from maintenance mode

As message window (Figure 4-111) displays, asking for confirmation to remove the host from maintenance mode.

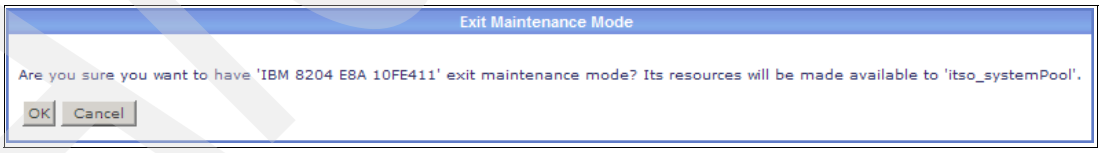

Figure 4-111 Confirmation to remove host from maintenance mode

Note: It might take several minutes for the system to show its status changed from In Service to Started in the system pools and Members view.

Permanently deleting a system pool

If a system pool is no longer needed, it can be deleted permanently from VMControl. If this task is executed, the system pool cannot be rediscovered by IBM Systems Director. Instead, it must be recreated.

A system pool can be deleted without affecting the virtual appliances and workloads that are running in it. However, any resilience settings on the workloads are removed when the system pool is deleted.

To delete a system pool permanently, complete the following steps:

1. Go to the Systems Pools view and select the system pool to be removed. Click **Action**, and select **Permanently Delete**, as shown in Figure 4-112.

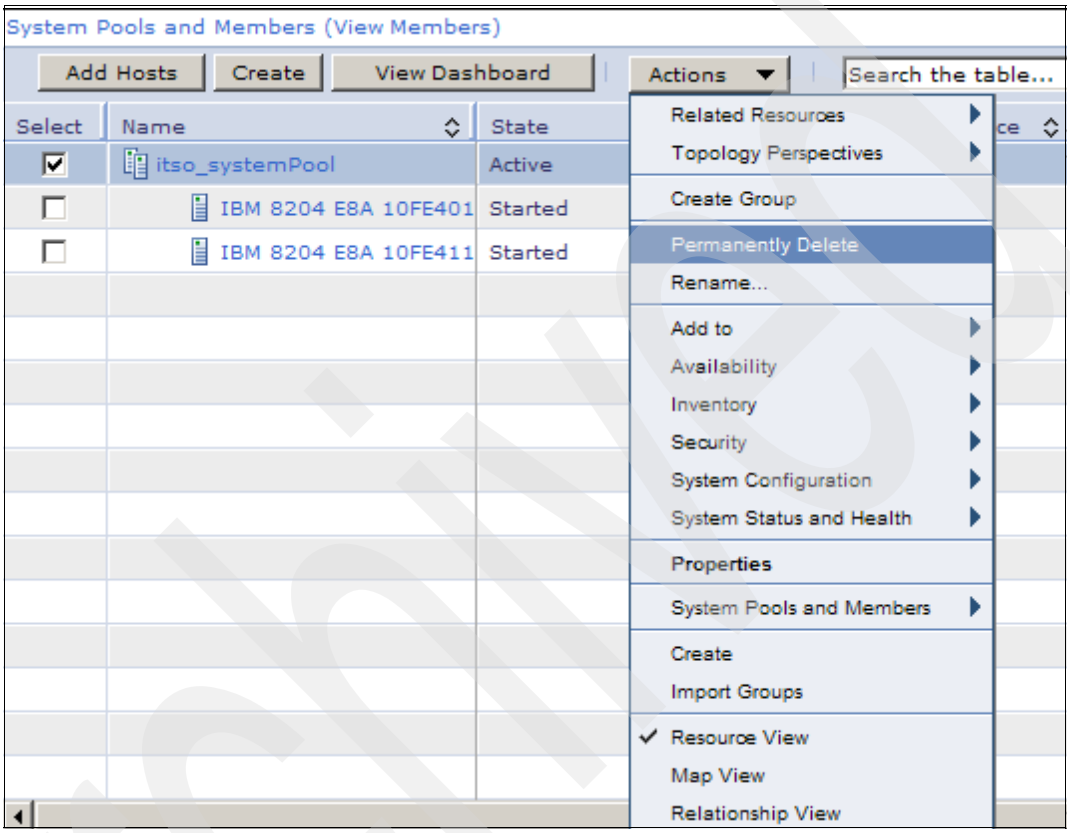

Figure 4-112 Permanently deleting a system pool

4.6.3 Deploying a virtual appliance into a System Pool

To deploy a virtual appliance into a system pool, the process is the same that is used to deploy a virtual appliance into a single virtual server. The main difference is that VMControl system pools chooses where the managed virtual appliance will be deployed.

To deploy a virtual appliance to a system pool follow these steps:

1. Go to the **VMControl** → **Basics** → **Deploy Virtual Appliance** menu, as seen in Figure 4-113.

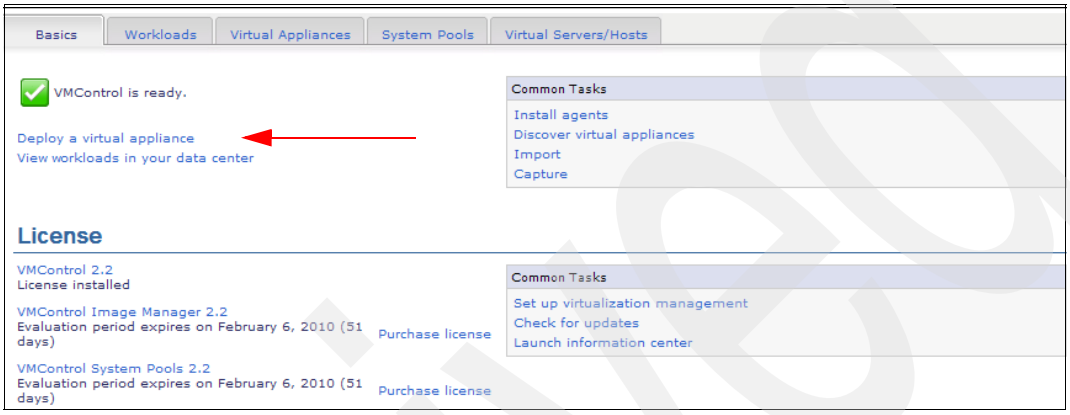

Figure 4-113 VMControl basics tab - deploying a virtual appliance menu

2. The deploy wizard starts and displays a set of instructions to proceed, as shown in Figure 4-114. Click **Next**.

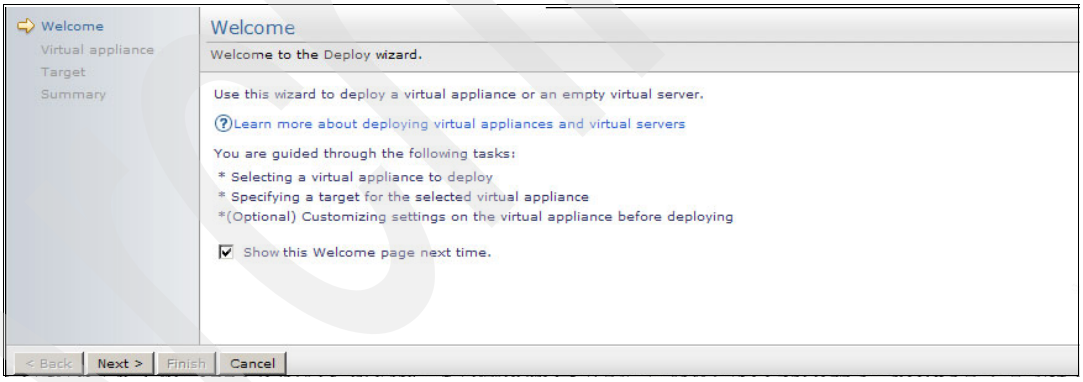

Figure 4-114 Virtual appliance deploy wizard menu

3. Select the virtual appliance to be deployed into the system pool, as in Figure 4-115. Click **Next**.

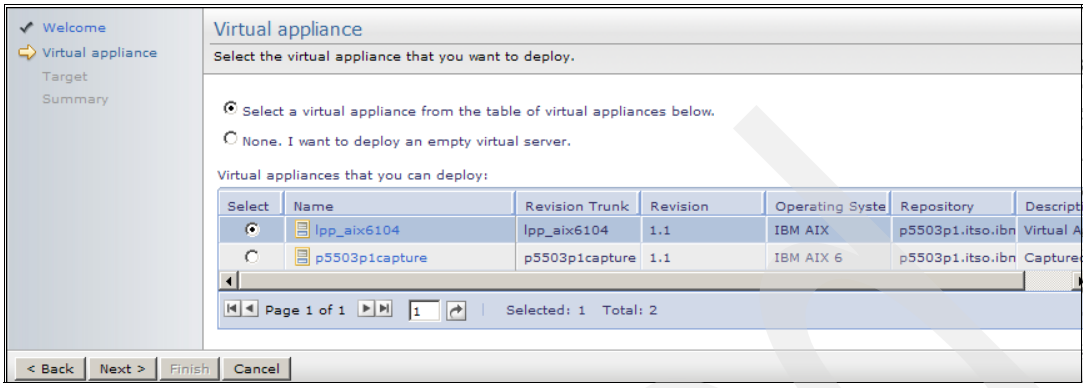

Figure 4-115 Virtual appliance deploy wizard - select a virtual appliance

4. Select the system pool on which the virtual appliance will be deployed. See Figure 4-116.

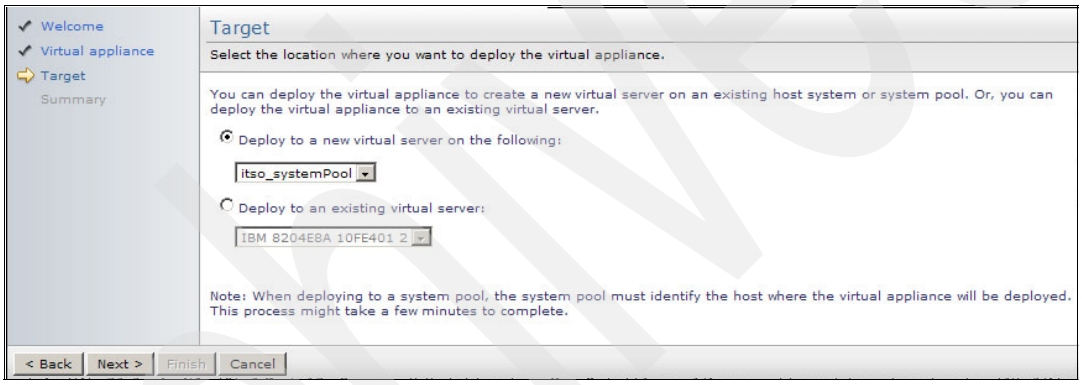

Figure 4-116 Virtual appliance deploy wizard - select the target system pool

The deploy wizard requests whether the resilience for this virtual appliance must be in place. Activating resilience automatically enables the policy-based relocation for the virtual appliance as shown Figure 4-117.

