IBM Director 4.1

IBM

Remote Deployment Manager 4.11 Operations Guide

SC90-P043-40

Note: Before using this information and the product it supports, read the general information in Appendix F, "Notices", on page 203

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Preface

This guide explains the capabilities of IBM® Remote Deployment Manager (RDM) 4.11. RDM provides administrators centralized control of systems from a remote console. With RDM, you can perform the following tasks:

- Administer servers, workstations, desktop systems, point-of-sale systems, and mobile systems that are connected to the local area network (LAN) or wide area network (WAN)
- Deploy operating systems, applications, BIOS code and other system firmware
- Back up and restore operations for the primary partition
- Maintain systems

How this book is organized

Chapter 1, "Introducing Remote Deployment Manager", on page 1 contains an overview of RDM and its components. It also includes information about the hardware and software required for an RDM installation.

Chapter 2, "The RDM interface", on page 7 provides a graphical view of the main windows of the console.

Chapter 3, "RDM tasks", on page 39 describes the main functions and operations of RDM.

Chapter 4, "Examples", on page 135 describes how to perform a variety of common tasks.

Chapter 5, "RDM extensions", on page 143 describes how to modify parts of RDM to address your unique requirements.

Chapter 6, "Utilities", on page 147 contains instructions on how to use the utilities supplied with RDM.

Chapter 7, "Solving RDM problems", on page 183 contains a compilation of answers and workarounds to known problems with RDM.

Appendix A, "Command list commands", on page 185 lists the syntax allowed in an RDM command list.

Appendix B, "System environment overrides", on page 189 describes customizing system environments.

Appendix C, "RDM 4.11 data", on page 193 describes file storage within the RDM repository directory structure.

Appendix D, "Linux directories", on page 195 lists the major Linux directories that must be avoided when deploying Linux.

Appendix E, "Getting help and technical assistance", on page 201 contains information about getting help and technical assistance.

Appendix F, "Notices", on page 203 contains product notices and trademarks.

Notices that are used in this book

This book contains the following notices designed to highlight key information:

- **Notes:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or difficult situations.
- **Attention:** These notices indicate possible damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.

RDM publications

The following publications are available in Portable Document Format (PDF) on the *IBM Remote Deployment Manager version 4.11* CD in the docs directory:

- *Remote Deployment Manager 4.11 Getting Started*
- *Remote Deployment Manager 4.11 Installation Guide*
- *Remote Deployment Manager 4.11 Compatibility and Configuration Guide*

You can also obtain these publications from the IBM Support Web site at http://www.ibm.com/pc/support.

The *Remote Deployment Manager 4.11 Compatibility and Configuration Guide* lists hardware that IBM has tested with RDM. This publication is updated periodically; check the RDM Web page for the latest version.

RDM resources on the World Wide Web

The following Web pages provide resources for understanding, using, and troubleshooting RDM and systems-management tools.

IBM Remote Deployment Manager 4.11
: http://www.ibm.com/servers/eserver/xseries/systems_management/rdm.html

  From this Web page, you can download the latest version of the *Remote Deployment Manager 4.11 Compatibility and Configuration Guide*.

IBM Support page
: http://www.ibm.com/pc/support/

  This is the IBM Support Web site for IBM hardware and systems-management software. For systems-management software support, click **Systems management**.

IBM Online Assistant and e-Mail
: http://www.ibm.com/pc/qtechinfo/MIGR-4Z7HJX.html

  This Web page offers a quick resource to help solve your technical questions. Follow the instructions on this page to find additional solutions for your systems-management tools.

  If you do not find an acceptable solution, or if you just want to bypass looking for your own solution, you can submit an electronic question. From any page within the IBM Online Assistant, click **None of the above** to submit an electronic inquiry. Response times vary between 24 and 48 hours.

IBM Systems Management Software: Download/Electronic Support page
: http://www.ibm.com/pc/us/eserver/xseries/systems_management/dwnl.html

Use this Web page to download IBM systems-management software, including IBM Director.

IBM xSeries® Systems Management page
http://www.ibm.com/pc/ww/eserver/xseries/systems_management/index.html

This Web page presents an overview of IBM systems management and IBM Director. Click **IBM Director 4.1** for the latest information and publications.

IBM Universal Manageability page
http://www.ibm.com/pc/us/pc/um/index.html

This Web page links to an IBM portfolio of advanced management tools that help lower costs and increase availability throughout the life cycle of a product.

IBM ServerProven® page
http://www.ibm.com/pc/us/compat/index.html

This Web page provides information about IBM hardware compatibility with IBM systems-management software.

Chapter 1. Introducing Remote Deployment Manager

IBM Remote Deployment Manager (RDM) 4.11 is a powerful and flexible IBM Director extension. When installed in an IBM Director environment, RDM adds tools for configuring, deploying, and retiring systems. Using RDM, you can accomplish the following deployment tasks:

- Update system firmware
- Install operating systems and applications
- Backup and recover primary partitions
- Securely erase data from disks

RDM integrates seamlessly with IBM Director. You can access management and deployment functions through the same administrative console; you can perform comprehensive systems management using either a drag-and-drop action or a single click.

RDM components

The RDM software has three components: RDM Server, RDM Deployment Server (also known as D-Server), and RDM Console.

RDM Server

RDM Server is the main component of Remote Deployment Manager; it contains the application logic and stores data in a Microsoft Jet database.

RDM Server must be installed on the *management* server, the server on which IBM Director is installed. When you install RDM Server, RDM Console and RDM Deployment Server are installed automatically.

RDM Server can be installed on the following operating systems:

- Windows 2000 Server (Service Pack 3 or later required)
- Windows 2000 Advanced Server (Service Pack 3 or later required)

RDM Console

RDM Console is the graphical user interface (GUI) component of Remote Deployment Manager. When installed on a *management console*, a system on which IBM Director Console is installed, RDM Console adds RDM tasks to IBM Director Console.

RDM Console must be installed on any management console from which a system administrator will remotely access the management server and perform RDM tasks.

RDM Console can be installed on the following operating systems:

- Windows 2000 Professional (Service Pack 3 or later required)
- Windows 2000 Server (Service Pack 3 or later required)
- Windows 2000 Advanced Server (Service Pack 3 or later required)
- Windows XP Professional (Service Pack 1 or later required)

RDM Deployment Server

RDM Deployment Server is a file server application that delivers programs and data files to target systems.

A remote system on which RDM Deployment Server is installed is called a *deployment server*. If your environment includes several local area networks (LANs), you might want to have several deployment servers.

The instance of RDM Deployment Server that is installed on the management server contains the *master repository*; it contains the master copy of all the files used by RDM. Deployment servers contain a *distributed repository*, a subset of the master repository.

RDM Deployment Server can be installed on the following operating systems:

- Windows 2000 Professional (Service Pack 3 or later required)
- Windows 2000 Server (Service Pack 3 or later required)
- Windows 2000 Advanced Server (Service Pack 3 or later required)
- Windows XP Professional (Service Pack 1 or later required)
- Windows Server 2003, Standard Edition
- Windows Server 2003, Enterprise Edition
- Windows Server 2003, Web Edition

RDM Deployment Server components

RDM Deployment Server includes several subcomponents:

Preboot Execution Environment (PXE) service
The RDM PXE service supports the PXE protocol, which enables one to remotely start and configure computers that do not have an operating system installed. The RDM PXE service contains two internal components: Proxy Dynamic Host Configuration Protocol (DHCP) service and Boot service. The Proxy DHCP service directs the target system to the Boot service, which provides the target system with the fully qualified name of the appropriate network bootstrap program.

Multicast Trivial File Transfer Protocol (MTFTP) service
The MTFTP service transfers files between RDM Deployment Server and target systems by using either Trivial File Transfer Protocol (TFTP) or MTFTP. RDM uses MTFTP to provide native operating-system images and file up to 2 GB in size; it uses TFTP for the DOS or Linux images, bootstrap images, and other small files.

RDM repository
The RDM repository contains the files that RDM uses to run tasks on the target systems. These include PXE bootstrap programs, DOS or Linux system environments, and other image files, for example, Windows installation images, Linux installation images, and system firmware diskette images.

PowerQuest unicast image server
The PowerQuest unicast image server transfers PowerQuest-formatted images between RDM Deployment Server and target systems using a PowerQuest proprietary protocol. The PowerQuest images are used with the Power Restore task to backup and restore boot partitions and master boot records; they are used to perform cloned installations of operating systems also.

RDM D-Server service
The RDM D-Server service relays communications between target systems and RDM Server.

How RDM works

How RDM works includes the following key components:

- Adding target systems to the network
- Discovering a PXE-enabled target system
- Performing tasks on the target system

To use RDM, you first must connect the target system to the network and power it on. (The network must contain a running DHCP server.) Then, you must ensure that the system is configured to start from the network and that Wake on LAN® is enabled. When the system starts, it broadcasts a DHCPDISCOVER request and is assigned an IP address by the DHCP service.

RDM automatically listens on the LAN for new PXE-enabled systems that start (boot) from the network. When RDM discovers such a system, it queries the system for hardware information including the following items:

- Machine model and type
- Serial number
- Media access control (MAC) address
- Network interface card (NIC)
- BIOS version

This information is stored in the IBM Director database. RDM then assigns a default name to the system, in the form of *MachinetypeMachinemodel-Serialnumber*, and the new system is displayed in IBM Director Console. You can now perform tasks on the target system.

The following steps occur when you start a task on a target system:

1. RDM Deployment Server sends a packet to the target system. (This packet contains the MAC address of the target system NIC; if the NIC supports Wake on LAN, it can power on the system.)
2. The target system powers on and starts (boots) from the network, where it receives an IP address from the DHCP service and the fully qualified name of an RDM bootstrap loader program from RDM Deployment Server.
3. The target system downloads and runs the RDM bootstrap loader program. The RDM bootstrap loader program queries RDM Deployment Server, asking for instructions, and RDM Deployment Server relays the message to RDM Server.
4. If there is no RDM task to be performed on the target system, RDM Server instructs the system to start from the hard disk drive.
5. If there are RDM tasks scheduled to be performed on the target system, RDM Server sends the fully qualified name of a DOS or Linux system environment to the system.
6. The RDM bootstrap loader program downloads the system environment from the RDM Repository and installs it on virtual diskette drive A.
7. The target system starts (boots) from the virtual diskette drive A. The autoexec.bat file automatically starts an RDM program, rdagent.exe.
8. The rdagent.exe program then runs in a loop, requesting commands from the task command list, running the command, and reporting the success of the operation to RDM Server.

Hardware and software requirements

This section contains information about system requirements for both management systems and target systems.

Management systems

The following table lists the software, RAM, and hard disk space needed by the RDM software components.

Table 1. Minimum hardware and software requirements for RDM

	RDM Server	RDM Deployment Server	RDM Console
IBM Director software	IBM Director Server 4.1 or later	None	IBM Director Console 4.1 or later
Memory (RAM)	1024 MB	1024 MB	256 MB
Temporary disk space on system partition	200 MB	200 MB	200 MB
Disk space for RDM programs	300 MB	300 MB	30 MB
Disk space for RDM repository	2048 MB	2048 MB	Not applicable
Network adapter	At least 1 Ethernet or Token Ring adapter, with TCP/IP connectivity	At least 1 Ethernet or Token Ring adapter, with TCP/IP connectivity	At least 1 Ethernet or Token Ring adapter, with TCP/IP connectivity

The actual disk space needed for RDM repository will depend on the number and size of the image files that it stores.