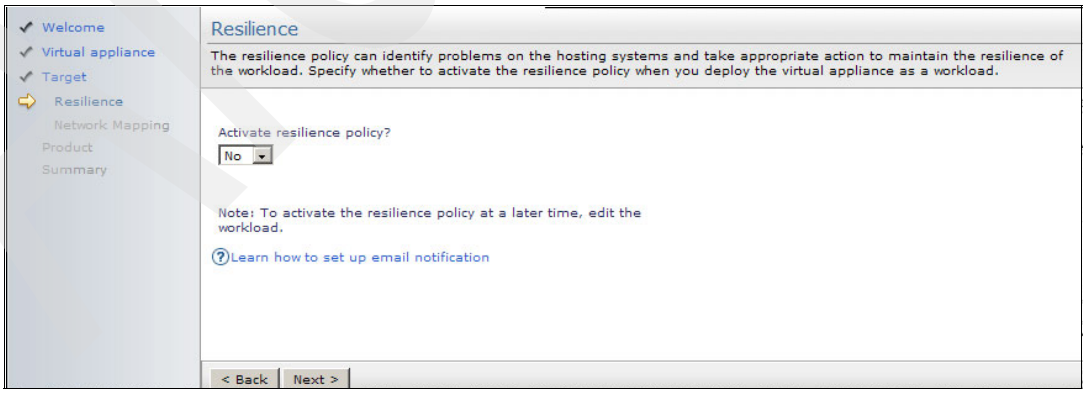

Figure 4-117 Virtual appliance deploy wizard - activate resilience menu

5. Select the network adapters that are to be included in this virtual appliance, as in Figure 4-118.

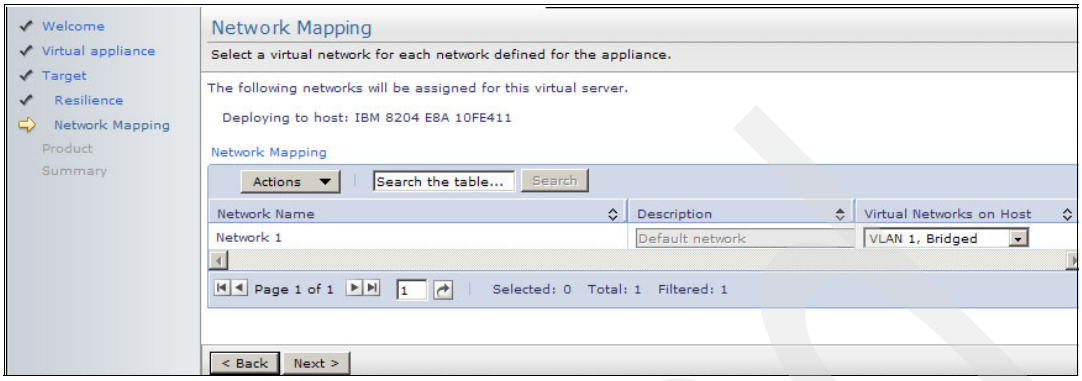

Figure 4-118 Virtual appliance deploy wizard - network selection menu

6. Complete the network configuration. See Figure 4-119.

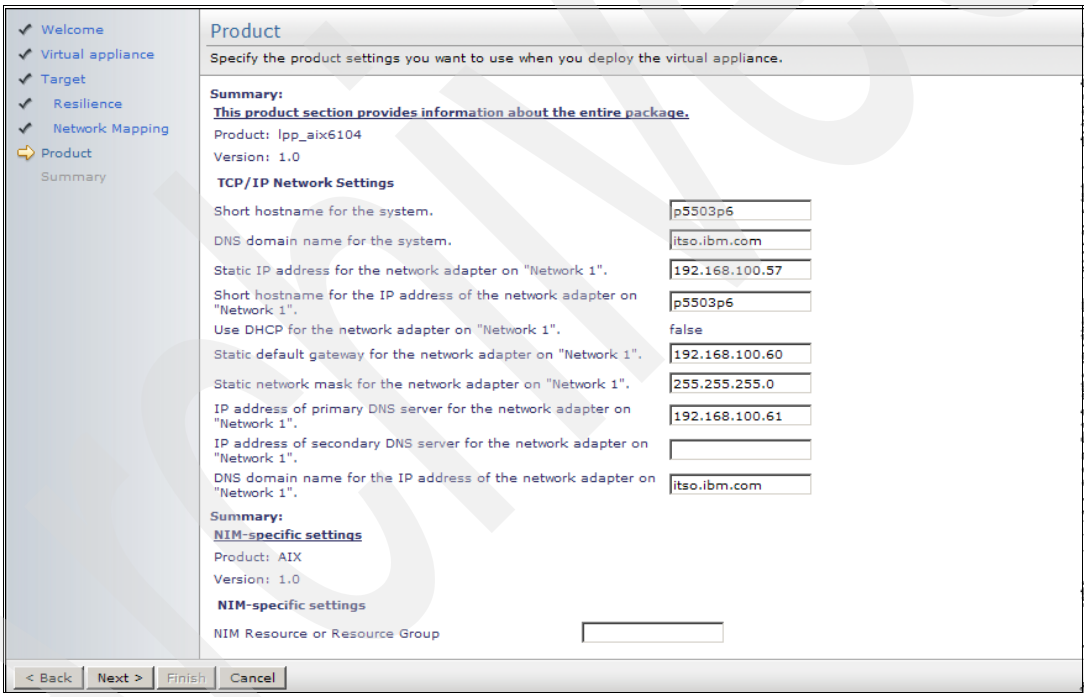

Figure 4-119 Virtual appliance deploy wizard - network configuration menu

The last step displays a summary of what has been entered and what is going to be executed.

7. Review and confirm all the information and click **Finish** to start deploying the new virtual appliance, as shown in Figure 4-120.

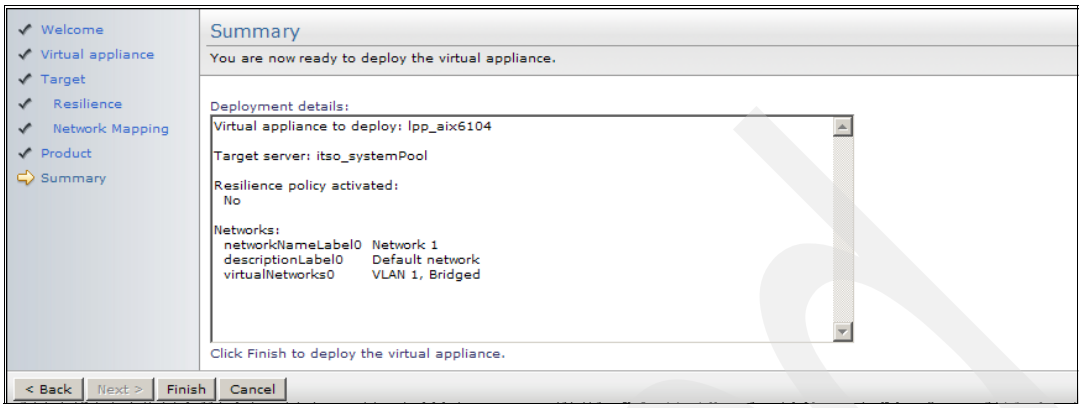

Figure 4-120 Virtual appliance deploy wizard - summary view

4.7 Relocation

Depending on the virtualization environment and on the plug-ins installed, IBM Systems Director provides either static or live relocation. With static relocation, if the virtual server is powered on, the relocation operation powers off the virtual server at the beginning of the relocation process and powers the virtual server on when the relocation is completed. With live relocation, if the virtual server is powered on, the relocation occurs without powering the server off.

Note: To use live relocation in a Power Systems environment, make sure that the Live Partition Mobility feature is enabled on all hosts within the system pool. Live Partition Mobility is a feature of the IBM PowerVM Enterprise Edition.

With VMControl, there are three options for relocation:

- Manually relocate virtual servers at any time.
- Activate a resilience policy on the workload to relocate virtual servers automatically to prevent predicted hardware failures from affecting the availability of the workload.
- Create an automation plan to relocate the virtual servers when certain events occur.

4.7.1 Manual relocation

Manual relocation enables the capability of moving servers between hosts within a system pool.

Note: When relocating a server within a system pool, the target host is automatically chosen by VMControl.

To relocate a single virtual server manually, click **Inventory** → **Views** → **Virtual Servers and Hosts** and select the host to be relocated. Click **Action Button** → **Availability** → **Relocate**, as shown in Figure 4-121, and VMControl automatically relocates the server.

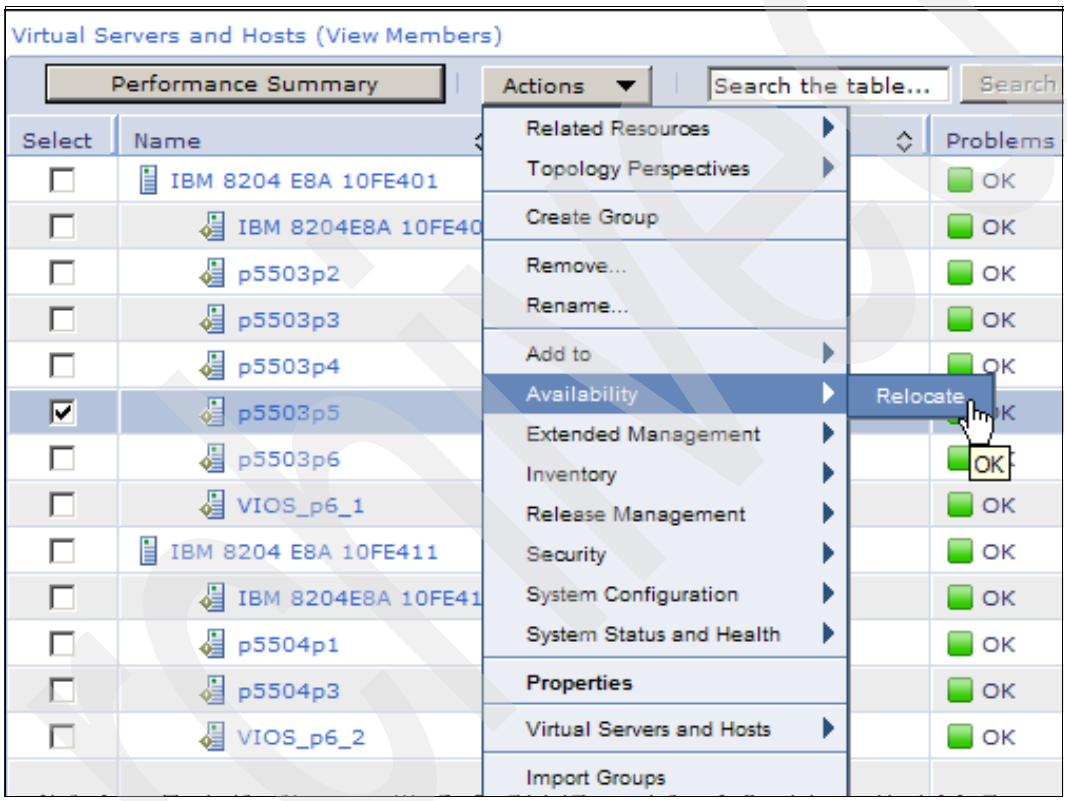

Figure 4-121 Manual relocation activity pane

A window containing the proposed action plan appears for confirmation, as shown in Figure 4-122.

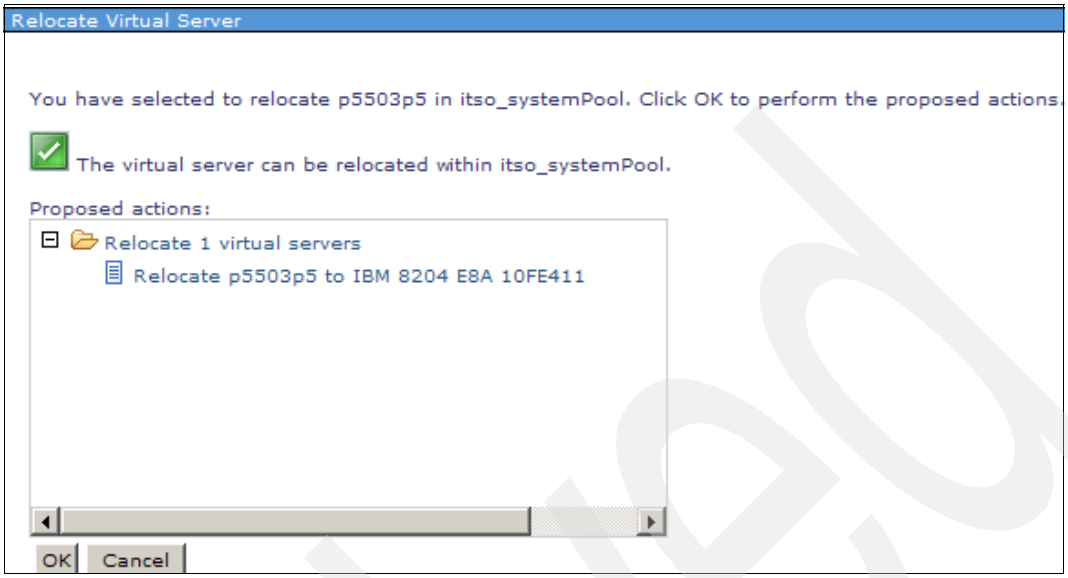

Figure 4-122 Confirmation message

Click **OK** for VMControl to start the relocation process.

4.7.2 Policy-based relocation

When the resiliency policy is enabled on a workload, VMControl can detect hardware problems related to processors, memory subsystems, power source, or storage and relocate virtual servers to another host in the system pool.

If the policy is in Advise mode, which is the default, all actions performed by the resilience policy must be approved by the administrator, including relocations, before they are performed. The notification of policy-based actions for the system pool are shown through the problem status view. The proposed actions can be approved, deleted, or ignored.

VMControl can perform proposed policy-based actions without approval. This setting can be changed on the workload settings.

There are no additional steps required to set up or activate the resilience policy. With VMControl, the resiliency policy can be initiated using either the following methods:

- Activate the resilience policy for a workload when you deploy a virtual appliance to a system pool.
- Activate the resilience policy for a workload when you edit a workload.

4.7.3 Automatic relocation

VMControl systems pools can predict hardware failure problems and relocate virtual servers to maintain resilience. However, one might want to monitor and adjust resources within the system pool. For example, hosts in a system pool can be monitored for CPU consumption by activating high and low values for threshold monitoring. Then, if this threshold is crossed, a message is displayed in the system pools dashboard, and in the problems view.

An automation plan can also be created to relocate the server automatically in case the thresholds are crossed. For instance, a threshold for CPU use is activated, and if crossed, VMControl relocates the virtual server to another host within the system pool that has adequate resources.

The following paragraphs provide an example of how to set up an environment to relocate virtual servers automatically. This example can used as a guide to activating thresholds and creating a customized automation plan for relocation. For more detailed information, see the IBM System Director information center documentation:

http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp?topic=/director_6.1/fqm0_main.html

To create an automation plan for relocating virtual servers (the event action) when specified thresholds are exceeded (the event), follow these steps:

1. In the IBM Systems Director navigation panel, expand **Automation** and click **Event Automation Plans**.
2. On the event automation plans page, click **Create**, as shown in Figure 4-123.

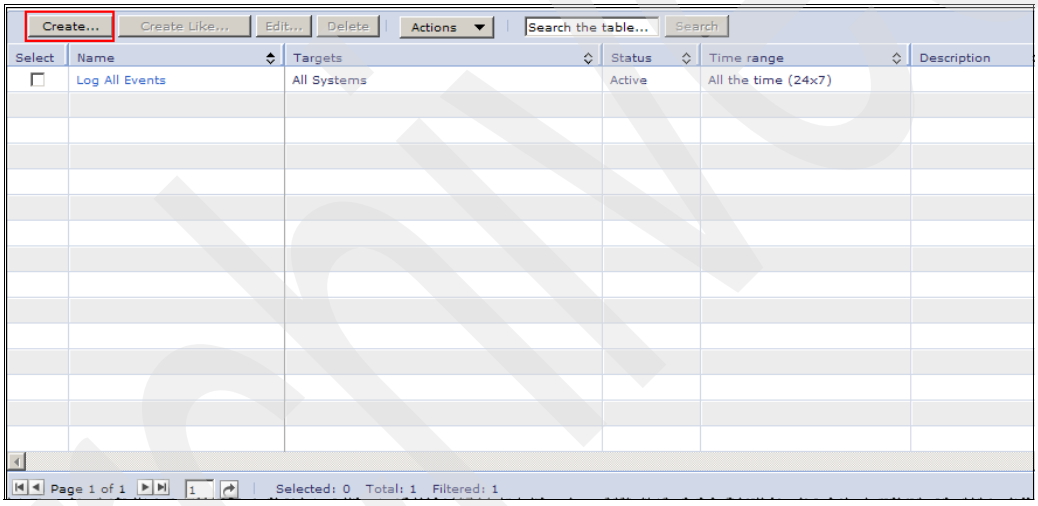

Figure 4-123 Event Automation page

3. In the Event Automation Plan wizard, the Welcome page is displayed. Click **Next**.

4. On the “Name and description” page, type a descriptive name for the event automation plan that is being created, as shown in Figure 4-124.

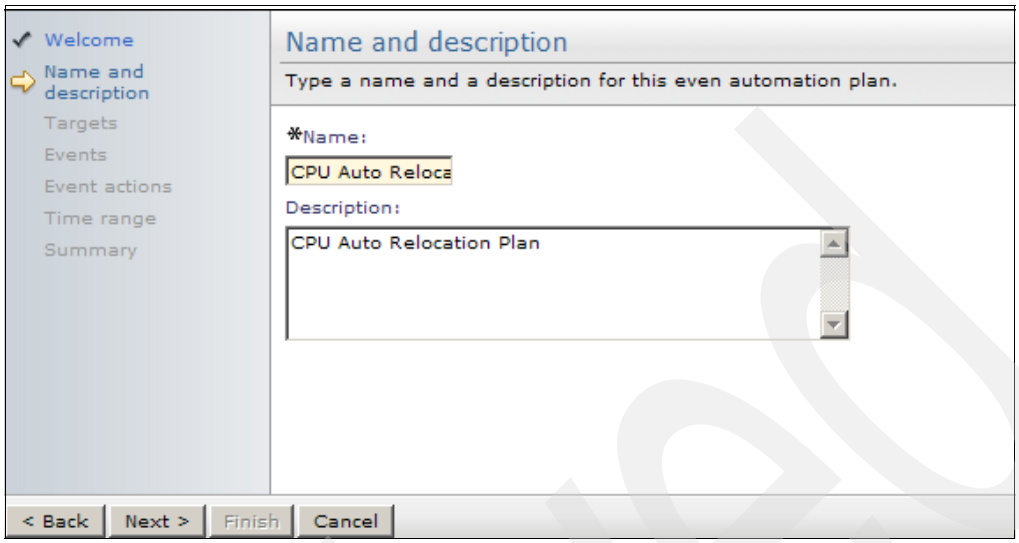

Figure 4-124 Automation plan name and description

5. On the “Targets” page, select one or more hosts that are members of the system pool. The hosts are the systems that the event automation plan monitors for specific generated events. Select the systems in the Available list and click **Add** to move them to the Selected list, as shown in Figure 4-125.

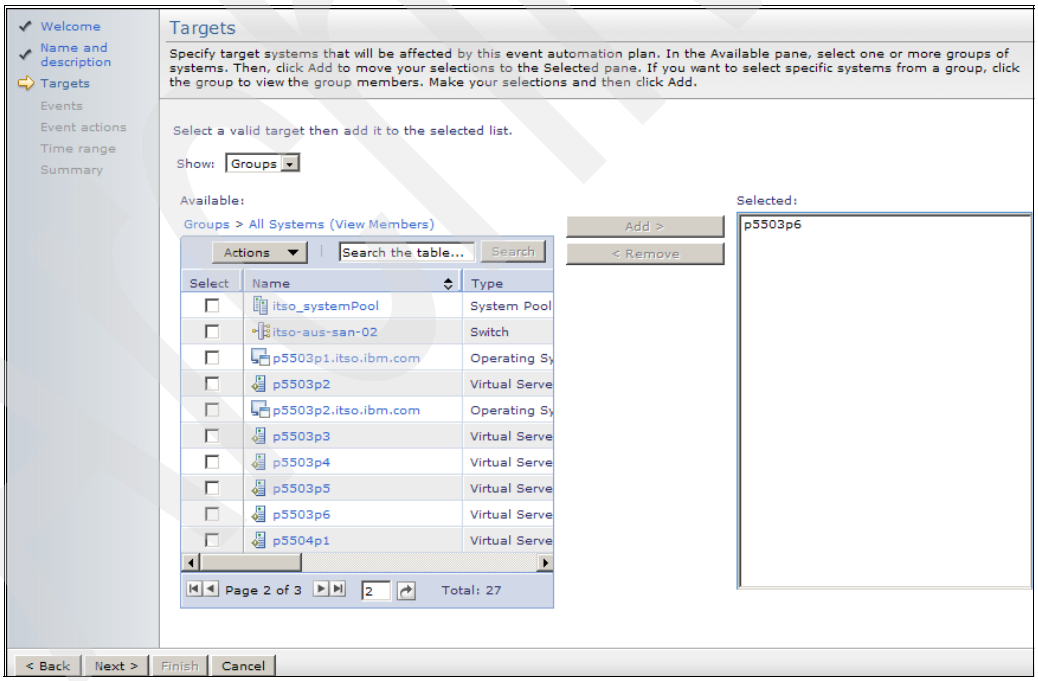

Figure 4-125 Select systems to be part of the automation plan

6. On the events page, click **Common** from the Events list.

7. In the list of event types, select **Event Severity**, and select **Fatal** and **Critical** from the list of severity levels. These selections ensure that predicted hardware failures that are fatal or critical trigger the automation plan. Optionally, thresholds can be selected and the set associated critical and warning values. When a virtual server reaches the CPU use threshold, it triggers the automation plan. See Figure 4-126.

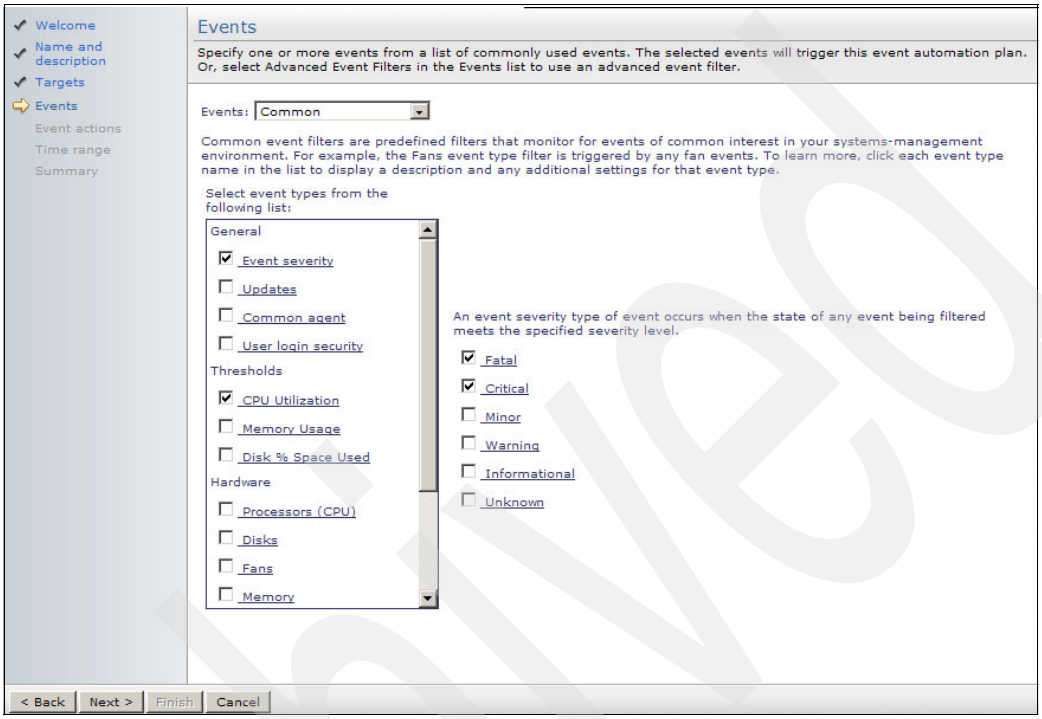

Figure 4-126 Events and severity selection pane

8. On the “Events Actions” page, click **Create**.

9. On the “Create Actions” window, select **Start a program on the management server** to create an event action and click **OK**. See Figure 4-127.

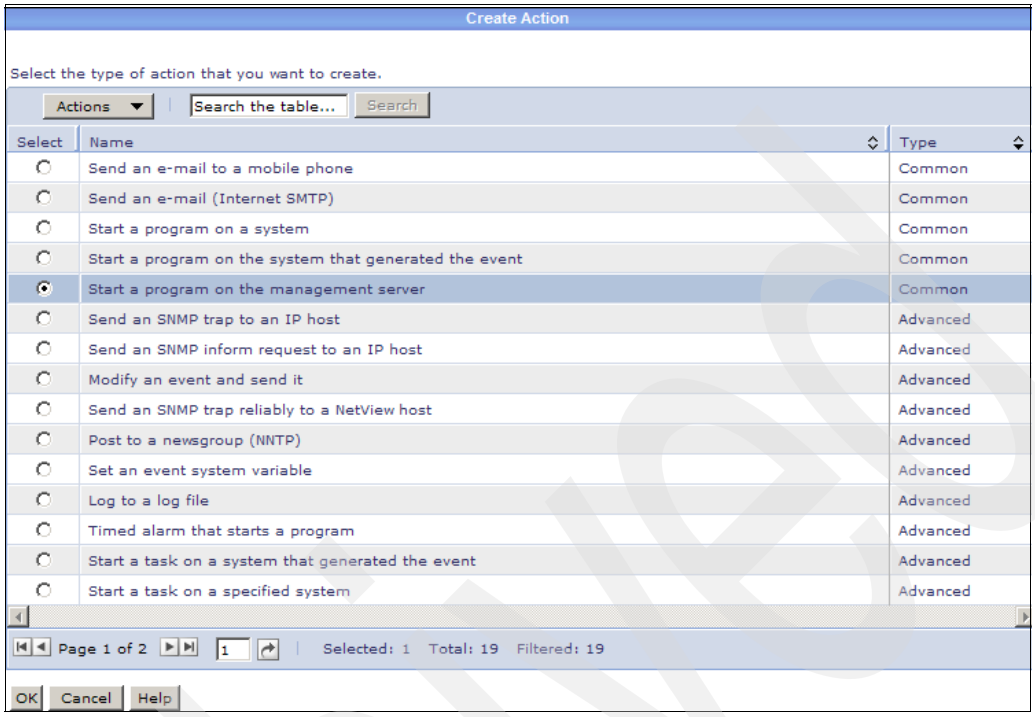

Figure 4-127 Create action for event automation

10. Fill out the form, adding a name and type the name of the directory where the **`smcli`** command is located on the management server. For example, `/opt/ibm/director/bin`.
11. Type `smcli vmrelocate -e -n &system` for the program file name field.