A DHCP service must be installed on the network.

Target systems

Target systems must contain the following hardware:

- A supported 32-bit Intel® Pentium® (or equivalent) processor that complies with the Wired for Management (WfM), version 2.0, specification
- An Ethernet or Token Ring network adapter that supports one of the following protocols:
  – Preboot Execution Environment (PXE) 1.0
  – PXE 2.0
  – PXE 2.1

Notes:

1. You cannot deploy Linux to target systems that contain network adapters that support only PXE 1.0.
2. Some systems do not support the PXE protocols completely; some RDM functions fail on specific systems. See the *Remote Deployment Manager 4.11 Compatibility and Configuration Guide* for system specific information.

Supported operating systems

This section lists the operating systems upon which RDM 4.11 can be installed.

RDM Server

RDM Server is supported on the following operating systems:

- Windows 2000 Server (Service Pack 3 or later required)
- Windows 2000 Advanced Server (Service Pack 3 or later required)

RDM Deployment Server

RDM Deployment Server is supported on the following operating systems:

- Windows 2000 Professional (Service Pack 3 or later required)
- Windows 2000 Server (Service Pack 3 or later required)
- Windows 2000 Advanced Server (Service Pack 3 or later required)
- Windows XP Professional (Service Pack 1 or later required)
- Windows Server 2003, Standard Edition
- Windows Server 2003, Enterprise Edition
- Windows Server 2003, Web Edition

RDM Console

RDM Console is supported on the following operating systems:

- Windows 2000 Professional (Service Pack 3 or later required)
- Windows 2000 Server (Service Pack 3 or later required)
- Windows 2000 Advanced Server (Service Pack 3 or later required)
- Windows XP Professional (Service Pack 1 or later required)

Chapter 2. The RDM interface

This chapter gives you an overview of the RDM interface. If you are new to RDM, it will be easiest if you open IBM Director Console and follow along with the instructions. You can also use this chapter as a reference to find where RDM stores various parameters that you can configure.

Note: For an overview of IBM Director, read Chapters 1 and 2 of the IBM Director 4.1 Systems Management Guide (dir41_sysmgt.pdf) in the \docs directory on the IBM Director CD.

In RDM, the IBM Director Group object takes on the role of the container, and the RDM Task object takes its role as a service, and the action of applying a task to a group takes on its role as an organizer. This allows flexibility in applying a task to a system, or group of systems, by dragging or other selection methods. A system might be viewed as unscheduled, scheduled, or in progress (among several other categories) for sorting and viewing systems. New systems are displayed in the applicable pane as they are discovered.

Console

Most RDM functions can be accessed through the RDM tasks in the right pane of IBM Director Console, either by right-clicking the applicable item, or by dragging systems onto a task.

RDM installation does not add groups to the Groups pane (the left pane of the Console); however, during operation, you can create Groups manually with IBM Director.

The Group Contents pane, the middle pane in IBM Director Console, contains a list of the systems that are members of the group that is selected in the Group pane.

In the Tasks pane (right pane of the console window), you can initiate almost all of the RDM functions that operate on systems. Under the Remote Deployment Manager heading, there is a series of subheadings underneath. Content changes as you define tasks but the general presentation is a tree view that contains the following hierarchy:

- Remote Deployment Manager (the main heading)
- RDM templates
- RDM tasks (built-in or ones you create)

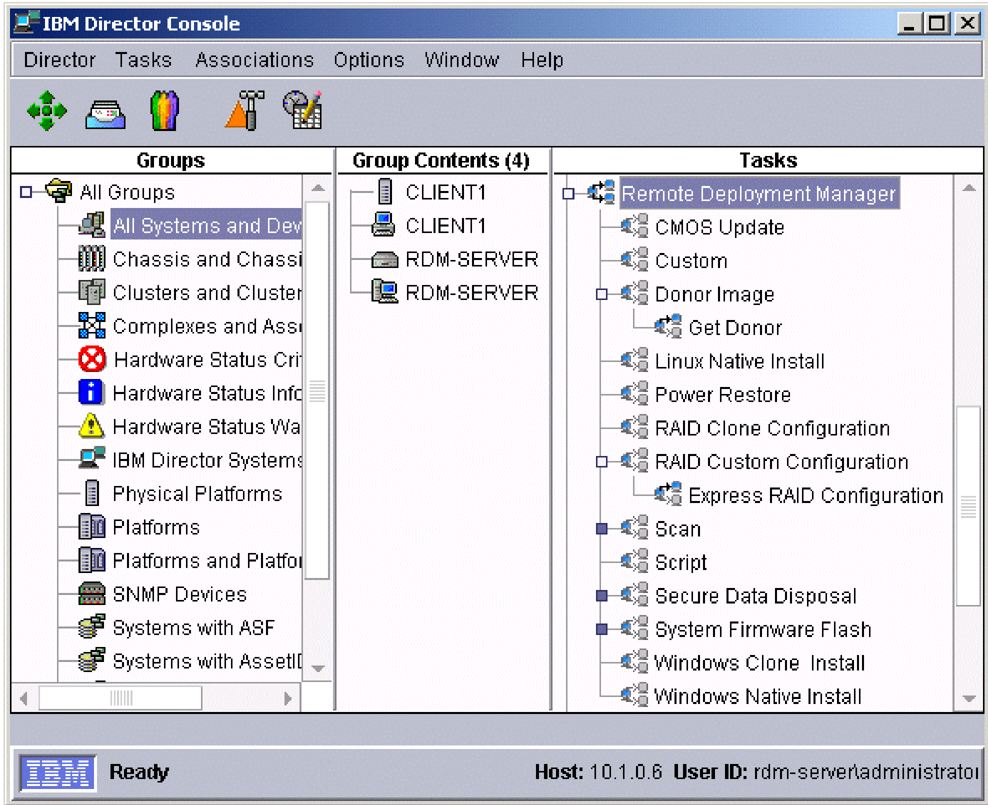


Figure 1. IBM Director Console

Icons

The table shows the RDM program and status icons. To clear status icons, right-click on a system in the Group pane. Select **RDM** → **Clear icons**.

Icon	Definition
	RDM Identifies the RDM program within IBM Director.
	Template Identifies a template within RDM. All template windows show this program icon in the left corner.
	Task Identifies a task within RDM. All task windows show this program icon in the left corner.

Icon	Definition
	Connect Indicates a target system is running an RDM task. This status icon appears next to the target system in the Group pane. The icon flashes blue during server processing, normal if the processing is occurring on the target system.
	Waiting Indicates a target system has been assigned a task, but Wake on LAN has not yet awakened the system. This status icon appears next to the target system in the Group pane. The icon is cleared once the target system connects to the RDM Server.
	Error Indicates an error has occurred running a task. This status icon appears next to the target system in the Group pane.

Task creation

You create RDM tasks by using the corresponding task templates. They provide either a property-sheet or wizard interface for task creation.

Templates

You can think of a template as a prototype of a specific kind of RDM task. Each template has its own characteristics and attributes that apply to any tasks created from that template. In other words, any new task is initialized with the properties and default parameter values of its template. RDM comes with a set of templates that appear in the Tasks pane. A basic RDM user operation is to take a template and use it to create a task that is ready to do work. For example, you can create a System Firmware Flash task customized with specific System Firmware levels for specific machine types, or a Windows Native Install task to deploy a specific Windows version with specific default parameters values.

Task creation wizards

Task wizards provide you with a relatively foolproof method of creating a task by guiding you through questions, one window at a time, in a predefined order. Before moving on to the next window, the data entered is validated, ensuring you create a usable task as the end product.

Right-click a task template in the IBM Director Tasks pane to create a new task. Open a task creation wizard by using the **Create new task** option.

Typically, wizards are used for complex tasks only, such as RAID custom configuration or Windows native installations, where the amount of information you request is too large to fit in a single window. You can modify default values in the task templates and the individual tasks themselves by editing the task template.

Property sheets

Property sheets have several uses:

- Change the default values of parameters in a template.
- Modify a task.
- Create a new task. Some templates use a property sheet for task creation; others use a wizard.
- View the collected information representing a task or template.

The values of a template property sheet are applied to any task created from that specific template. If you change the template, the changes are reflected in any new task you create from that template. When you create a task, you can edit its properties without affecting its template. The task property sheet provides you easy access to the information by clicking on tabs to access different pages of settings.

Within property sheets, hot keys (that is, shortcut keys) are supported where an underlined letter in a field label or command is displayed. Press ALT+underlined letter to move to that field, select a check box, or to run that command.

To navigate to other tabs (Setup and Advanced) of a task window by using just keystrokes, complete these steps:

1. Open a task window. (The focus is on the **OK** button to start.)
2. Press the **Ctrl+Tab** key combination three times to cycle the focus through the Cancel and Help keys. (The focus is now on the tabs.)

3. Press the arrow keys to move between tabs.
4. Press the **Tab** key once when, for example, you select the Advanced tab. (Now the focus is on the Categories on the Advanced page.)
5. Press the arrow keys to move between the different list items.

Many of the properties are common across all of the templates:
- General
- Advanced: Command list
- Advanced: User parameters
- Advanced: Task folder

These properties are discussed in the following section. Task specific properties, such as Windows networking, are discussed as part of the specific task.

General properties

The basic information for each task or template is displayed. You can access this window through the wizards, the task notebook or the template notebook.

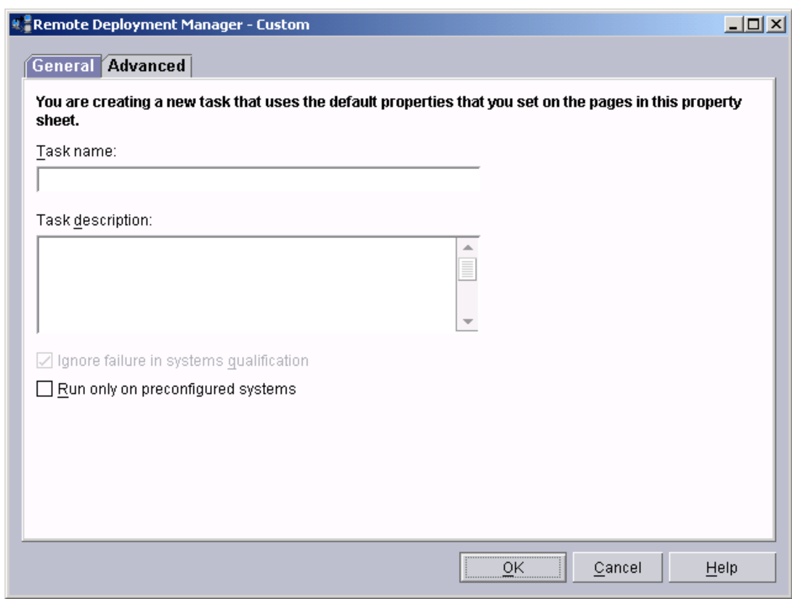


Figure 2. Sample General properties page

The General page has the following entry fields and options:

Task Name
A unique task name must be assigned to every task. You cannot modify this field if you are editing the template properties.

Task Description
The user-assigned description of the task. The description is used to add details about the task.

Ignore failure in systems qualification
Selecting this option forces the task to run on systems that fail qualification. Unqualified systems are reported in an exception list. If this option is not selected, and all the systems fail qualification, the message

```
None of the selected systems passed qualification.
```

is displayed.

Note: Running tasks on unqualified systems can lead to run-time errors, undefined results, or the task might fail.