12. If the event action selected includes the Test button, it can be used to determine if the settings for the event are correct, as shown in Figure 4-128.

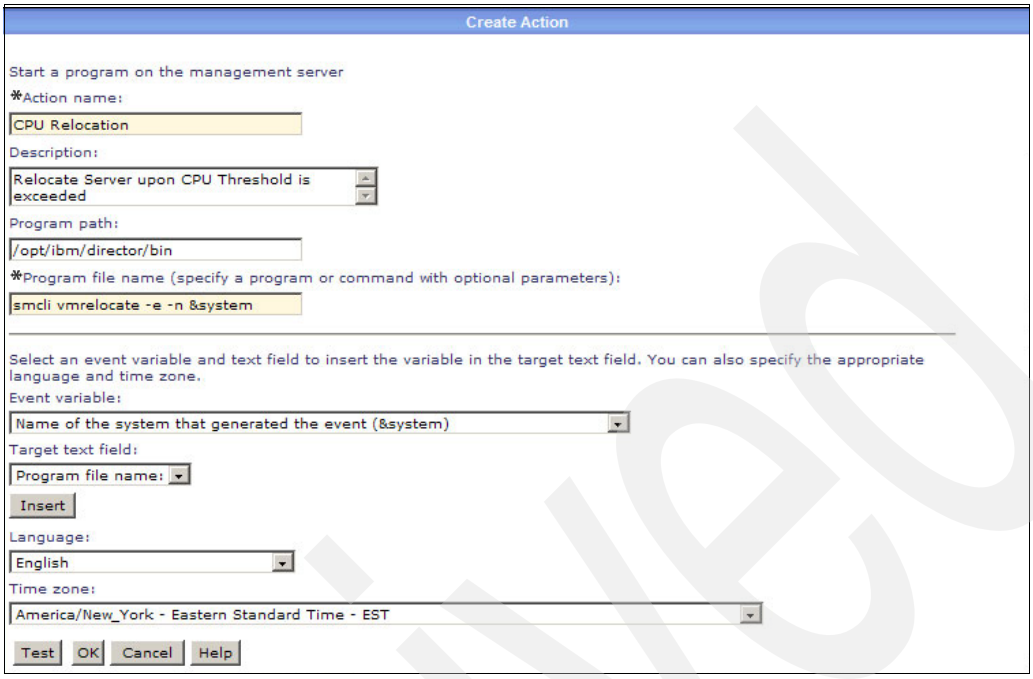

Figure 4-128 Create Action wizard pane

13. In the Create Automation Plan wizard, select the created events, and click **Next**.

The time range of the event can be customized to have it activated only during certain time of the day, or the week. See Figure 4-129.

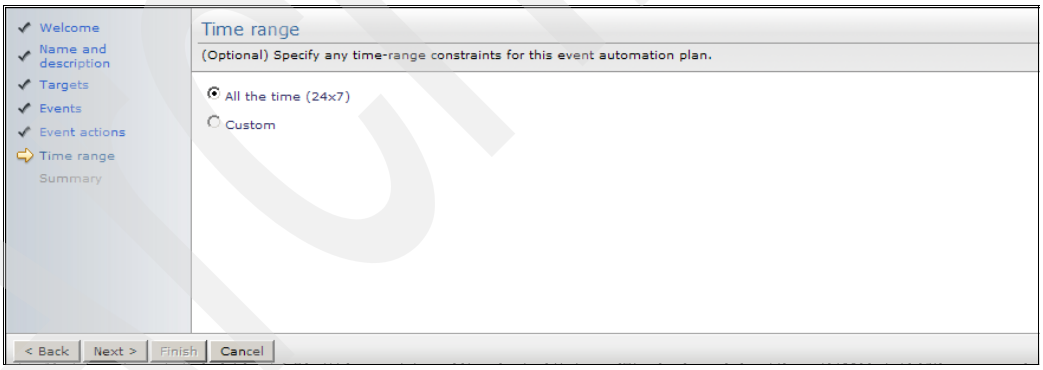

Figure 4-129 Select automation plan time range

The wizard shows a summary of the events and plans created.

14. Click **Finish** to create it. See Figure 4-130.

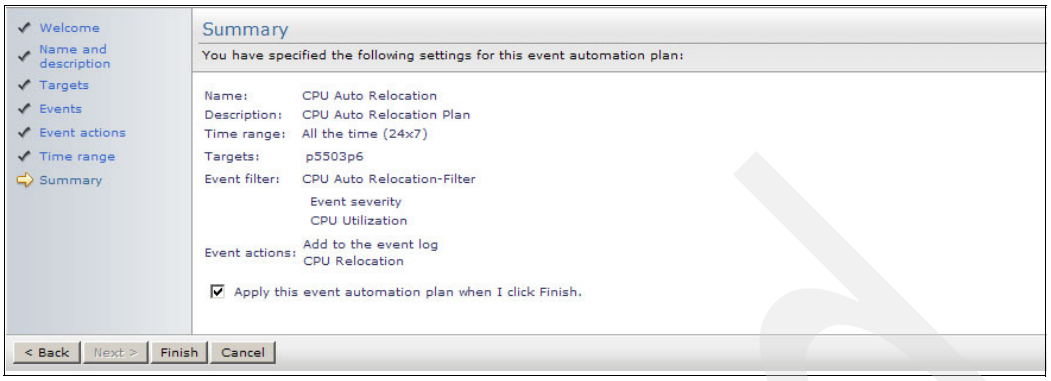

Figure 4-130 Event automation plan summary view

The automation plan is now created. And if the CPU thresholds are crossed, the selected virtual server is automatically relocated to another host within the system pool of which the virtual server is a member.

5

Tips and tricks

This chapter provides tips and tricks to challenges observed during the residency.

The following sections are presented in this chapter:

5.1 Hints and tips

These are a series of experiences learned during the residency that can be useful if there are tasks or challenges similar to the ones observed during the implementation of IBM Systems Director VMControl.

5.2 Job control: Re-running the job

If you want to re-run a completed job simply click **Run Now** in the “Active and Scheduled Jobs” window. You are not able to change the job name but the job can be executed without creating it from scratch. In Figure 5-1, we selected a single job to run, but multiple jobs can also be selected.

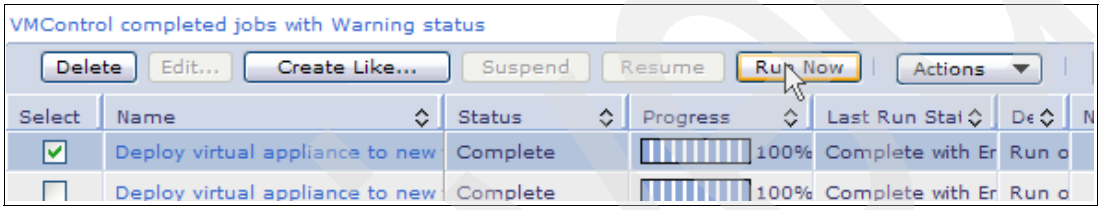

Figure 5-1 Run now button: Job view window

No confirmation window shows. The job can be selected out of the VMControl jobs pane as shown in Figure 5-2.

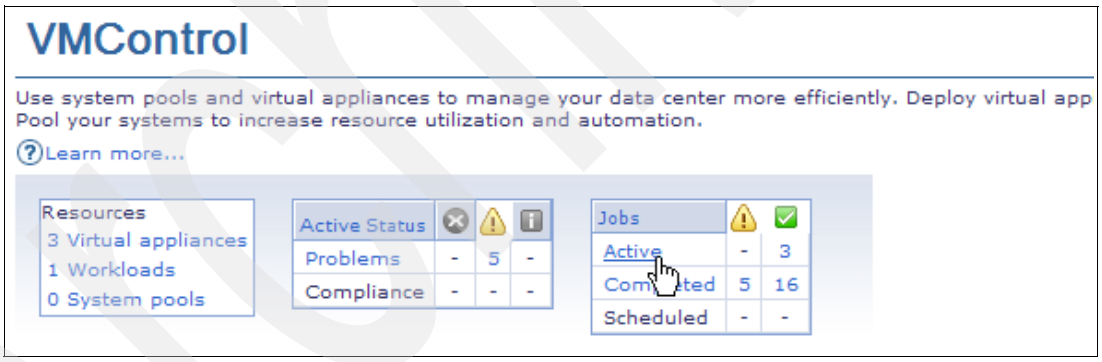

Figure 5-2 Active jobs pane window after the run now feature is executed

5.3 Set extended VMControl logging

By default, VMControl logging is not enabled in the IBM Systems Director. Table 5-1 has reference settings about extended logging for VMControl. To enable extended logging, apply configuration changes to the IBM Systems Director and NIM servers.

Table 5-1 IBM Systems Director extended logging for VMControl

Location	Directory	Filename
IBM Systems Director	/opt/ibm/director/lwi/conf	logging.properties
	Package name	
	com.ibm.director.im.level	
	com.ibm.director.vsm.power.services.virtual_server.level	
	com.ibm.usmi.client.cim.level	
	com.ibm.sysmgt.power.accesspoint.cim.level	
Reload command	/opt/ibm/director/lwi/bin/lwilog.sh -refresh	
Log directory	/opt/ibm/director/lwi/logs	
IBM NIM server	/opt/ibm/director/agent/conf/	logging.properties
	Package name	
	com.ibm.director.im.rf.nim.master.level	
Reload command	/opt/ibm/director/agent/bin/lwilog.sh -refresh	
Log directory	/opt/ibm/director/agent/logs	

In general, Java logging on the Package Level is set by using the standard stanza notation of `Package Name=LOG LEVEL` within the properties file. By definition the following log levels can be applied:

- SEVERE (highest value)
- WARNING
- INFO
- CONFIG
- FINE
- FINER
- FINEST (lowest value)

In addition there is an OFF level that can be used to turn off logging and an ALL level that can be used to enable logging of all messages.

5.4 DNZIMN867E cannot exchange SSH key

The task of deploying a virtual appliance into a new virtual server failed with the error shown in Example 5-1.

Example 5-1 Log entry for DNZIMN867E cannot exchange SSH key

```
.... (Content omitted) .....
Wed Dec 16 10:58:22 EST 2009-Level:50-MEID:0--MSG: DNZIMN105E An error occurred
starting the virtual server to prepare it for deployment.
DNZIMN867E Could not exchange SSH key with 192.168.100.253 due to the following
error:
2760-287 [dkeyexch] Internal error - exchange script returns unknown error: 1
.... (Content omitted) .....
```

Solution

The problem is caused by failing key exchange between the NIM server and the HMC. The utility **dkeyexch** is part of the dsm.core AIX fileset. You can check the associated log files in directory `/var/ibm/sysmgt/dsm/log`. To correct the problem you need to recreate the key pairs. This is done in two steps:

1. Delete the key from the host using the **dkeyexch -d** command.
2. Write the key to the host using the **dkeyexchf** command.

Example 5-2 shows the commands used to recreate the SSH keys on the NIM server p5501p1 with HMC with IP 192.168.100.253 and password file passwd_192_168_100_253.

Example 5-2 dkeyexch commands to recreate SSH keys

```
p5501p1(root)/> dkeyexch -d -f  passwd_192_168_100_253 -I hmc -H 192.168.100.253
p5501p1(root)/> dkeyexch -f  passwd_192_168_100_253 -I hmc -H 192.168.100.253
```

5.4.1 DNZIMN878E NIM command failed

Deploying a virtual appliance into a new virtual server failed with the error shown in Example 5-3.