At the template level, this option sets the default condition for new tasks created from the template. This default can be changed for an individual task.

At the task level, this option specifies whether to force the task to run on systems that fail qualification

Run only on preconfigured systems

Preconfigured systems are those that already have their system or task parameter values in the database. If selected, preconfiguration is validated when the task is run. Select the check box to toggle the check mark.

At the template level, this option sets the default condition for new tasks created from the template. This default can be changed for an individual task.

At the task level, this option specifies whether preconfiguration validation is performed when this specific task is run.

Note: If you edit the template notebook, these are the default values used the next time you create a task. If you edit an existing task, the values are changed only for that task.

Advanced properties - Command list

The command list contains the commands that are run when a task is run. You can access this window from the **Advanced** tab of the template notebook, or by editing an existing task.

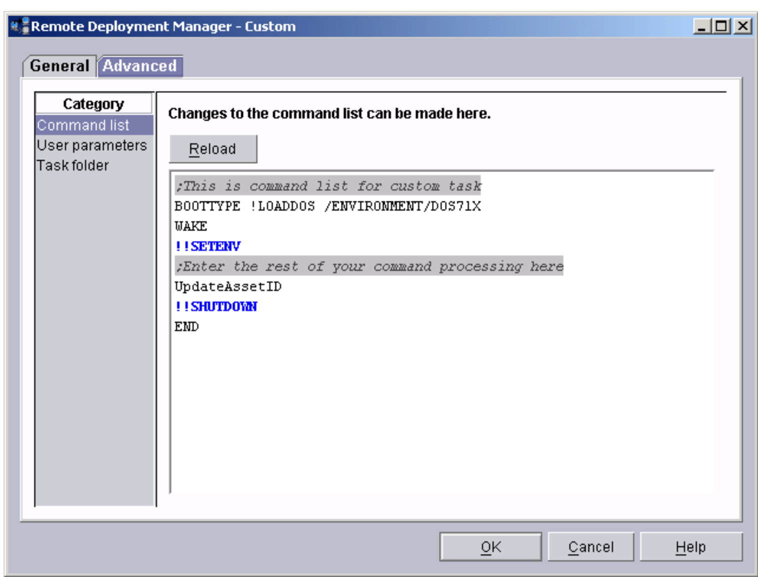


Figure 3. Sample command list on the Advanced tab

Click in the Command pane and add, edit or delete commands. Refer to Appendix A, "Command list commands", on page 185 for a list of the commands and syntax.

Click **Reload** to restore the command list to the last-saved version.

Advanced properties - User parameters

Use the User Parameters window to create and select parameters for the Command list. You can access this window from the **Advanced** tab of the template notebook or by editing an existing task.

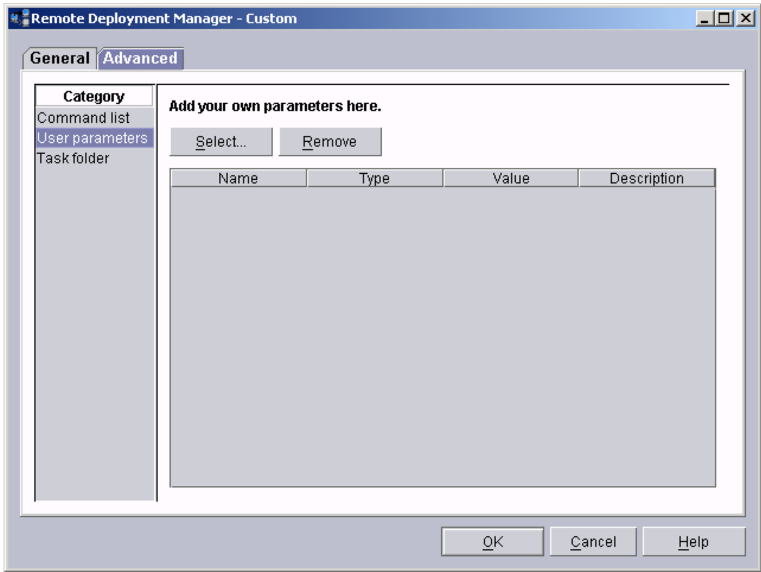


Figure 4. Sample User parameters list on the Advanced page

Use **Select** to access the “User Parameter” window for selecting, creating, and deleting parameters.

Use **Remove** to delete a selected parameter from the list. The parameter is removed from the list and the task, but not from the repository. The parameter is not accessible to future tasks.

1. Click **Select** on the parameter list to access the “Create Parameters” window.

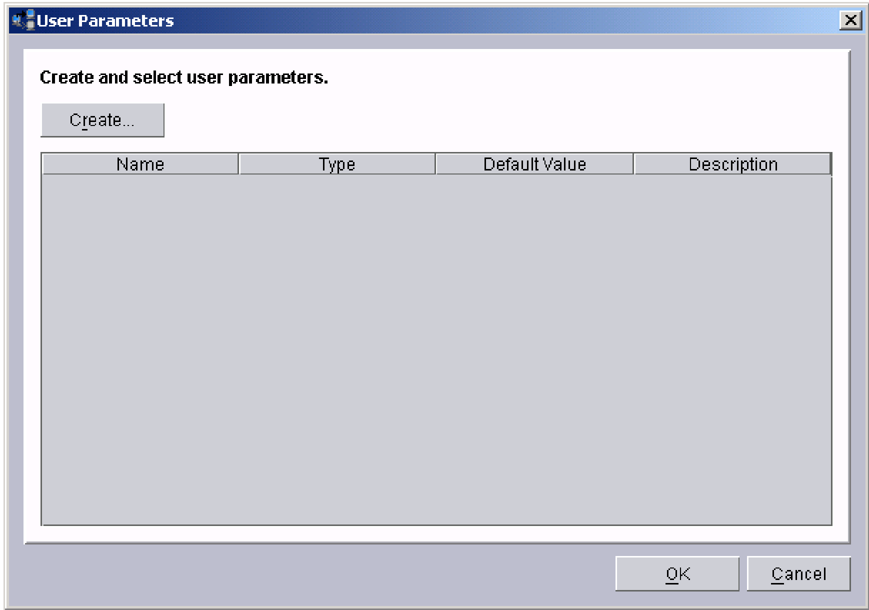


Figure 5. "User Parameters" window

2. Click **Create** to access the "Create User Parameter" window.

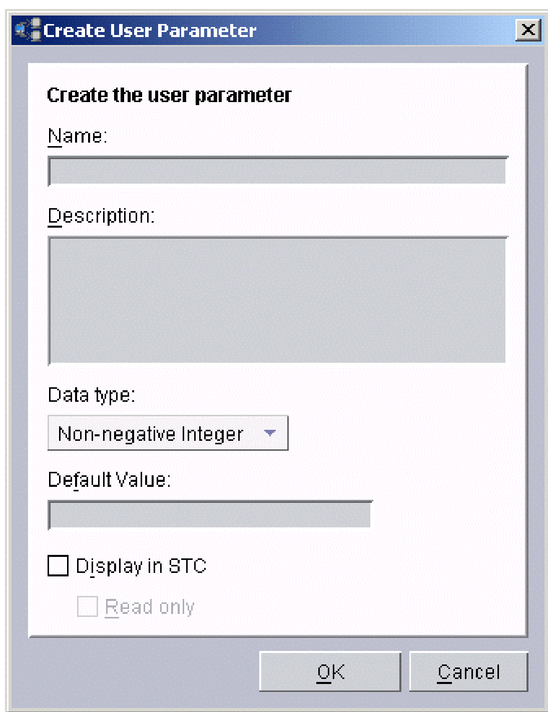


Figure 6. "Create User Parameter" window

3. Add the information for the new parameter:

Name
The parameter name.

Description
A brief description of the parameter.

Data Type
: Select the parameter data type: *Number* or *Text*.

Default Value
: Type the default value for the parameter.

Display in STC
: If selected, this adds the parameter to the STC, where it is available to other tasks of the same template type. This selection enables the **Read only** check box.

Read only
: If selected, this option sets the displayed STC parameters to read only.

4. Click **OK** to save the parameter and return to the “User Parameters” window. The parameter is now listed.
5. Click to select the new parameter. Multiple parameters can be selected.

Advanced properties - Task folder

This page is informational only and provides the location of the task files. The Task folder provides the full path to where the command list file is stored. It gives you a way to use your favorite text editor to create the actual contents of the file.

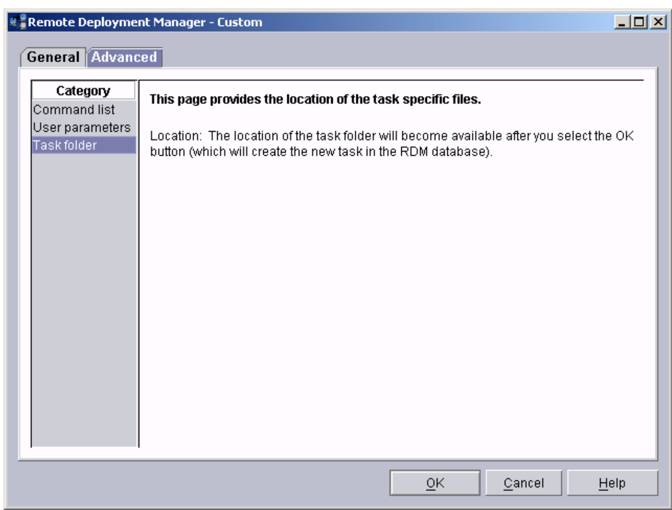


Figure 7. Sample Task folder on the Advanced tab

Options

You can control how RDM works by setting the values of some global parameters. These options are available from IBM Director Console menus.

RDM options

Access the “RDM Options” window by clicking:

Tasks → Remote Deployment Manager → RDM Options

On the Server page, set time intervals for replication transactions and time-outs, and enable or disabled the default scan task. On the System page, set the server response time and forced shutdown option.

Note: A system might take longer than the default timeout value and still successfully complete a task. This only indicates that the system took longer than expected to complete the last instruction from the RDM Server. There will still be an error logged indicating the timeout failure. For future successes, modify the command list of the task to include a longer timeout than the default server value. Refer to Appendix A on page 186 for the TIMEOUT command.