Example 5-3 Log entry for DNZIMN878E NIM command failed

```
.... (Content omitted) .....
Thu Dec 10 17:27:26 EST 2009-Level:1-MEID:0--MSG: Job activation status changed to
"Complete with errors".
Thu Dec 10 17:27:26 EST 2009-Level:50-MEID:0--MSG: DNZIMN878E Command LANG=C; nim
-a verbose=5 -o bos_inst -a source=mksysb -a
group=nimrf-000000000000000b-res_group -a accept_licenses=yes p5502p7 did not run
properly.
Thu Dec 10 17:27:26 EST 2009-Level:200-MEID:0--MSG: Subtask activation status
changed to "Complete with errors".
.... (Content omitted) .....
```

Solution

The problem is caused by a failing NFS export operation on the NIM server. In our case, the file system `/export/nim` was manually exported. After removal of `/export/nim` from the exported file system list, the deploy operation completed without errors.

A

Network Installation Manager basic configuration

This appendix explains how to perform an initial Network Installation Manager (NIM) configuration. This quick guide is not intended to cover all NIM configuration scenarios, but shows the reader what has been configured and deployed for this IBM Redbooks publication's sample scenarios.

VMControl and Network Installation Manager (NIM)

In a Power Systems environment, VMControl uses NIM as an image repository and uses its features to deploy, capture, import, and install new virtual appliances and workloads. VMControl 2.2 makes it possible to use multiple NIM servers as image repositories. It also makes use of the new Distributed System Management (DSM) utility.

To prevent problems, VMControl ensures automatic cleanup of the NIM resources after capture and deploy operations, which includes cleaning up of the NIM standalone (machine) object.

This automatic clean up has been designed to:

- Avoid conflict when re-running a failed deployment (same IP address used for new LPAR with new MAC address).
- Avoid problems with duplicate short host names with separate domains. They only cause conflicts if deploying them simultaneously.

Note: Resource cleanup can be disabled on the IBM Systems Director. To disable it, go to `/opt/ibm/director/agent/conf/overrides` in the NIM server, and create or edit the `nim.properties` file. The current options to disable the resource cleanup are:

- `com.ibm.director.im.rf.nim.master.skipDeleteStandaloneAfterDeploy`
- `com.ibm.director.im.rf.nim.master.skipResourceCleanup`

Their default values are set to false, which means that the resource will be cleaned up after a deployment.

Simultaneous operations between VMControl and NIM can be performed. Deployment, captures, imports, and delete operations do not interfere with each other. However, certain operations wait for the required resources while other operations will just fail if the required resources are in use.

Basic NIM configuration example

The following section provides a basic NIM configuration example.

NIM server setup

The following are the system requirements for the NIM server setup.

System requirements

Before starting the NIM server configuration, ensure that the following requirements are met:

- The system is running AIX version 6.1.3 (6.1 TL3) or later.
- The following file sets are installed:
  - `bos.sysmgt.nim.master`
  - `bos.sysmgt.nim.spot`

Note: To check for these filesets on the NIM server, run the **`lslpp -l | grep nim`** command.

- The system has been discovered, accessed, and inventoried by the IBM Systems Director server.

Setting up the NIM server

There are multiple ways of setting up a NIM server, for example:

The **smitty nimconfig** fastpath can be used to set up the NIM server, as shown in Example A-1.

Example A-1 SMIT panel to configure an AIX machine as the NIM server

```
Configure Network Installation Management Master Fileset

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

                                                      [Entry Fields]
* Network Name                                       [nimnet]
* Primary Network Install Interface                  [en0] +

  Allow Machines to Register Themselves as Clients?  [yes]                +
  Alternate Port Numbers for Network Communications
       (reserved values will be used if left blank)
    Client Registration                               []                    #
    Client Communications                             []                    #

F1=Help             F2=Refresh          F3=Cancel           F4=List
F5=Reset            F6=Command          F7=Edit             F8=Image
F9=Shell            F10=Exit            Enter=Do
```

The command **nimconfig** can be used as shown in Example A-2.

Example A-2 Using the command nimconfig to configure an AIX machine as the NIM server

```
# nimconfig -a netname=nimnet -a pif_name=en0 -a cable_type=tp \
> -a platform=chrp -a netboot_kernel=64 -a client_reg=yes
```

Additional NIM networks need to be added if clients are residing on separate logical networks. If the NIM image repository connects to the IBM Systems Director Server through one network adapter, and connects to the virtual server where you plan to deploy a virtual appliance through a separate network adapter, a new network needs to be defined. Example A-3 shows how to configure a second network adapter on the NIM server,

Example A-3 NIM command to add an additional network adapter to the NIM configuration

```
# nim -o define -t ent -a net_addr=1.2.3.4 -a snm=255.255.255.0 seconday_net
# nim -o change -a if2='secondary_net 1.2.3.4 0' -a cable_type2=tp master
```

In Example A-3, `1.2.3.4` is the IP address of the network being defined, `255.255.255.0` is the subnet mask for the network, and `secondary_net` is the NIM network object name.

Depending on the network topology, it might be necessary to define multiple NIM network objects and multiple NIM routes between the networks.

Note: For further information about the NIM network configuration, see the NIM documentation on the Information Center:

http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp?topic=/director_6.1/fqm0_main.html

Resource creation

The following steps are necessary to create the lpp resources on the NIM server.

Creating an lpp_source

An lpp_source is a NIM resource containing AIX installp images. To create a new lpp_source an AIX media is required. I can be done using an ISO/UDF file.

To create an lpp_source from the AIX DVD media start by making the CD-ROM/DVD-ROM drive available for the NIM server LPAR. In Example A-4, the AIX media has been mounted under `/mnt`. Example A-4 shows the command to build a NIM lpp_source.

Example A-4 Building an lpp_source from the command-line

```
# nim -o define -t lpp_source -a source=/mnt -a server=master \
> -a location=/export/nim/lpp_source/aix6104 -a packages=all lpp_aix6104
```

It might take a while to complete depending on your system speed. After the task is completed, mount the second AIX media and execute the command shown in Example A-5.

Example A-5 Continuing building the lpp_source from the second AIX media

```
# nim -o update -a source=/mnt -a packages=all lpp_aix6104
```

It is also recommended that a **`lppmgr`** and a check operations be performed after the lpp_source is built, as shown in Example A-6.

Example A-6 Performing lpp_source checking

```
# nim -o lppmgr lpp_aix6104
# nim -o check lpp_aix6104
```

Creating a SPOT

A Shared Product Object Tree (SPOT) is a fundamental resource in the NIM environment. A SPOT resource is required to install or initialize machine configurations.

A SPOT provides a `/usr` file system for diskless and dataless clients as well as the network boot support for all clients. It is created through a installp process using a install source that can be either the install CD/DVD or an existing lpp_source.

Example A-7 shows how to create a SPOT from a lpp_source.

Example A-7 Creation of a SPOT object

```
# nim -o define -t spot -a server=master \
> -a location=/export/nim/spot -a source=lpp_aix6104
```

Note: You only need to specify the top directory for the SPOT creation; the **`nim`** command creates a directory with the name as the SPOT object name.

Troubleshooting hints and tips

The following sections contain helpful NIM deployment troubleshooting hints and tips.

Trace logging features

To enable trace logging for the NIM server agent, the following steps need to be taken:

1. Add the following line to `/opt/ibm/director/agent/conf/overrides/logging.properties`:

   `com.ibm.director.im.rf.nim.master.level=FINER (or FINEST for even more detail)`

2. Run the command **`/opt/ibm/director/agent/bin/lwilog.sh -refresh`**.

The trace logs for the NIM server agent are stored under the `/opt/ibm/director/agent/logs/trace-log-*.xml` directory.

Network boot logs can also be checked for further troubleshooting. They are stored in the director agent under `/tmp/lpar_netbook.exec.<pid>.log`. Upon a failed deploy operation, the logs are also compressed into `/opt/ibm/director/agent/logs/dmsLogs*.zip`.

Common errors and causes

A deploy operation can hang or fail due to a bos_inst (Base Operating System Install) error. The common causes might be the following:

- AIX is back level on the NIM server. It must be AIX 6.1 TL3 or higher.
- Problems with the lpar_netboot. Check `/tmp/lpar_netboot.<pid>.log` on the NIM server for error details.
- A firewall between the LPAR and the NIM server. Change the firewall settings to enable the LPAR to get through the firewall.
- If using multiple network adapters on the NIM server, the NIM install networking must be set up with the secondary network settings.

  A NIM network object (ent) must be configured for the secondary network adapter, and it must be added to the master object as `if2`. Also, static routing might need to be set up in the NIM network objects between the LPAR's subnet and the NIM server's subnet. See the VMControl Information Center troubleshooting section for details at:

  `http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp?topic=/director_6.1/fqm0_main.html`

Check to validate the NIM server can be reached by using the PING test between the LPAR and NIM server:

- Check the lpar_netboot logs to see if the BOOTP succeeded.
- Check if PING test works by bringing up a serial console on the LPAR to deploy. Review the SMS menus to perform a PING test.
- If the LPAR does not exist yet, create one manually and try the PING test from it.

B

Unattended installations

This appendix describes the steps required for running unattended installations of the IBM Systems Director Server and the IBM Systems Director VMControl plug-in.

Unattended installation of the IBM Systems Director Server

To install the IBM Systems Director Server v6.1.2, you can either use the IBM Systems Director for AIX v6.1.2 DVD or the installation package that can be downloaded from the IBM Systems Director downloads Web site:

http://www.ibm.com/systems/management/director/downloads

The IBM Systems Director V6.1.2 installation package file is provided so you can install IBM Systems Director 6.1.0 and immediately update the server to version 6.1.2, including the latest version of the Common Agent. The same installation package can be used for updating existing 6.1.0 or 6.1.1. server to 6.1.2, which also updates the Common Agent to the latest version if a previous version was already installed.

Note: IBM Systems Director 6.1.2 installation package simplifies the installation and update processes, and verifies disk space availability so that the installation does not run out of space. For more information, see the README file in the 6.1.2 installation package archive.

To verify that the system is ready for the installation of the IBM Systems Director Server, review the information provided in 3.2, “Preparing the IBM Systems Director Server installation” on page 21.

To install IBM Systems Director Server using the 6.1.2 installation package file in silent mode, log in to the management server system as the root user and perform the following steps:

1. Download the installation package from the IBM Systems Director download Web site and extract the contents to a local directory, as shown in Example B-1.

Example B-1 Extract the contents of the 6.1.2 installation package file

```
root@p5502p2 /kits > ls
SysDir6_1_2_Server_Inst_Upd_AIX.tar.gz
root@p5502p2 /kits>
root@p5502p2 /kits> mkdir SysDir_6_1_2_Server_AIX
root@p5502p2 /kits> cd SysDir_6_1_2_Server_AIX
root@p5502p2 /kits/SysDir_6_1_2_Server_AIX>
root@p5502p2 /kits/SysDir_6_1_2_Server_AIX> gzip -dc
../SysDir6_1_2_Server_Inst_Upd_AIX.tar.gz | tar -xf -
root@p5502p2 /kits/SysDir_6_1_2_Server_AIX>
root@p5502p2 /kits/SysDir_6_1_2_Server_AIX> ls
612-installer-readme_aix.txt   AIX61/      license/     server/
AIX53/                         bin/        plugins/     update/
root@p5502p2 /kits/SysDir_6_1_2_Server_AIX>
```

2. Before starting the installation using silent mode you can customize the installation options by providing all the options in a response file. IBM Systems Director 6.1.2 installation image provides a response file that you can use as a starting point. The response file name is dirserv.rsp and can be found on <SysDir_image>/server, as shown in Example B-2.

Example B-2 Make a copy of the response file before customizing it

```
root@p5502p2 /kits/SysDir_6_1_2_Server_AIX> cd bin
root@p5502p2 /kits/SysDir_6_1_2_Server_AIX/bin>
root@p5502p2 /kits/SysDir_6_1_2_Server_AIX/bin> cp ../server/dirserv.rsp .
root@p5502p2 /kits/SysDir_6_1_2_Server_AIX/bin>
```

Table B-1 lists the options that are included in the response file with the values that are used by default when installing IBM Systems Director.

Table B-1 IBM Systems Director Server silent installation options

Option name	Option value	Description
LogFile	/var/log/dirinst.log	Full path of installation log file
PortNumber	8421	Web interface port number
SecurePortNumber	8422	Web interface secure port number
TPMHostname	localhost	TPM host name
TPMIPAddress	127.0.0.1	TPM IP address
EnableNonStop	0	Enable or disable the non stop service
AgentPort	9510	Agent listener port
AgentNonStopPort1	9514	Nonstop services port 1
AgentNonStopPort2	9515	Nonstop services port 2

I you need to change the value for some of the installation options, you can create a copy of the response file, add the needed changes, and provide this file to the installation script using **-f** flag. After installation, keep the response file for future use and reference.

3. To install the IBM Systems Director Server in silent mode, use the flags shown in Table B-2, which must be provided in the installation script.

Table B-2 Silent mode installation script flags

Flag name	Flag description
-a	Resource Manager ID
-p	Agent registration password
-r	Resource Manager password
-U	Administrator's user name
-P	Administrator's password

4. For a fresh installation of the IBM Systems Director Server, the installation script allows you to both install the product and update it at the same time as shown in Example B-3.

Example B-3 Use installds script provided to start the IBM Systems Director Server installation

```
root@p55O2p2 /kits/SysDir_6_1_2_Server_AIX/bin> ls
aix/          dirserv.rsp*  installds*
root@p55O2p2 /kits/SysDir_6_1_2_Server_AIX/bin>
root@p55O2p2 /kits/SysDir_6_1_2_Server_AIX/bin>
root@p55O2p2 /kits/SysDir_6_1_2_Server_AIX/bin> ./installds -i -u -s -U root -P
itsoadmin -f ./dirserv.rsp -a resmgr -p regp -r resmgrpass
Now checking the space needed for the director server installation...    [done]
/kits/SysDir_6_1_2_Server_AIX/server
+-------------------------------------------------------------------------------+
                    Pre-installation Verification...
+-------------------------------------------------------------------------------+
Verifying selections...done
Verifying requisites...done
```

```
Results...

WARNINGS
--------
  Problems described in this section are not likely to be the source of any
  immediate or serious failures, but further actions may be necessary or
  desired.

  Already Installed
  -----------------
  The number of selected filesets that are either already installed
  or effectively installed through superseding filesets is 8.  See
  the summaries at the end of this installation for details.

  NOTE:  Base level filesets may be reinstalled using the "Force"
  option (-F flag), or they may be removed, using the deinstall or
  "Remove Software Products" facility (-u flag), and then reinstalled.

  << End of Warning Section >>

SUCCESSES
---------
  Filesets listed in this section passed pre-installation verification
  and will be installed.

  Selected Filesets
  -----------------
  DirectorCommonAgent 6.1.2.0               # All required files of Direct...
  cas.agent 1.4.1.3                         # Common Agent Services Agent

  << End of Success Section >>

+-----------------------------------------------------------------------------+
                    BUILDDATE Verification ...
+-----------------------------------------------------------------------------+
Verifying build dates...done
FILESET STATISTICS
------------------
   10  Selected to be installed, of which:
        2  Passed pre-installation verification
        8  Already installed (directly or via superseding filesets)
  ----
    2  Total to be installed

+-----------------------------------------------------------------------------+
                         Installing Software...
+-----------------------------------------------------------------------------+

installp:  APPLYING software for:
        cas.agent 1.4.1.3

Stopping The LWI Nonstop Profile...
Waiting for The LWI Nonstop Profile to exit...
Waiting for The LWI Nonstop Profile to exit...
Waiting for The LWI Nonstop Profile to exit...
```

```
Stopped The LWI Nonstop Profile.

... (content omitted) ...

Finished processing all filesets.  (Total time:  9 mins 56 secs).

+-----------------------------------------------------------------------------+
                             Summaries:
+-----------------------------------------------------------------------------+

Pre-installation Failure/Warning Summary
----------------------------------------
Name                       Level           Pre-installation Failure/Warning
-------------------------------------------------------------------------------
sysmgt.cim.providers.osba 1.2.8.0         Already installed
sysmgt.cim.providers.smas 1.2.8.0         Already installed
sysmgt.cim.providers.metr 1.2.8.0         Already installed
sysmgt.cim.smisproviders. 1.2.1.0         Already installed
sysmgt.cim.smisproviders. 1.2.1.0         Already installed
sysmgt.cim.smisproviders. 1.2.1.0         Already installed
sysmgt.cimserver.pegasus. 2.9.0.0         Already installed
DirectorPlatformAgent     6.1.2.0         Already installed


Installation Summary
--------------------
Name                        Level           Part        Event       Result
-------------------------------------------------------------------------------
cas.agent                   1.4.1.3         USR         APPLY       SUCCESS
cas.agent                   1.4.1.3         ROOT        APPLY       SUCCESS
DirectorCommonAgent         6.1.2.0         USR         APPLY       SUCCESS
DirectorCommonAgent         6.1.2.0         ROOT        APPLY       SUCCESS
Attempting to install DirectorServer
+-----------------------------------------------------------------------------+
                    Pre-installation Verification...
+-----------------------------------------------------------------------------+
Verifying selections...done
Verifying requisites...done
Results...

SUCCESSES
---------
  Filesets listed in this section passed pre-installation verification
  and will be installed.

  Selected Filesets
  -----------------
  DirectorServer 6.1.0.0                    # All required files of Direct...

  << End of Success Section >>

... (content omitted) ...

ATKUPD760I Start processing update "com.ibm.tivoli.cas.agent.feature_1.4.1.1" and
system "p550202".
```

```
......ATKUPD764I Update "com.ibm.tivoli.cas.agent.feature_1.4.1.1" is installed on
system "p55O2p2".
ATKUPD741I Update Installation service: "Feature Installation" finished
successfully.
.........................................ATKUPD747W Provider "Feature
Installation" was unable to restart local resource "IBM Systems Director". Restart
must be performed manually to complete the install operation.
ATKUPD7O3I Update Installation service: Request completed.
ATKUPD727I The update install task has finished successfully.
.Waiting for post-install inventory and compliance to complete...
.....................................................................................
.........................
Post-install compliance is complete.
Deleting group: All Needed IBM Systems Director 6.1 Updates
It is now safe to restart the management server.
In post validation...
Now cleaning all temporary filesets and filesystems created during the
installation...
Shutting down IBM Director...
Stopping The LWI Nonstop Profile...
Waiting for The LWI Nonstop Profile to exit...
Waiting for The LWI Nonstop Profile to exit...
Waiting for The LWI Nonstop Profile to exit...
Stopped The LWI Nonstop Profile.
Removing file systems that can not be removed while director server is running...
Starting The LWI Nonstop Profile...
The LWI Nonstop Profile succesfully started. Please refer to logs to check the LWI
status.
Local resource "IBM Systems Director" restarted.
Starting IBM Director...
The starting process may take a while. Please use smstatus to check if the server
is active.
                                                                        [done]
root@p55O2p2 /kits/SysDir_6_1_2_Server_AIX/bin>
```

Verification steps

At the end of the update phase of the installation you might get the following messages:

```
ATKUPD741I Update Installation service: "Feature Installation" finished
successfully.
ATKUPD727I The update installation task has finished successfully.
```

These messages are listed in the standard output and also stored in the `/tmp/dirupdater.log` file. This indicates that the update to 6.1.2 was successful.

If you get the following message:

```
ATKUPD747W Provider "Feature Installation" was unable to restart local resource
"IBM Systems Director". Restart must be performed manually to complete the install
operation.
```

This indicates that the agent that is running locally on the server cannot automatically restart. In this case, you need to restart the agent manually using the following commands (see Example B-4):

```
/opt/ibm/director/agent/runtime/agent/bin/endpoint.sh stop
/opt/ibm/director/agent/runtime/agent/bin/endpoint.sh start
```

Example B-4 Manual restart of the Common Agent

```
root@p5502p2 /> /opt/ibm/director/agent/runtime/agent/bin/endpoint.sh stop
Stopping The LWI Nonstop Profile...
Waiting for The LWI Nonstop Profile to exit...
Waiting for The LWI Nonstop Profile to exit...
Stopped The LWI Nonstop Profile.
root@p5502p2 /> /opt/ibm/director/agent/runtime/agent/bin/endpoint.sh start
Starting The LWI Nonstop Profile...
The LWI Nonstop Profile succesfully started. Please refer to logs to check the LWI
status.
root@p5502p2 />
root@p5502p2 /> /opt/ibm/director/agent/runtime/agent/bin/endpoint.sh status
Running.
root@p5502p2 />
```

Unattended installation of IBM Systems Director VMControl

To verify that the system is ready for the installation of the IBM Systems Director VMControl plug-in, review the information provided in the hardware and software requirements section of IBM Systems Director VMControl available on Chapter 3.

To install VMControl 2.2 plug-in in the existing IBM Systems Director Server 6.1.2.1 installation, the following steps must be performed:

1. Download the IBM Systems Director VMControl installation program from IBM Systems Director Downloads Web site accessible at the following address:

   http://www.ibm.com/systems/management/director/downloads/plugins

2. The download package for AIX is `SysDir_VMContron_2_2_AIX.tar.gz`.
3. Extract the contents of the downloaded package file, as shown in Example B-5.

Example B-5 Extract the VMControl installation package into a local directory on the server

```
root@p5502p2 /kits/vmc22> ls
SysDir_VMControl_2_2_AIX.tar.gz
root@p5502p2 /kits/vmc22>
root@p5502p2 /kits/vmc22> mkdir aix ; cd aix
root@p5502p2 /kits/vmc22/aix>
root@p5502p2 /kits/vmc22/aix> gzip -dc ../SysDir_VMControl_2_2_AIX.tar.gz | tar
-xf -
root@p5502p2 /kits/vmc22/aix>
```

4. To set up and run an unattended installation of IBM Systems Director VMControl, edit the `installer.properties` file, which is used as a response file of this installation. Table B-3 shows the options to be included in the file.

Table B-3 IBM Systems Director VMControl silent installation options

Option name and value	Description
INSTALLER_UI=silent	As the installation will be performed in silent mode, no graphical environment is required.
LICENSE_ACCEPTED=true	Acceptance of the license agreement.
START_SERVER=true	IBM Systems Director Server will restarted after the installation of VMControl Manager.

5. Start the installation of VMControl plug-in in silent mode using the following command (see Example B-6):

```
./Systems_Director_VMControl_2_2_AIX.sh -i silent
```

Example B-6 IBM Systems Director VMControl installation in silent mode

```
root@p550p2 /kits/vmc22/aix> ./Systems_Director_VMControl_2_2_AIX.sh -i silent
Preparing to install...
Extracting the JRE from the installer archive...
Unpacking the JRE...
Extracting the installation resources from the installer archive...
Configuring the installer for this system's environment...

Launching installer...

Preparing SILENT Mode Installation...

===============================================================================
IBM Systems Director VMControl                  (created with InstallAnywhere)
-------------------------------------------------------------------------------


===============================================================================
Installing...
-------------

 [==================|==================|==================|==================]
 [------------------|------------------|------------------|------------------]

Installation Complete.
root@p550p2 /kits/vmc22/aix>
```

Verification steps

To verify if the installation completed successfully, check the `/opt/ibm/director/VMControlManager/installLog.txt` log file.

C

Customizable parameters file for deploying a new virtual appliance

This appendix provides an example of the fully customizable file values that are possible to set while deploying a new virtual appliance with VMControl.

Summary of properties

Example C-1 shows the properties of the values that are possible to set while deploying a new virtual appliance with VMControl.