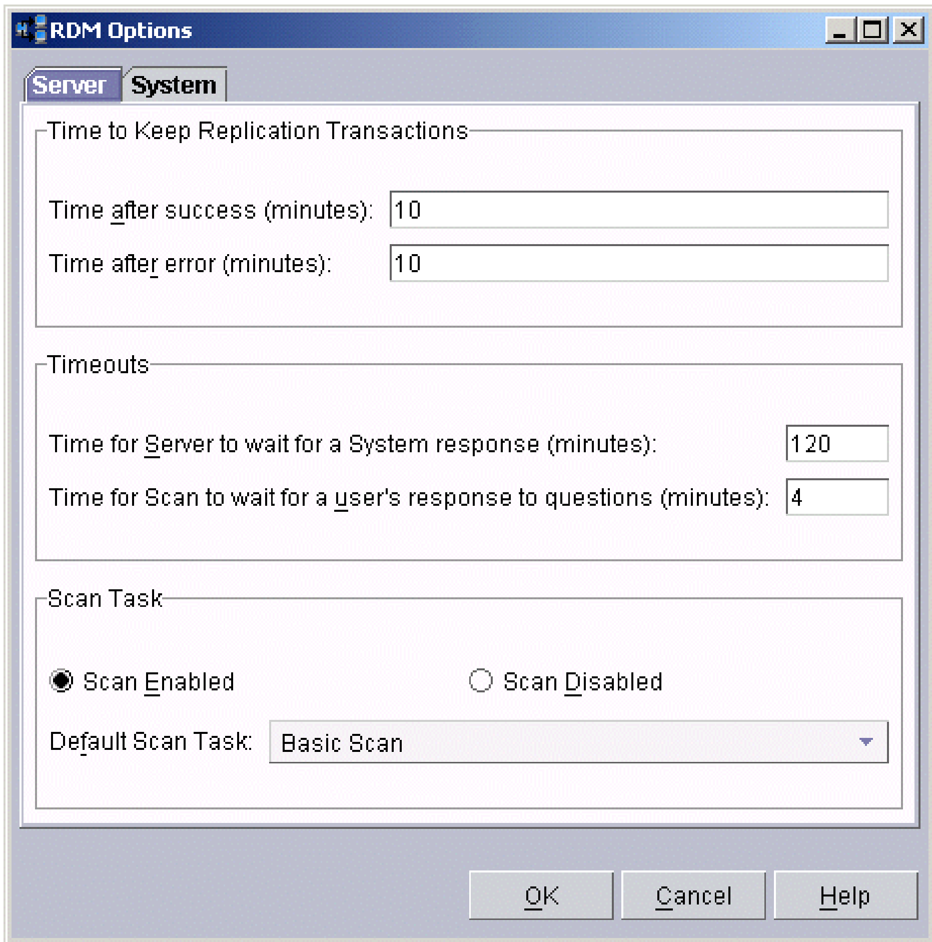


Figure 8. Server page for the “RDM Options” window

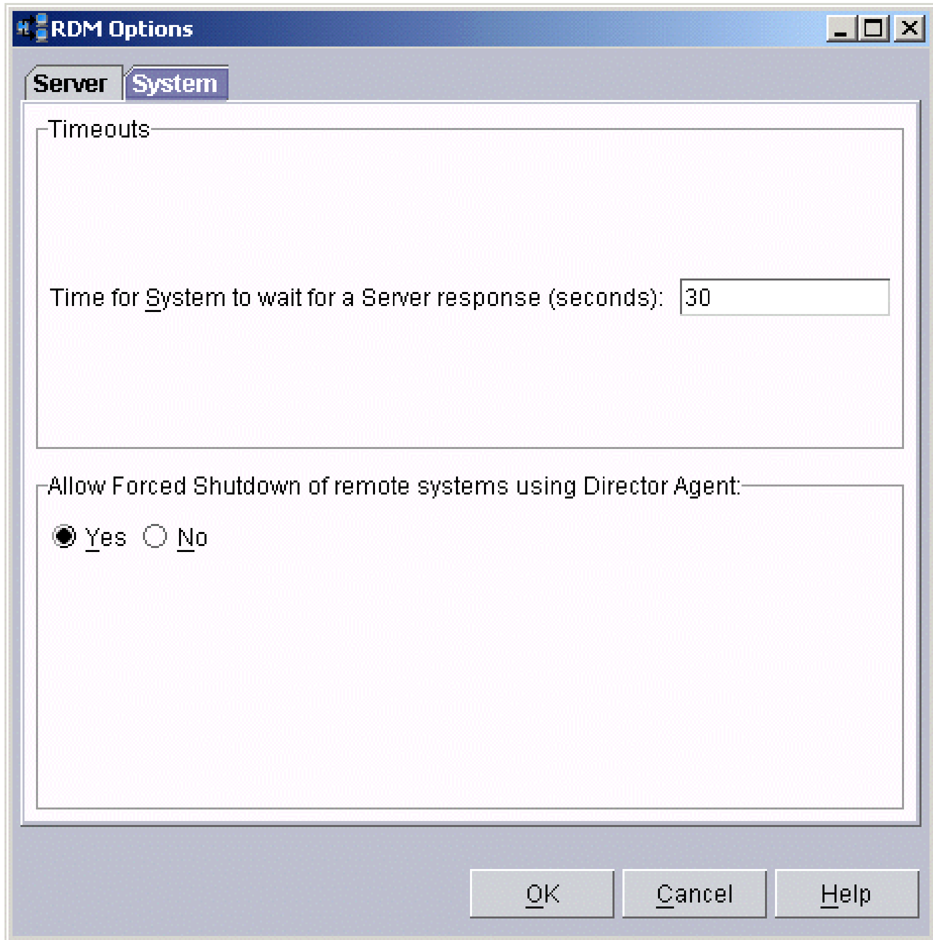


Figure 9. System page for the "RDM Options" window

Deployment Server options

RDM Deployment Server (D-Server) management is accomplished through options in the Tasks menu. The Deployment Server Management Options window sets options relating to the entire RDM program, as opposed to specific tasks. Select **Tasks → Remote Deployment Manager → D-Server Options** to open the Deployment Server Management Options window. The left pane of the Deployment Server Management Options window lists the D-Servers. An asterisk (*) next to a D-Server name denotes that D-Server as the Master D-Server. The settings for the selected D-Server are displayed in the right pane.

Note: The D-Server is shut down and restarted in response to specific setting changes without regard for whether there are any jobs in progress. For a remote D-Server, changes in the MTFTP settings IP Start, Pool Size, and Port will shut down and restart the D-Server. For the master D-Server, changes in the network settings IP Address and HTTP Port will shut down and restart the D-Server. If this happens while a system is in the middle of an MTFTP operation, the MTFTP operation will fail with an illegal TFTP operation error because the reset server knows nothing about the previous session that was started before it was reset.

You *must* click **OK** to save any changes you make. If you click **Cancel** (or the **X** icon in the upper-right corner), any changes you made on the pages of this window or on any dialogs that were involved in the changes are lost.

Click the **Connections** tab to display the D-Server properties.

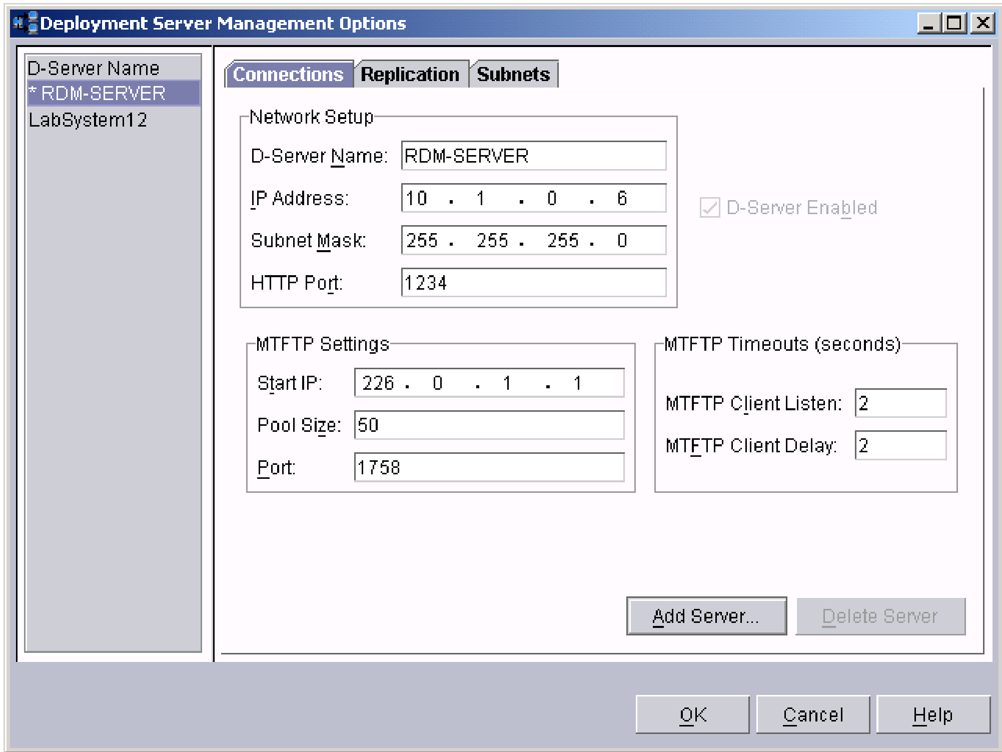


Figure 10. Connections page for "D-Server Options"

Network Setup

D-Server Name - This is the hostname of this server. This left column lists multiple D-Servers. Properties displayed reflect the selected D-

IP Address - The IP address of this D-Server. Remote D-Server IP addresses are disabled and cannot be changed in this window. You must configure a remote D-Server address with the RDM Deployment Server configuration program (DSCONFIG) on the remote D-Server.

Subnet Mask - The subnet mask of this D-Server.

HTTP Port - The port number that this D-Server uses to communicate (using HTTP format) with the RDM server. The default is 1234. The maximum value is 65535 for all D-Servers. The minimum value is 80 for Remote D-Servers and 1024 for Master D-Servers.

MTFTP Settings

Start IP - type the first class-D (multicast) IP address for the range of addresses that are assigned to the D-Server. By default, this is set to the IP address selected when RDM Remote Deployment Server was installed.

Pool Size - type the number of contiguous class-D addresses reserved for use by the D-Server. By default, this is set to the pool size selected when RDM Remote Deployment Server was installed.

Port - type the port number assigned to the MTFTP service. This port is used to download files from the Master D-Server to the target system. By default, this is set to the port selected when RDM Remote Deployment Server was installed.

MTFTP Timeouts (seconds)

MTFTP Client Listen - type the number of seconds that a target system listens to determine whether or not a file is being transmitted on the network. When this time interval is exceeded, the target system requests the file from the D-Server. By default, this is set to two seconds.

MTFTP Client Delay - type the number of seconds that a client system with an incomplete file transmission waits before requesting the file from the D-Server. By default, this is set to two seconds.

Note: If you change the MTFTP client listen and the MTFP client delay, the values are not transmitted to the target systems; the default value of two seconds is used.

In addition to **OK**, there are two buttons:

Add Server - Creates a new entry in the list, allowing this RDM Server to manage another D-Server. RDM must have already been installed onto the target D-Server. You can then change its other settings on the Connections page, if desired.

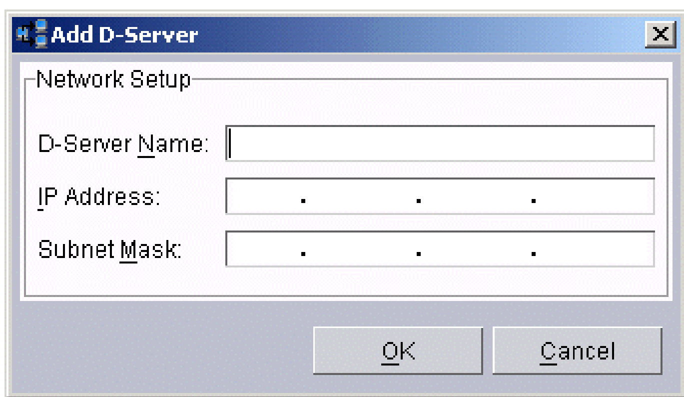


Figure 11. Add D-Server

Delete Server - This removes the selected D-Server from management by the RDM Server, but does not uninstall any code on the D-Server.

Note: If you uninstall a D-Server, it might remain listed in the “Deployment Server Management Options” window. You must manually delete the D-Server listing after it is uninstalled.

The Replication page defines rules for each D-Server with regard to how data is replicated from the master repository to the distributed repository on the selected

D-Server. Each D-Server can use different rules, based on usage characteristics and bandwidth.

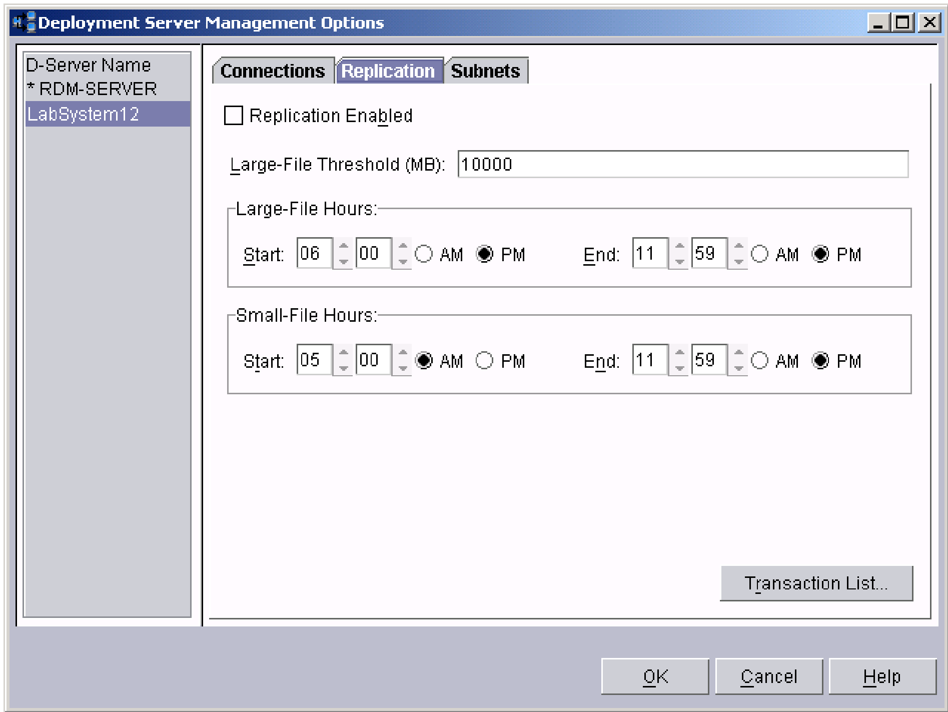


Figure 12. Replication page for “D-Server Options”

Note: There are no replication settings for the Master D-Server. The Master D-Server cannot be disabled so those options are disabled on the Replication page when you select the Master D-Server.

The Replication page contains the following entry fields:

Replication Enabled - Select this check box if you want to allow this D-Server to get files directly from the RDM Server. You would not typically select this box in cases where the connection between the D-Server and RDM Server was very slow or unreliable. The implication is that you will manually get the necessary files to the D-Server (for example, by creating a CD that contains the files and mailing it to the D-Server site, where someone would manually copy the files to the D-Server). Checking the Replication Disabled box does not impact the RDM Server ability to delete files from the D-Server. That facility is needed to ensure consistency.

Large-File Threshold - This is the file size at which RDM will consider the file to be “large”; any files smaller will be considered “small”.

Large-File Hours - These are the hours within which a large file might be replicated over the network. Often, you constrain these to nighttime to avoid excessive network traffic at peak times.

Small-File Hours - These are the hours within which you might replicate small files over the network.

Transaction List - This button opens the “Transaction List” window showing the outstanding replication transactions (these include file deletion commands) waiting to be run by the selected D-Server. Transactions that are complete or in error are removed from the list, based on the times specified on the Server page of RDM Options (**Tasks → Remote Deployment Manager → RDM Options**).

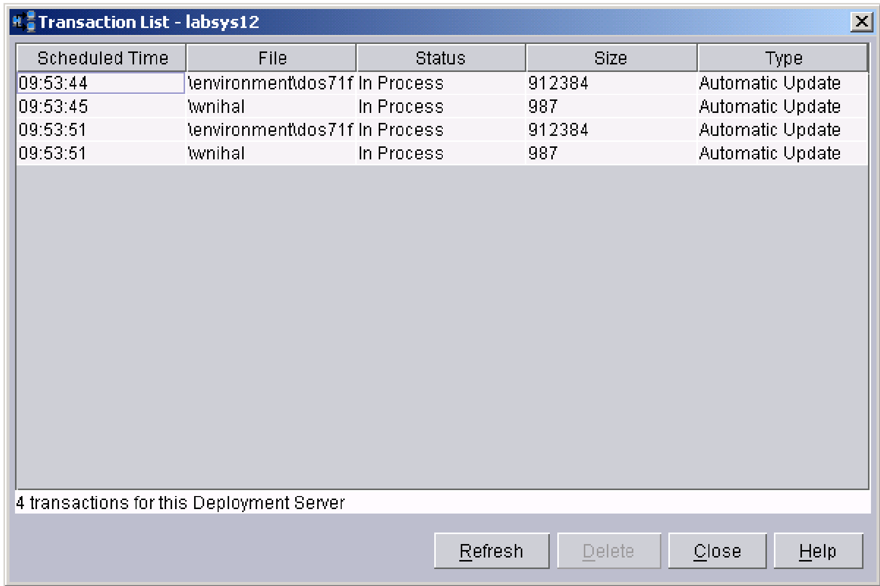


Figure 13. Transaction List

Transaction **Status** is one of the following states:

- *Pending* - The transaction is scheduled to run later.
- *In process* - The transaction is running now. You cannot delete a transaction in this state.
- *Error* - The transaction had an error.
- *Complete* - The transaction completed successfully.

Transaction **Type** is one of the following types:

- *User initiated* - The replication was manually forced during image creation by IM.
- *Automatic update* - A system running a task that needs an image initiates the replication.

To delete a transaction, select the transaction in the list, and then click **Delete**.

To refresh the list, click **Refresh**.

The Subnets page defines the subnets that are served by each D-Server.

Note: Remote D-Servers cannot be on the same subnet as the Master D-Server.

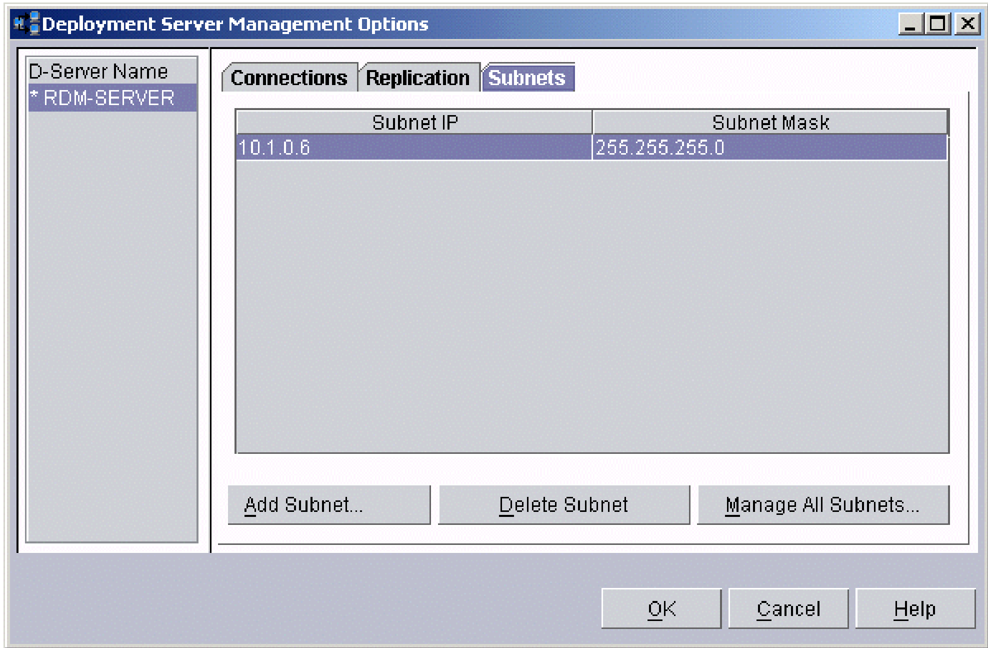


Figure 14. Subnets page for “D-Server Options”

Add Subnet - Click to add the specified subnet.

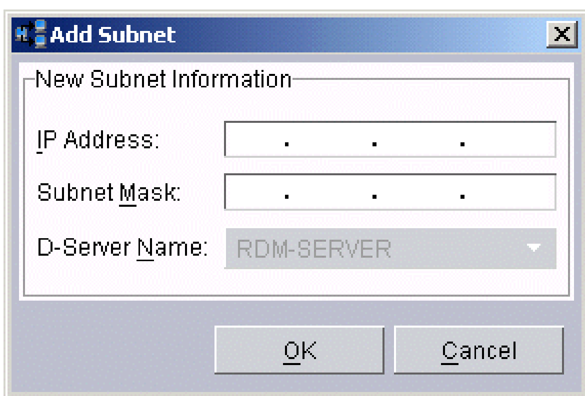


Figure 15. “Add Subnet” window

Delete Subnet - Click to delete the selected subnet.

Manage All Subnets - Click to access all of the subnets for all D-Servers in the RDM database. You can add and delete subnets from this list with **Add** and **Delete**. You can reassign subnets to a different D-Server by selecting the D-Server Name and then selecting another D-Server from the resulting drop-down list.

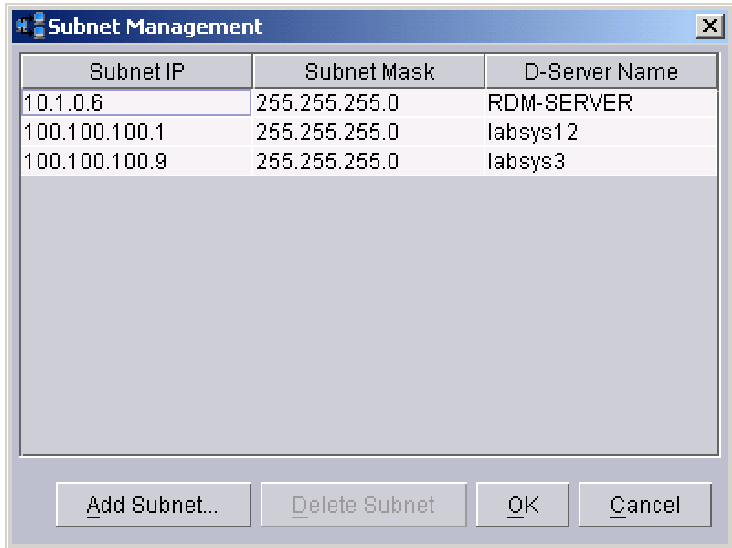


Figure 16. “Manage All Subnets” window

Click **OK** to apply the changes. Click **Cancel** to exit with no changes.

Start/stop the RDM D-Server service from the command line:

- To start, type the following command in the “Command Prompt” window:
  `net start dserver`
- To stop, type the following command in the “Command Prompt” window:
  `net stop dserver`

Image management

Image Management (IM) is the RDM tool that collects, builds, defines, propagates, and deletes the image files you use to implement various RDM tasks. Most tasks of RDM have references to image files that are copied and used by the tasks. All of these image files are collected inside the RDM Server Deployment Server. You use IM to import or build those images (into the applicable file format) from their own source files.

When the RDM Server is installed, one of the components that is always installed with it is a Deployment Server. Part of any Deployment Server is a repository of files. The one installed within the RDM Server is referred to as the Master Repository. IM serves as the manager of the RDM Master Repository. All activities involving the exploring, browsing, building, and deleting are handled by IM.