Example C-1 smcli lscustomization -a deploy_new -V 31000 -s 28034 -v

```
root@p5502p2 /> smcli lscustomization -a deploy_new -V 31000 -s 28034 -v
Sat Dec 12 11:37:48 EST 2009  lscustomization Operation started.
cpushared
   Value:1
   Min:1
   Max:128
   Increment:1
   IncrementType:LINEAR
   Description:The desired number of dedicated or virtual processors to be
assigned to the virtual server.

cpudedicated
   Value:1
   Min:1
   Max:128
   Increment:1
   IncrementType:LINEAR
   Description:The desired number of dedicated or virtual processors to be
assigned to the virtual server.

cpumode
   Value:SHARED
   Options:SHARED,
         DEDICATED
   Description:Indicates whether the virtual server will use physical or virtual
processors (dedicated or shared mode).

memsize
   Value:1024
   Min:128
   Max:15872
   Increment:64
   IncrementType:LINEAR
   Description:The desired amount of memory (MB) to be assigned to the virtual
server.

memmax
   Value:1024
   Min:128
   Max:15872
   Increment:64
   IncrementType:LINEAR
   Description:The maximum amount of memory (MB) that can be assigned to the
virtual server.

memmin
   Value:1024
   Min:128
```

```
   Max:15872
   Increment:64
   IncrementType:LINEAR
   Description:The minimum amount of memory (MB) that can be assigned to the
virtual server.

virtualnetworks
   Min:1
   Max:1
   Changeable Columns:
      Column Name*CLI Attribute
      Virtual Networks on HosthostVnet

   Options:
   Key,Network Name,Description,Virtual Networks on Host*
   [Network 1]Network 1Default networkETHERNET0/3

   Options:ETHERNET0/3 (VLAN 3, Not Bridged),
         ETHERNET0/2 (VLAN 2, Not Bridged),
         ETHERNET0/1 (VLAN 1, Bridged)

cpushmin
   Value:1
   Min:1
   Max:40
   Increment:1
   IncrementType:LINEAR
   Description:The minimum number of dedicated or virtual processors that can be
assigned to the virtual server.

cpushminu
   Value:1.0
   Min:0.1
   Max:4.0
   Increment:0.1
   Description:The minimum number of processing units that can be assigned to the
virtual server.

cpushu
   Value:1.0
   Min:0.1
   Max:12.8
   Increment:0.1
   Description:The desired number of processing units to be assigned to the
virtual server.

cpushmax
   Value:1
   Min:1
   Max:128
   Increment:1
   IncrementType:LINEAR
   Description:The maximum number of dedicated or virtual processors that can be
assigned to the virtual server.
```

```
cpushmaxu
   Value:1.0
   Min:0.1
   Max:12.8
   Increment:0.1
   Description:The maximum number of processing units that can be assigned to the
virtual server.

cpushmode
   Value:UNCAP
   Options:UNCAP,
         CAP
   Description:The processing units sharing mode of the virtual server.

cpushpri
   Value:127
   Min:0
   Max:255
   Increment:1
   IncrementType:LINEAR
   Description:The priority of the virtual server to available processing units in
the shared processor pool.

cpudedmin
   Value:1
   Min:1
   Max:4
   Increment:1
   IncrementType:LINEAR
   Description:The minimum number of dedicated or virtual processors that can be
assigned to the virtual server.

cpudedmax
   Value:1
   Min:1
   Max:128
   Increment:1
   IncrementType:LINEAR
   Description:The maximum number of dedicated or virtual processors that can be
assigned to the virtual server.

poolstorages
   Min:1
   Max:1
   Options:
   Key,Pool,Storage Server Path,Free Space (GB),Description
   [rootvg:VIOS VIOS_p5_2]rootvgVIOS VIOS_p5_2 113.75VIOS logical volume pool.
Virtual servers using this pool cannot be relocated.
   [clientvg:VIOS VIOS_p5_2]clientvgVIOS VIOS_p5_2 327.5VIOS logical volume pool.
Virtual servers using this pool cannot be relocated.


product.AIX1.com.ibm.ovf.vim.2.nim.6.nim.Resource.1
   Value:
```

```
   Description:Specify the name of an existing NIM Resource or NIM Resource Group
to allocate during the deployment. Any defined NIM Resource Group, or Resource of
class "resources" can be specified, except: mksysb, spot, lpp_source, ovf_vm,
master
   Category:NIM-specific settings
   OVFClass:com.ibm.ovf.vim.2.nim.6
product.AIX1.com.ibm.ovf.vim.2.system.hostname
   Value:
   Description:Short hostname for the system.
   Category:TCP/IP Network Settings
   OVFClass:com.ibm.ovf.vim.2
product.AIX1.com.ibm.ovf.vim.2.system.domainname
   Value:
   Description:DNS domain name for the system.
   Category:TCP/IP Network Settings
   OVFClass:com.ibm.ovf.vim.2
product.AIX1.com.ibm.ovf.vim.2.networkport.6.ip
   Value:
   Description:Static IP address for the network adapter on "Network 1".
   Category:TCP/IP Network Settings
   OVFClass:com.ibm.ovf.vim.2
product.AIX1.com.ibm.ovf.vim.2.networkport.6.hostname
   Value:
   Description:Short hostname for the IP address of the network adapter on
"Network 1".
   Category:TCP/IP Network Settings
   OVFClass:com.ibm.ovf.vim.2
product.AIX1.com.ibm.ovf.vim.2.networkport.6.gateway
   Value:
   Description:Static default gateway for the network adapter on "Network 1".
   Category:TCP/IP Network Settings
   OVFClass:com.ibm.ovf.vim.2
product.AIX1.com.ibm.ovf.vim.2.networkport.6.netmask
   Value:
   Description:Static network mask for the network adapter on "Network 1".
   Category:TCP/IP Network Settings
   OVFClass:com.ibm.ovf.vim.2
product.AIX1.com.ibm.ovf.vim.2.networkport.6.dns1.ip
   Value:
   Description:IP address of primary DNS server for the network adapter on
"Network 1".
   Category:TCP/IP Network Settings
   OVFClass:com.ibm.ovf.vim.2
product.AIX1.com.ibm.ovf.vim.2.networkport.6.dns2.ip
   Value:
   Description:IP address of secondary DNS server for the network adapter on
"Network 1".
   Category:TCP/IP Network Settings
   OVFClass:com.ibm.ovf.vim.2
product.AIX1.com.ibm.ovf.vim.2.networkport.6.domainname
   Value:
   Description:DNS domain name for the IP address of the network adapter on
"Network 1".
   Category:TCP/IP Network Settings
   OVFClass:com.ibm.ovf.vim.2
```

```
totaldiskspaceforvirtualserver
   Value:Total required disk space for virtual server: 9,537 MB.
   Description:null

Sat Dec 12 11:37:52 EST 2009  lscustomization Operation took 4 seconds.
```

D

Open Virtualization Format (OVF) support

In this appendix, we describe the OVF support and its benefits when working with virtualized environments.

Introduction to Open Virtualization Format

A software virtual appliance is one or more virtual machines that collectively provide a specific function for your business, through the services of a virtualization platform. As the amount of virtual servers and separate business environments grow, system administrators are faced with nonstandard methods of distributing and deploying the virtual appliances through their business. The Open Virtualization Format (OVF) standard tackles this problem by standardizing the description and format of virtual image appliances.

The Open Virtualization Format specification from the Distributed Management Task Force, Inc. (DMTF) differs from other standards such as Common Information Model (CIM) in that OVF uniquely addresses the challenges of packaging and distribution of virtual machines in support of deployment, whereas standards such as CIM manage virtual machines after deployment.

Because there are so many disparate points of view in the virtualization world, a proposal was made that there be a way to standardize virtual machine delivery in a hypervisor agnostic fashion. In 2008, the Distributed Management Task Force (DMTF) drafted the OVF Specification V1.0.0. The DMTF is a collective effort by Dell, HP, IBM, Microsoft, VMware and XenSource.

IBM Systems Director VMControl can import virtual appliance packages that use the Distributed Management Task Force (DMTF) Open Virtualization Format (OVF), which is a platform independent and open packaging and distribution format for virtual appliances.

What is Open Virtualization Format (OVF)

The Open Virtualization Format (OVF) is a virtual machine standard that provides a flexible, secure, portable and efficient way to package and distribute virtual machines. The OVF file is an XML file that describes a virtual machine and its configuration.

The following are key features and benefits of OVF:

Enables optimized distribution

OVF enables the portability and distribution of virtual appliances. In addition to support for compression for more efficient package transfers, OVF supports industry standard content verification and integrity checking, and provides a basic scheme for the management of software licensing.

Provides a simple, automated user experience

OVF offers a robust and user-friendly approach to streamline the installation process. During installation, metadata in the OVF file can be used by a customer's management infrastructure to validate the entire package and determine whether each virtual machine must be installed. Compatibility with the local virtual hardware is also verified.

Supports both single and multi virtual machine configurations

Virtual appliance solutions stacks might consist of one or many virtual appliances. With OVF, Software Developers can configure complex multi-tiered services consisting of multiple interdependent virtual appliances.

Enables portable VM packaging

OVF is virtualization platform-independent, while also enabling platform-specific enhancements to be captured. It supports the full range of virtual hard disk formats used for virtual machines today, and is extensible to deal with future formats. Virtual machine properties are captured concisely and accurately.

Affords vendor and platform independence

OVF does not rely on the use of a specific host platform, virtualization platform, or guest operating system.

Supports localization

OVF supports user visible descriptions in multiple locales, and supports localization of the interactive processes during installation of an appliance. This allows a single packaged appliance to serve multiple market opportunities.

Offers future extensibility

OVF is extensible. It is designed to be extended as the industry moves forward with virtual appliance technology.

OVF package requirements

An OVF package is a representation of a virtual server that contains a configured, tested operating system and middleware and software applications, along with the metadata that describes the virtual server.

The OVF package can be in one of the following formats:

- A set of files (called set-of-file format).
- Single tar file containing the same set of files, typically with a .ova extension.

Using virtual appliances extends the standard way of cloning a system. At present, the most common way of cloning is using an AIX system backup. Inside the AIX system backup, the operating system (OS) specific parameter are located as follows:

- Show bosdata
- Assigned console
- Locale settings
- target_disk_data

In an virtualized environment, the system is not only described by its OS specific parameters. There is information required during deployment, for example:

- Virtual CPU assignment
- Memory allocation
- Assigned network adapter

All this information is kept as metadata inside the OVF XML file.

Sample OVF file used in the scenario chapter

Example D-1 shows the ovf file we used in the scenario section (Export Virtual Appliance).