Note: Do not manipulate (delete, add, or rename) any images files or directories from the command line prompt or by using Windows Explorer-type of programs. Instead, use IM.

IM builds images by copying files and directories from your specified source. IM stores those files and directories into one image file (for some types of image, this might be a zipped file), transports it to the RDM server, and adds it into the Master Repository directory. Those image files inside the Master Repository directory are assigned unique filenames by IM and are not intended to be meaningful when browsed in the file system.

Create an image

Common input sources for images include:

- Local drives (diskette drive, hard disk drive, CD-ROM drive, mapped network drives). These are drives on the physical IBM Director Console.
- Server drives. These are drives on the physical IBM Director Server.

Note: Image Management does not validate Windows operating-system languages. The file copy process starts regardless of what language CD has been inserted. For example, if you select to create a Windows XP Professional French image but use the Spanish version of the Windows CD, no error is given.

Replicate an image

When you click **Replicate**, a window opens allowing you to select which of the known Deployment Servers are to be loaded with the image.

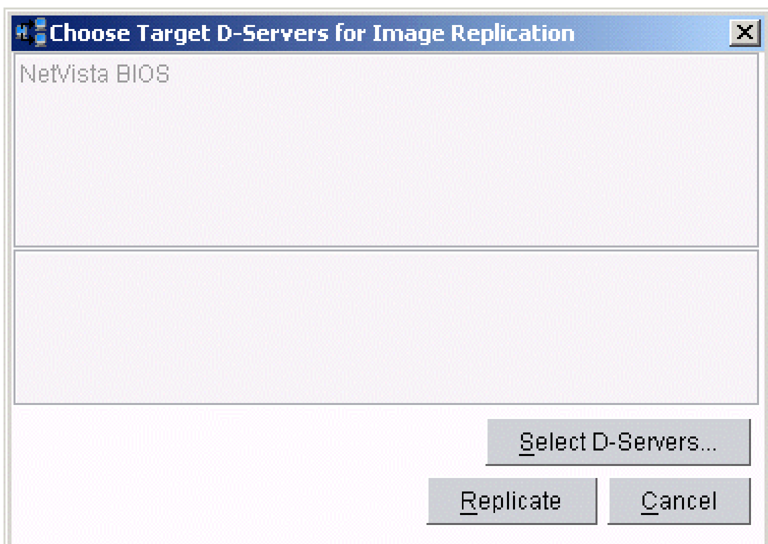


Figure 17. Target D-Servers window

Note: You must take care to avoid situations where the wrong data is loaded to a Deployment Server - this could potentially compromise security in multi-corporate installations.

After you select the Deployment Servers you want, a queue of replication transactions is created, one entry for each Deployment Server. Each entry in the queue causes the file to be transmitted to its respective Deployment Server.

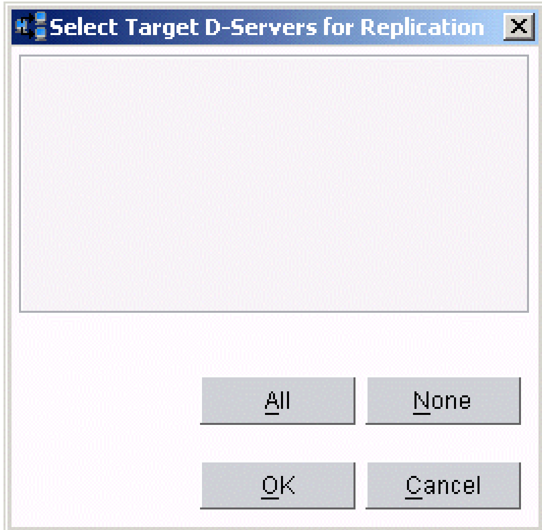


Figure 18. Queue of replication transactions window

Delete an image

You cannot edit the content of an image file in RDM. If you need to modify an image, you must delete the old image and then add the new image. You can delete an image, provided that there are no references to it from any existing tasks or jobs, whether the job states are running or queuing.

In other words, IM provides a means of compressing files, but decompression is only done at the system; IM does not provide a way to expand the components of an image back to their original form.

When an image is deleted, it is also deleted from each remote Deployment Server.

Edit or view image properties

The Image Properties function is only available when you select a single image, and then click Edit. An images properties window might also be called from within a task template or task. The property sheet deals with the primary attributes of the file.

Export an image

The export function, used for manual replication, copies all the files of an image into a subdirectory that has the same structure as the Master Repository. You can then create a CD that contains the exported files. At a remote Deployment Server, you would copy the files from the CD to the local repository.

Complete the following steps to export an image from any RDM console:

1. On the RDM Server, create a new directory (or use an existing empty directory)
2. On the RDM Console, open the main IM window (**Tasks → Remote Deployment Manager → Image Management**)

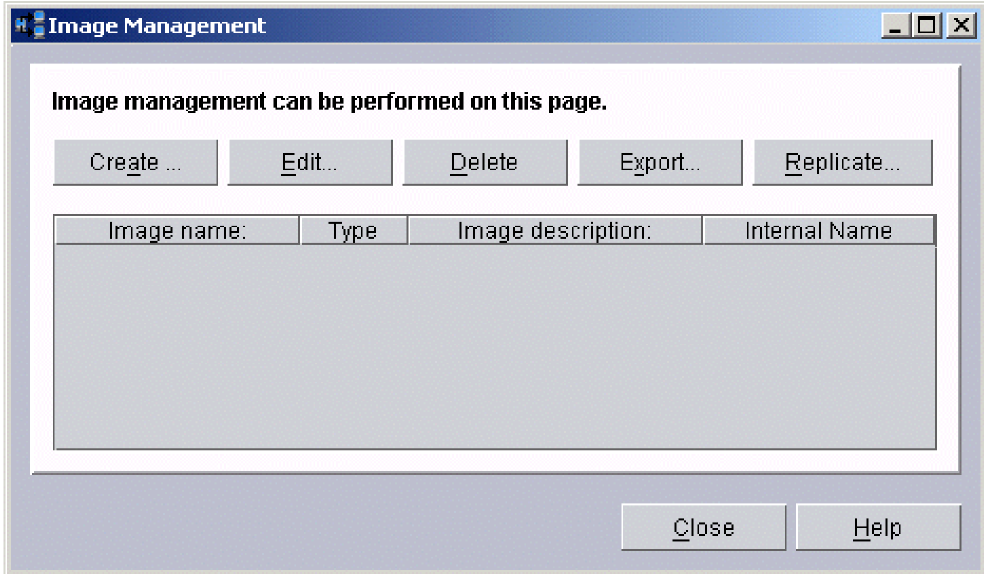


Figure 19. Image Management window

3. Select one or more images from the list.
4. Click **Export**. This causes a file window to open.

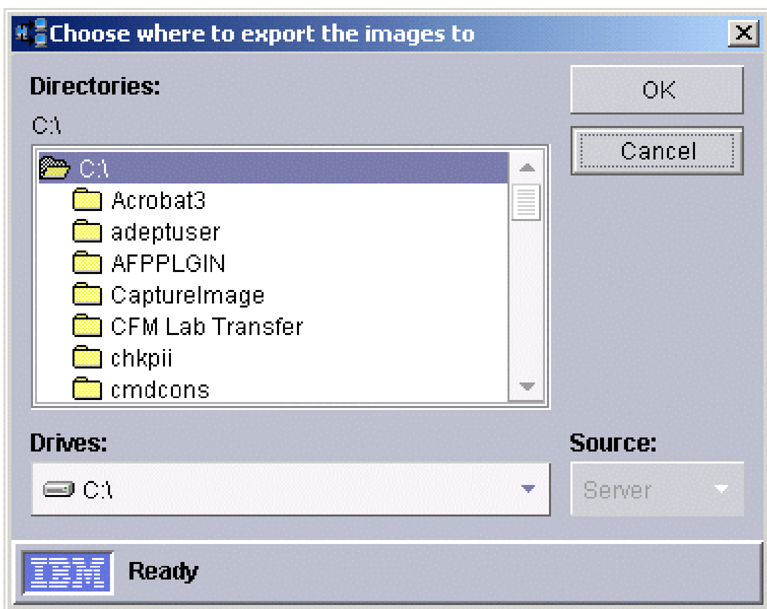


Figure 20. Select where to export images

5. Select the target directory (which is always on RDM Server, regardless of where RDM Console is installed). This causes RDM to copy the selected images to the target directory.
6. Create a CD that contains the exported files.
7. At a Remote D-Server, copy the files from the CD to the local repository.

Invoke the Image Manager

IM is accessible from multiple points within RDM and can be run in the following ways:

- As a tool
- From a task creation wizard or property sheet
- From a template property sheet

You typically run the Image Manager as a tool whenever you receive new image data that you will eventually use in a new task, or that could be used by an existing task. For example:

- You acquire a System BIOS diskette image from the IBM Web site. You would create a new System Firmware Flash image so that it would be included in the Deploy Latest System Firmware task.
- You would create a Windows Server 2003 Enterprise Edition image upon receiving the site-licensed CD from Microsoft, knowing that some Windows Native Install tasks will soon be created which will need that image.

In these cases, start IM from the IBM Director main menu:
Tasks → Remote Deployment Manager → Image Management

You can, instead, wait until you create a new task to invoke IM. The task wizard or property sheet (or even the template property sheet) provides a way to display IM.

Use the top-level of IM to view the images in the Master Repository. IM exports images to other directories, replicates images to other D-Servers, deletes existing images, creates new images, and allows you to edit image properties. The Type and Internal Name of images are predefined and cannot be altered. However, you are free to enter whatever Name and Description are appropriate.

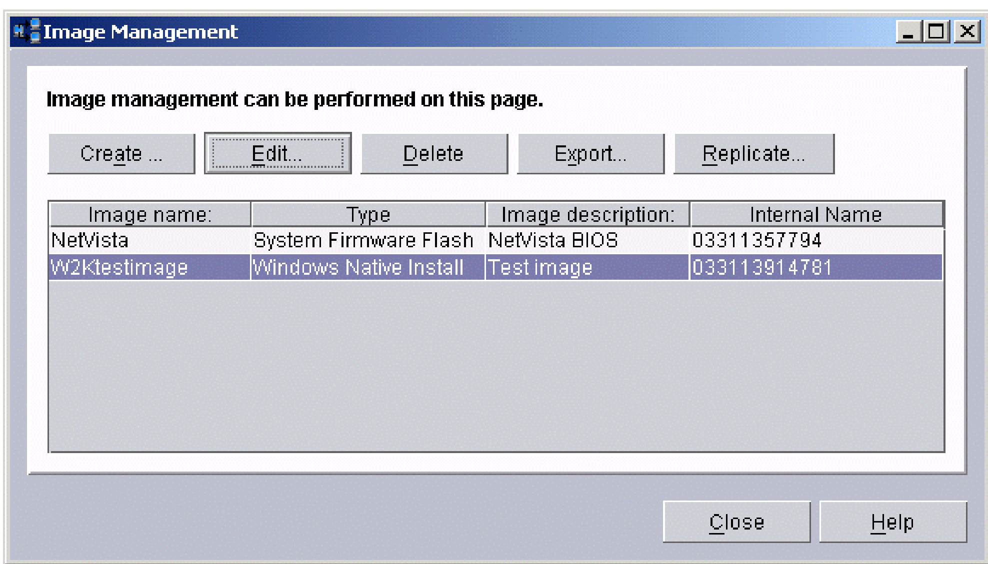


Figure 21. Listing of images in Image Management window

Click **Create** to open the Selection window in which you specify the type of image to create:

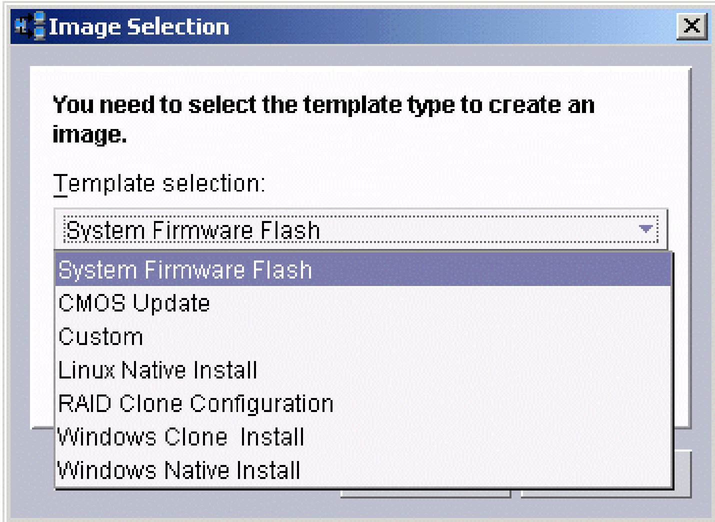


Figure 22. Specify the image type to create

Select the appropriate image type from the drop-down list, and then select **OK** to begin the image creation process.

Image property sheet

The image property sheet is the user interface that actually imports the image into the Master Repository. They are highly task-dependent. See the sections on individual tasks for examples of image property sheets. A sample property sheet for a Windows Native Install image is shown next. On the General page, type a name and (optional) description of the image. On the Setup page, specify the source files from which the image will be created.

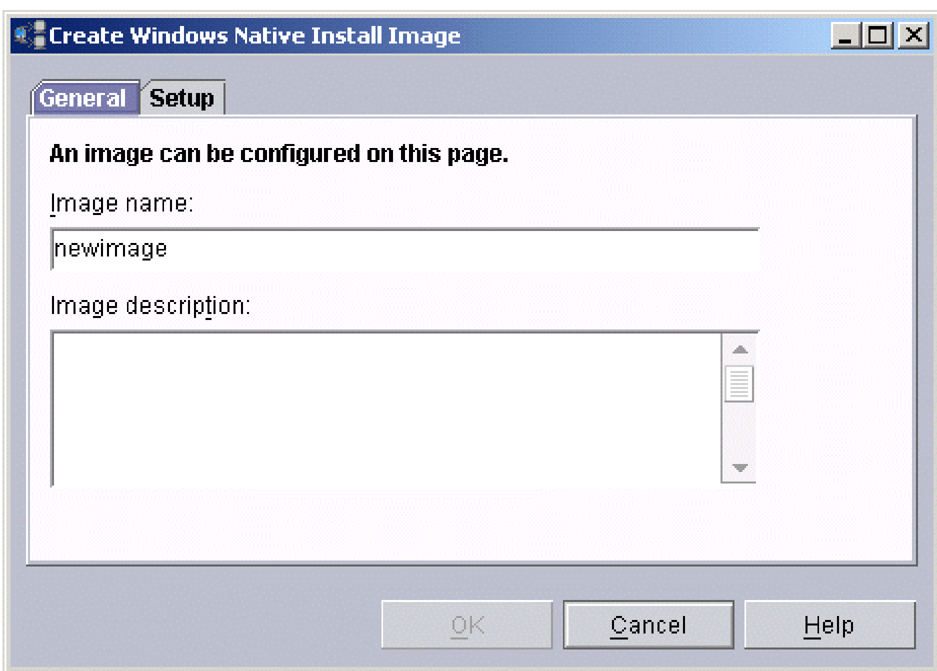


Figure 23. General page for name and description of image

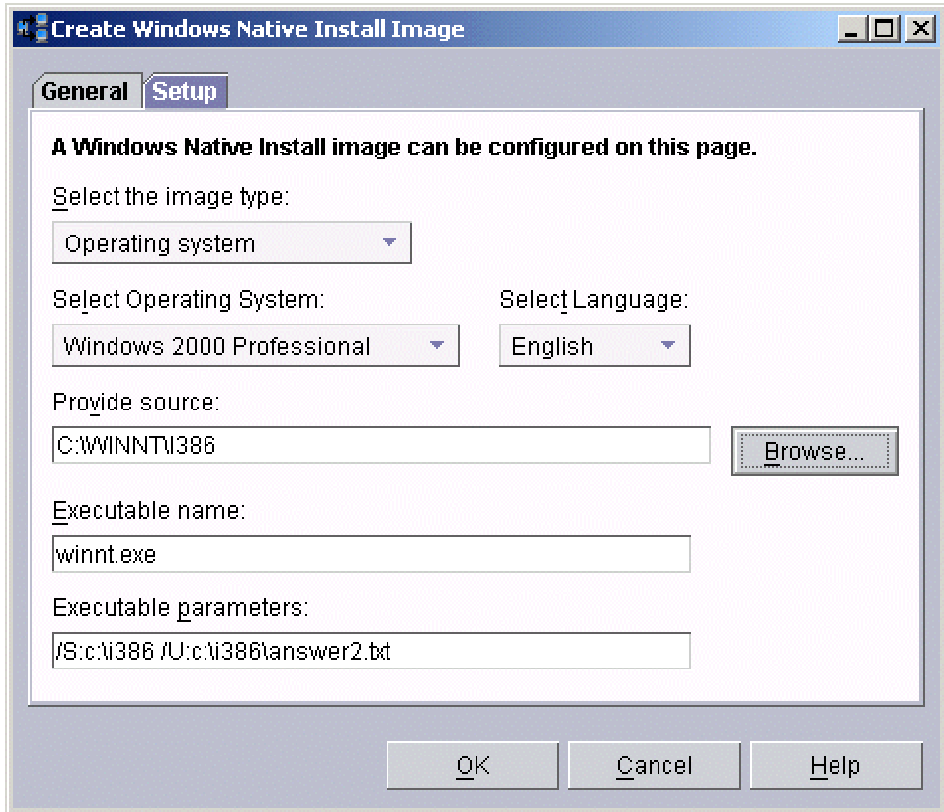


Figure 24. Setup page to specify source files for image

As an image is being created, the following Creation Progress window is opened.

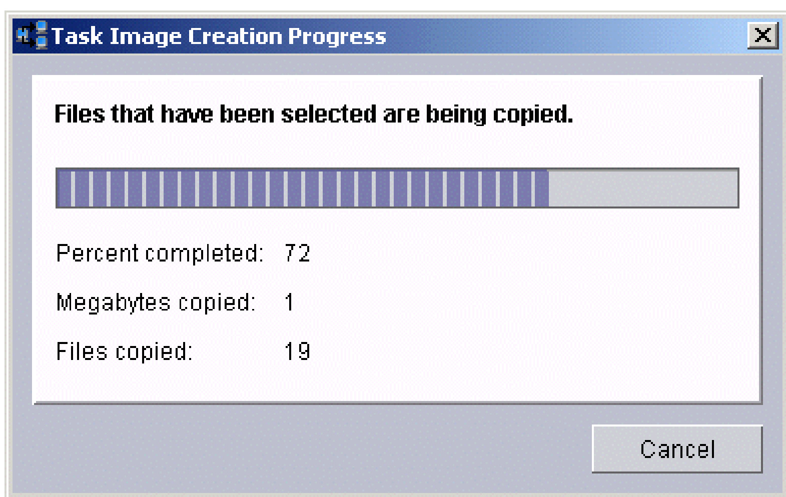


Figure 25. Task Image Creation Progress window

From within IM (**Tasks → Remote Deployment Manager → Image Management**), selecting an image and clicking Edit, an additional Image Properties page (not visible when accessing image property sheets through an individual task) is available that lists read-only attributes such as internal name and size.

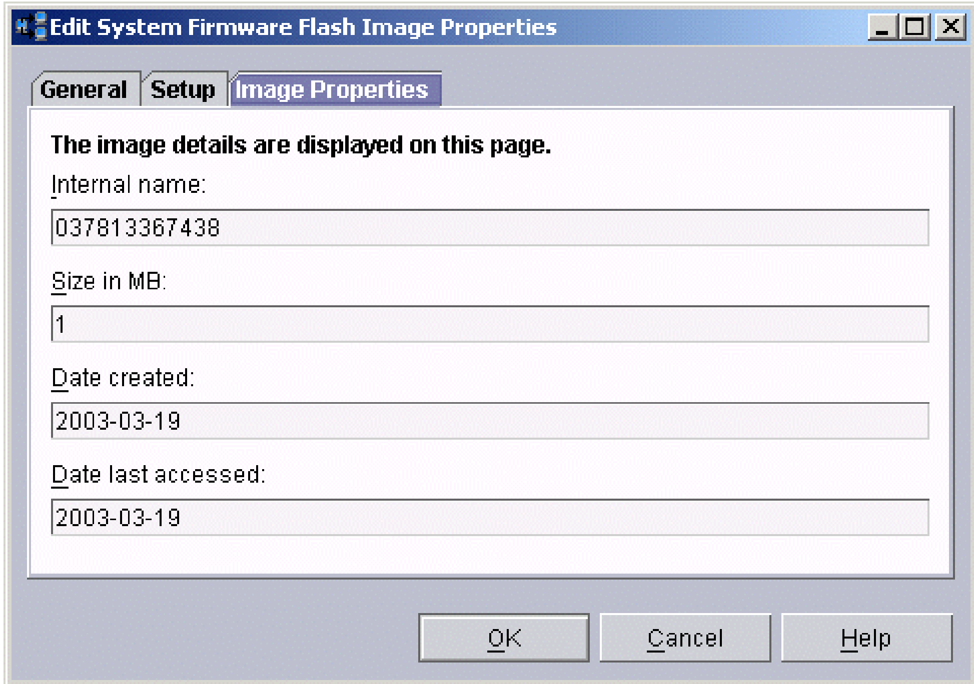


Figure 26. Edit System Firmware Flash Image Properties window

System/Task Configuration

The purpose of the System/Task Configuration (STC) window is to prompt RDM for system-specific information that is needed to run a task. The STC window associates some number of systems with a task and defines all the parameters needed to run that task on each of the systems. Exiting the STC window opens an IBM Director message box (if you have the check box on the STC screen "Execute this task..." selected) asking whether to schedule the task or to run it now.

Right-click a system, and then click **Remove System** from the context menu to delete systems already displayed, but not to remove its data from the database. This deploys a task on a subset of the systems that are configured for that task, without losing the system/task configuration data for the systems not being deployed.

Right-click a system, and then click **Unconfigure System** from the context menu to delete the STC data from the database.

The following steps outline what the STC does, whenever its window is displayed:

1. Qualification (verifies that the system is suitable for running the task)
2. Parameter generation (from task defaults)
3. Parameter editing by you in the STC window
4. Parameter validation
5. Save the new STC data (keyed by the system/task pair)

An STC window can be started in the following ways:

1. **Drag selected systems onto a task.** A context menu is displayed. Click **Configure Systems**. The STC window opens, with the dragged systems shown in the STC grid.
2. **Drag a task onto a system (or one of a set of selected systems).** A context menu is displayed. Click **Configure Systems**. The STC window opens, with the systems shown in the STC grid.
3. **Drag a group onto a task (from the left pane of the IBM Director Console).** A context menu is displayed. Click **Configure Systems**. The STC window opens, with the systems that are members of the group shown in the STC grid.
4. **Drag a task onto a group.** A context menu is displayed. Click **Configure Systems**. The STC window opens, with the systems that are members of the group shown in the STC grid.
5. **Right-click a task.** A context menu is displayed. Click **Configure Systems**. The STC window opens with all previously configured systems filled in.