Example D-1 OVF File

```
<?xml version="1.0" encoding="UTF-8"?>
<ovf:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:ovf="http://schemas.dmtf.org/ovf/envelope/1"
xmlns="http://schemas.dmtf.org/ovf/envelope/1"
xmlns:rasd="http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_ResourceAllocati
onSettingData" xmlns:vim="http://www.ibm.com/xmlns/ovf/extension/vim/2"
xmlns:vimphyp="http://www.ibm.com/xmlns/ovf/extension/vim/2/phyp/3"
xmlns:vimphyprasd="http://www.ibm.com/xmlns/ovf/extension/vim/2/phyp/3/rasd"
xmlns:vimrasd="http://www.ibm.com/xmlns/ovf/extension/vim/2/rasd"
xmlns:vssd="http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_VirtualSystemSet
tingData" xsi:schemaLocation="http://www.ibm.com/xmlns/ovf/extension/vim/2
ibm-vim2_2.1.0.xsd http://schemas.dmtf.org/ovf/envelope/1 dsp8023_1.0.0.xsd
http://www.ibm.com/xmlns/ovf/extension/vim/2/phyp/3/rasd
ibm-vim2-phyp3-rasd_2.1.0.xsd http://www.ibm.com/xmlns/ovf/extension/vim/2/rasd
ibm-vim2-rasd_2.1.0.xsd" xml:lang="en-US">
  <ovf:References>
    <ovf:File ovf:href="aix61def.mksysb" ovf:id="vimRef1" ovf:size="1948569600"/>
  </ovf:References>
  <ovf:DiskSection>
    <ovf:Info>Disk Section</ovf:Info>
    <ovf:Disk ovf:capacity="10000000000" ovf:capacityAllocationUnits="byte"
ovf:diskId="vimRef1disk" ovf:fileRef="vimRef1"
ovf:format="http://www.ibm.com/xmlns/ovf/diskformat/power.aix.mksysb"
ovf:populatedSize="10000000000"/>
  </ovf:DiskSection>
  <ovf:NetworkSection>
    <ovf:Info>Network Section</ovf:Info>
    <ovf:Network ovf:name="Network 1">
      <ovf:Description>Default network</ovf:Description>
    </ovf:Network>
  </ovf:NetworkSection>
  <ovf:VirtualSystem ovf:id="AIX1">
    <ovf:Info>This section describes a virtual system to be created when deploying
the package</ovf:Info>
    <ovf:InstallSection>
      <ovf:Info>This section provides information about the first time boot of the
virtual system.
                  Its presence indicates that the virtual system needs to be
booted after deployment,
                  to run first-boot customization.</ovf:Info>
```

```
    </ovf:InstallSection>
    <ovf:VirtualHardwareSection
ovf:transport="http://www.ibm.com/xmlns/ovf/transport/filesystem/etc/ovf-transport
">
      <ovf:Info>This section describes the virtual hardware requirements on the
target virtual system</ovf:Info>
      <ovf:System>
        <vssd:ElementName>VirtualSystem</vssd:ElementName>
        <vssd:InstanceID>VirtualSystem</vssd:InstanceID>
        <vssd:VirtualSystemType>IBM:POWER:AIXLINUX</vssd:VirtualSystemType>
      </ovf:System>
      <ovf:Item>
        <rasd:AllocationUnits>percent</rasd:AllocationUnits>
        <rasd:Caption>Processor Allocation</rasd:Caption>
        <rasd:ConsumerVisibility>3</rasd:ConsumerVisibility>
        <rasd:Description>Processor Allocation</rasd:Description>
        <rasd:ElementName>Allocation of 1 virtual processors, 1.0 processing
units.</rasd:ElementName>
        <rasd:InstanceID>1</rasd:InstanceID>
        <rasd:Limit>100</rasd:Limit>
        <rasd:Reservation>100</rasd:Reservation>
        <rasd:ResourceType>3</rasd:ResourceType>
        <rasd:VirtualQuantity>1</rasd:VirtualQuantity>
        <rasd:Weight>127</rasd:Weight>
        <vimphyprasd:VirtualLimit>1</vimphyprasd:VirtualLimit>
        <vimphyprasd:VirtualReservation>1</vimphyprasd:VirtualReservation>
        <vimphyprasd:Quantity>100</vimphyprasd:Quantity>
        <vimphyprasd:ShareMode>uncap</vimphyprasd:ShareMode>
      </ovf:Item>
      <ovf:Item>
        <rasd:AllocationUnits>byte * 2^10</rasd:AllocationUnits>
        <rasd:Caption>Memory Allocation</rasd:Caption>
        <rasd:ConsumerVisibility>2</rasd:ConsumerVisibility>
        <rasd:Description>Memory Allocation</rasd:Description>
        <rasd:ElementName>Allocation of 1024 MB of dedicated
memory.</rasd:ElementName>
        <rasd:InstanceID>2</rasd:InstanceID>
        <rasd:ResourceType>4</rasd:ResourceType>
        <rasd:VirtualQuantity>1048576</rasd:VirtualQuantity>
        <vimphyprasd:VirtualLimit>1048576</vimphyprasd:VirtualLimit>
        <vimphyprasd:VirtualReservation>1048576</vimphyprasd:VirtualReservation>
      </ovf:Item>
      <ovf:Item>
        <rasd:Caption>Virtual Disk Allocation</rasd:Caption>
        <rasd:Description>Virtual Disk Allocation</rasd:Description>
        <rasd:ElementName>Virtual Disk Allocation</rasd:ElementName>
        <rasd:HostResource>ovf:/disk/vimRef1disk</rasd:HostResource>
        <rasd:InstanceID>5</rasd:InstanceID>
        <rasd:ResourceType>31</rasd:ResourceType>
      </ovf:Item>
      <ovf:Item>
        <rasd:Caption>Ethernet Adapter Allocation</rasd:Caption>
        <rasd:Connection>Network 1</rasd:Connection>
        <rasd:Description>Network 1</rasd:Description>
```

```
        <rasd:ElementName>Allocation of non-IEEE-aware ethernet adapter on Network
1.</rasd:ElementName>
         <rasd:InstanceID>6</rasd:InstanceID>
         <rasd:ResourceType>10</rasd:ResourceType>
         <rasd:VirtualQuantity>1</rasd:VirtualQuantity>
       </ovf:Item>
     </ovf:VirtualHardwareSection>
     <ovf:ProductSection ovf:class="com.ibm.ovf.vim.2">
       <ovf:Info>This product section provides information about the entire
package.</ovf:Info>
       <ovf:Product>AIX61_tailored</ovf:Product>
       <ovf:Vendor>IBM</ovf:Vendor>
       <ovf:Version>1.0</ovf:Version>
       <ovf:FullVersion>1.0</ovf:FullVersion>
       <ovf:Category>TCP/IP Network Settings</ovf:Category>
       <ovf:Property ovf:key="system.hostname" ovf:type="string"
ovf:userConfigurable="true">
         <ovf:Label>Short hostname for the system.</ovf:Label>
         <ovf:Description>Short hostname for the system.</ovf:Description>
       </ovf:Property>
       <ovf:Property ovf:key="system.domainname" ovf:type="string"
ovf:userConfigurable="true">
         <ovf:Label>DNS domain name for the system.</ovf:Label>
         <ovf:Description>DNS domain name for the system.</ovf:Description>
       </ovf:Property>
       <ovf:Property ovf:key="networkport.6.ip" ovf:type="string"
ovf:userConfigurable="true">
         <ovf:Label>Static IP address for the network adapter on &amp;quot;Network
1&amp;quot;.</ovf:Label>
         <ovf:Description>Static IP address for the network adapter on
&amp;quot;Network 1&amp;quot;.</ovf:Description>
       </ovf:Property>
       <ovf:Property ovf:key="networkport.6.hostname" ovf:type="string"
ovf:userConfigurable="true">
         <ovf:Label>Short hostname for the IP address of the network adapter on
&amp;quot;Network 1&amp;quot;.</ovf:Label>
         <ovf:Description>Short hostname for the IP address of the network adapter
on &amp;quot;Network 1&amp;quot;.</ovf:Description>
       </ovf:Property>
       <ovf:Property ovf:key="networkport.6.usedhcp" ovf:type="boolean"
ovf:userConfigurable="false" ovf:value="false">
         <ovf:Label>Use DHCP for the network adapter on &amp;quot;Network
1&amp;quot;.</ovf:Label>
         <ovf:Description>Use DHCP for the network adapter on &amp;quot;Network
1&amp;quot;.</ovf:Description>
       </ovf:Property>
       <ovf:Property ovf:key="networkport.6.gateway" ovf:type="string"
ovf:userConfigurable="true">
        <ovf:Label>Static default gateway for the network adapter on &amp;quot;Network
1&amp;quot;.</ovf:Label>
         <ovf:Description>Static default gateway for the network adapter on
&amp;quot;Network 1&amp;quot;.</ovf:Description>
       </ovf:Property>
       <ovf:Property ovf:key="networkport.6.netmask" ovf:type="string"
ovf:userConfigurable="true">
```

```
        <ovf:Label>Static network mask for the network adapter on &quot;Network
1&quot;.</ovf:Label>
        <ovf:Description>Static network mask for the network adapter on
&quot;Network 1&quot;.</ovf:Description>
      </ovf:Property>
      <ovf:Property ovf:key="networkport.6.dns1.ip" ovf:type="string"
ovf:userConfigurable="true">
        <ovf:Label>IP address of primary DNS server for the network adapter on
&quot;Network 1&quot;.</ovf:Label>
        <ovf:Description>IP address of primary DNS server for the network adapter
on &quot;Network 1&quot;.</ovf:Description>
      </ovf:Property>
      <ovf:Property ovf:key="networkport.6.dns2.ip" ovf:type="string"
ovf:userConfigurable="true">
        <ovf:Label>IP address of secondary DNS server for the network adapter on
&quot;Network 1&quot;.</ovf:Label>
        <ovf:Description>IP address of secondary DNS server for the network
adapter on &quot;Network 1&quot;.</ovf:Description>
      </ovf:Property>
      <ovf:Property ovf:key="networkport.6.domainname" ovf:type="string"
ovf:userConfigurable="true">
        <ovf:Label>DNS domain name for the IP address of the network adapter on
&quot;Network 1&quot;.</ovf:Label>
       <ovf:Description>DNS domain name for the IP address of the network adapter
on &quot;Network 1&quot;.</ovf:Description>
      </ovf:Property>
      <vim:Description/>
    </ovf:ProductSection>
    <ovf:ProductSection ovf:class="com.ibm.ovf.vim.2.nim.6" ovf:instance="1">
      <ovf:Info>NIM-specific settings</ovf:Info>
      <ovf:Product>AIX</ovf:Product>
      <ovf:Vendor>IBM</ovf:Vendor>
      <ovf:Version>1.0</ovf:Version>
      <ovf:FullVersion>1.0</ovf:FullVersion>
      <ovf:Category>NIM-specific settings</ovf:Category>
      <ovf:Property ovf:key="nim.Resource" ovf:type="string"
ovf:userConfigurable="true">
        <ovf:Label>NIM Resource or Resource Group</ovf:Label>
        <ovf:Description>Specify the name of an existing NIM Resource or NIM
Resource Group to allocate during the deployment. Any defined NIM Resource Group,
or Resource of class &quot;resources&quot; can be specified, except: mksysb, spot,
lpp_source, ovf_vm, master</ovf:Description>
      </ovf:Property>
    </ovf:ProductSection>
    <ovf:OperatingSystemSection ovf:id="9" ovf:version="">
      <ovf:Info>AIX  Guest Operating System</ovf:Info>
      <ovf:Description>IBM AIX </ovf:Description>
      <vim:DiscoveryIpAddress vim:class="com.ibm.ovf.vim.2" vim:instance=""
vim:key="networkport.6.ip"/>
      <vim:NetworkBootIpAddress vim:class="com.ibm.ovf.vim.2" vim:instance=""
vim:key="networkport.6.ip"/>
    </ovf:OperatingSystemSection>
  </ovf:VirtualSystem>
</ovf:Envelope>
```

E

Additional material

This book refers to additional material that can be downloaded from the Internet as described in the following sections.

Locating the Web material

The Web material associated with this book is available in softcopy on the Internet from the IBM Redbooks Web server. Point your Web browser at:

ftp://www.redbooks.ibm.com/redbooks/SG247829

Alternatively, you can go to the IBM Redbooks Web site at:

ibm.com/redbooks

Select the **Additional materials** and open the directory that corresponds with the IBM Redbooks form number, SG247829.

Using the Web material

The additional Web material that accompanies this book includes the following files:

File name	*Description*
aix61def.zip	Complete aix61def.ovf file

System requirements for downloading the Web material

The following system configuration is recommended:

Hard disk space: 100 MB minimum
Operating System: Windows 2000 or higher
Processor: 2.00GHZ or higher
Memory: 512 MB

How to use the Web material

Create a subdirectory (folder) on your workstation, and unzip the contents of the Web material zip file into this folder.

Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this book.

IBM Redbooks

For information about ordering these publications, see “How to get Redbooks” on page 205. Note that some of the documents referenced here might be available in softcopy only.

- *Implementing IBM Systems Director 6.1*, SG24-7694
- *IBM PowerVM Live Partition Mobility*, SG24-7460
- *NIM from A to Z in AIX 5L*, SG24-7296

Online resources

These Web sites are also relevant as further information sources:

- IBM Systems Director v6.1.x Information Center

  http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp?topic=/director_6.1/fqm0_main.html

- IBM Systems Director VMControl 2.2 installation and user’s guide

  http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp?topic=/director_6.1/fqm0_main.html

- Simplify AIX image management in a PowerVM environment using IBM Systems Director VMControl V2.1

  http://www.ibm.com/developerworks/aix/library/au-aiximagemanagement/index.html

- Build virtual appliances using the OVF Toolkit

  http://www.ibm.com/developerworks/linux/library/l-ovf-toolkit
  http://http://www.ibm.com/developerworks/aix/library/au-create_WAP/index.html

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Index

E

F

H

I

L

M

N

O

P

R

S

T

U

V

W

Z

IBM Systems Director VMControl Implementation Guide on IBM Power Systems

(0.2”spine)
0.17”<->0.473”
90<->249 pages

IBM Systems Director VMControl Implementation Guide on IBM Power Systems

Optimizes management costs of physical and virtual environments

Increases efficiency and resource use in data centers

Includes implementation scenarios

This IBM Redbooks publication helps you install, tailor, and configure a solution with IBM Systems Director VMControl so that you can move beyond simply managing virtualization to using virtualization to better manage your IT infrastructure. This book describes how the combination of IBM Systems Director and VMControl reduces the total cost of ownership of a virtualized environment by decreasing management costs, increasing asset use, and linking infrastructure performance to business goals.

This book provides a broad understanding on how VMControl simplifies the management of virtual environments across multiple virtualization technologies and hardware platforms, freeing you from silos of virtualization and delivering enterprise-wide visibility and control. A leading multi-platform virtualization management solution, VMControl is now available in three Editions (Express, Standard, and Enterprise) to best match your virtualized environment.

In addition, this book describes the VMControl Enterprise Edition plug-in for IBM Systems Director, which uses a workload-optimized approach to decrease infrastructure costs and improve service levels. With VMControl Enterprise Edition, you can manage system pools with the simplicity of managing a single system, an essential capability for moving to cloud computing and a dynamic infrastructure.

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