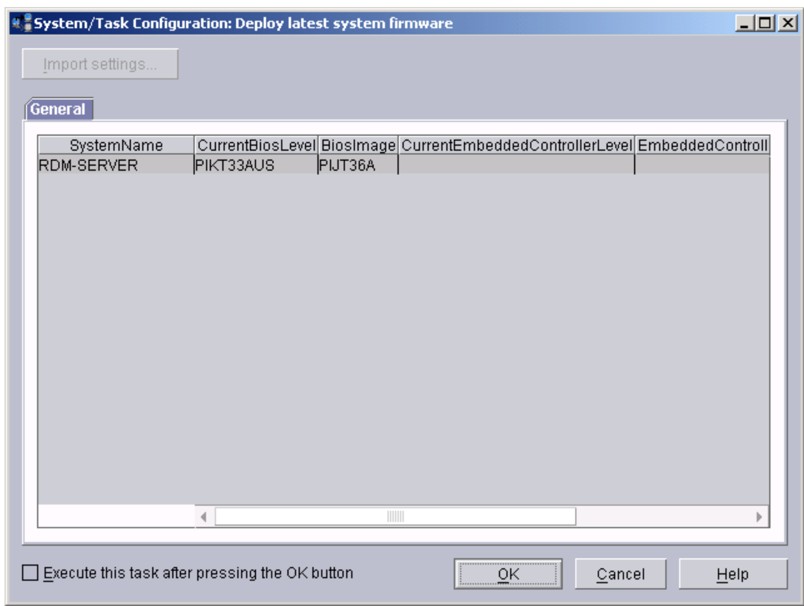


Figure 27. System/Task Configuration: System Firmware Flash window

Click **Import settings** to import parameter values for the systems displayed in the STC. The imported file must be a comma-delimited text file. Columns must be named (in the first comma-delimited row) to match existing columns in STC - fields not matching existing columns are discarded. The default extension for the imported file is .csv.

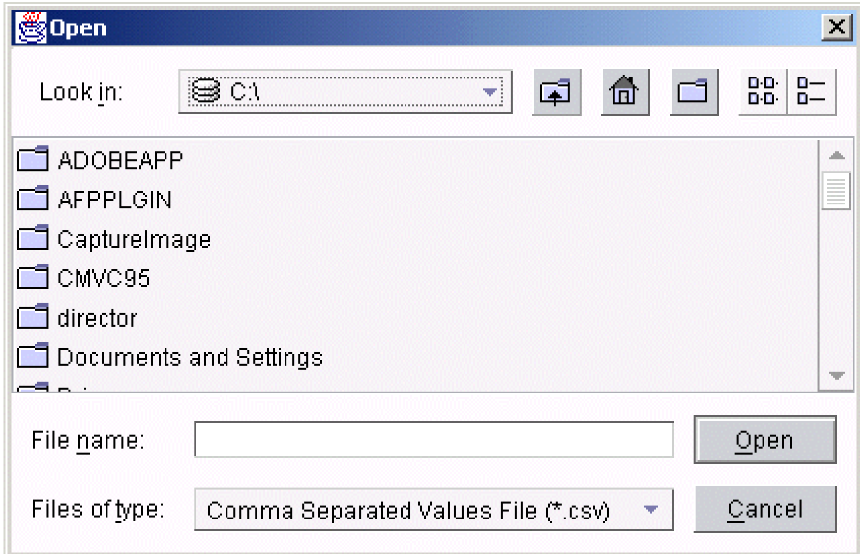


Figure 28. Specifying the source for the imported file

Target system qualification

System qualification is used to determine if a system meets the hardware requirements necessary for running a particular task. RDM can be forced to disregard system qualification by either checking a specific check box while the task is being created, or by choosing to ignore the system qualification on a specific system when RDM warns of a potential conflict.

Note: For all tasks, they must not currently be running a task of the same type when system qualification is performed. For example, if you are running a Windows Native Install task, qualification on a second Windows Native Install task fails.

System qualification varies for each task type:

CMOS Update
There must be at least one CMOS image in the master repository that corresponds with the target system's BIOS product code and level.

Custom
System qualification is always skipped for Custom tasks and templates.

Donor
System qualification is always skipped for the Donor task and template.

Linux Native Install
Target systems must be capable of running Linux.

Power Restore
System qualification is always skipped for Power Restore tasks and templates.

RAID Clone
Qualification depends on the type of clone file specified for the task:

- Configuration backup files require either a ServeRAID controller or an integrated SCSI controller with RAID capabilities.

- Command files require either a ServeRAID controller or an integrated SCSI controller with RAID capabilities. In addition, the target system must have physical drives at the channel/SCSI IDs called out in the configuration commands and must be of adequate size to accommodate the logical drives defined.

RAID Custom
Target systems must have either a ServeRAID controller installed, or an integrated SCSI controller with RAID capabilities. Target systems must have enough adequately sized physical drives to support the task configuration.

Scan
System qualification is always skipped for Scan tasks and templates.

Script
All tasks within a script must pass the qualification specified for each task. For example, if a Script task included a System Firmware Flash task and a Windows Native Install task, both tasks must pass their individual qualifications for the Script task to qualify.

Secure Data Disposal
If a specific disk is selected, it must be present on the target system.

System Firmware Flash
There must be at least one system firmware image in the master repository that corresponds with the Current System Firmware product code on the managed system.

A further qualification exists for the built-in Update with the Latest System Firmware Level task: if the Apply Same Level parameter is used, target systems are flashed even if the version is the same. If not specified, target systems having the same version are disqualified.

Windows Clone Install
Target and Donor systems must have compatible Hardware Abstraction Layers (HALs) and identical mass storage controllers.

Windows Native Install
Target systems must be capable of running Microsoft Windows. Systems must have a minimum of a 4 GB drive.

Data import/export

Data importing and exporting is a means of getting data from foreign programs, including LANClient Control Manager™ (LCCM) 2.x or RDM 3.x, into RDM. Data imported or exported is system data.

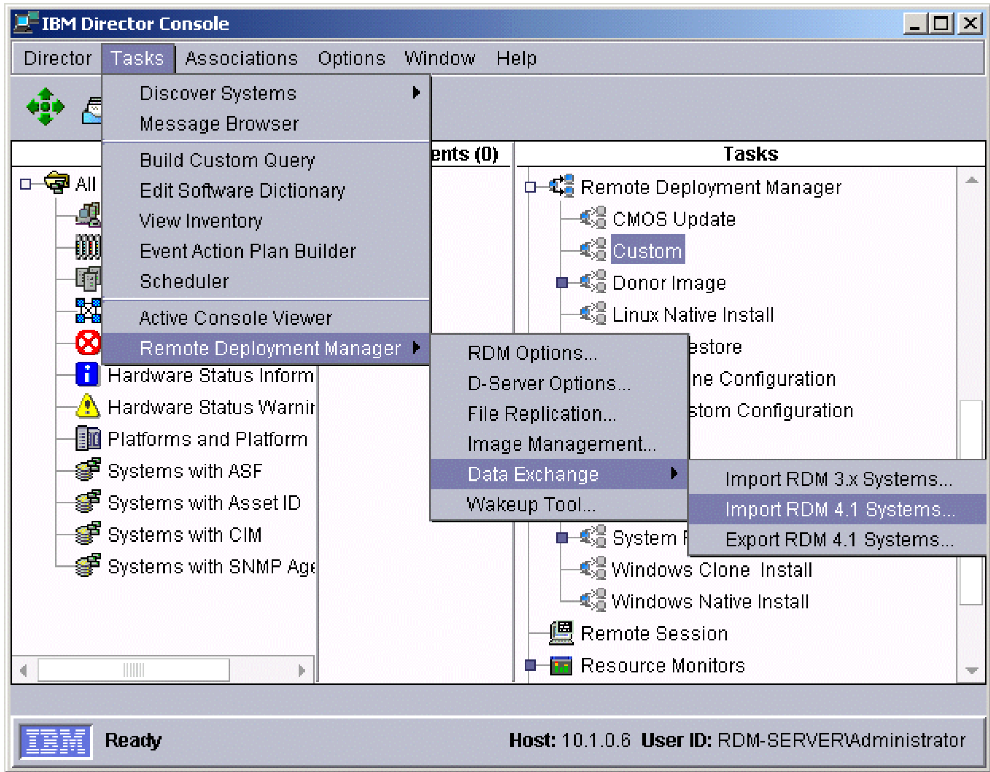


Figure 29. Import RDM 4.11Systems window

It should be emphasized that importing “data” in this sense is different from importing “images,” which happens in the Image Manager. In the image case, you are dealing with getting the files necessary to perform a certain task; this is an ongoing operation. Importing data refers to a more global operation, possibly affecting multiple tasks. It is usually a one-time, or infrequently performed operation, and is primarily used when the system is first installed, as a way to use data that already exists.

Import RDM 3.x Systems. Imports old RDM 3.1 client information into an RDM 4.11 installation in a 2-step process:

1. From RDM 3.1, export client data to a file.
2. From RDM 4.11, import that same client data file.

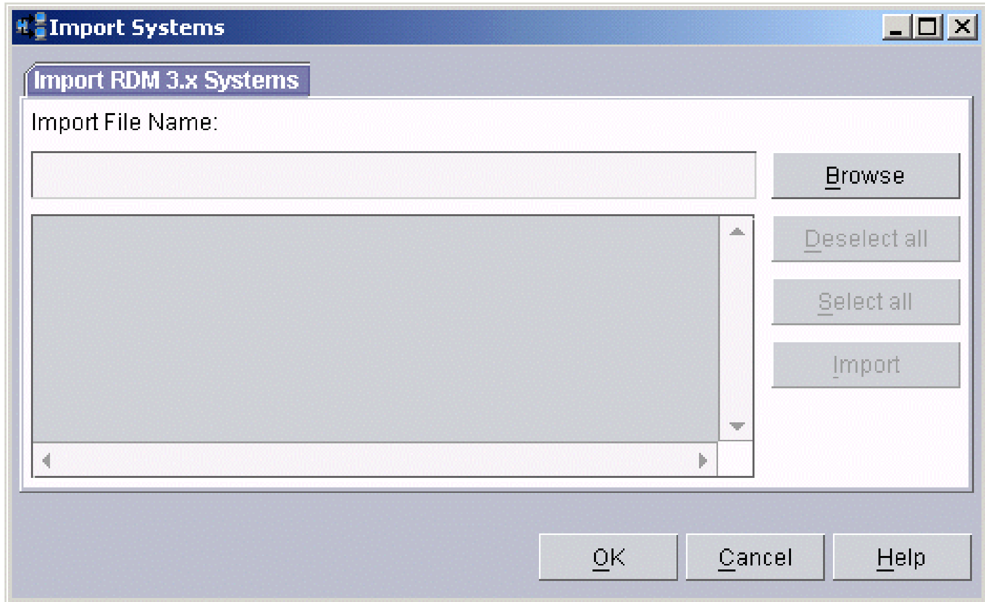


Figure 30. Import RDM 3.x Systems window

Import RDM 4.1 Systems. Always a local file.

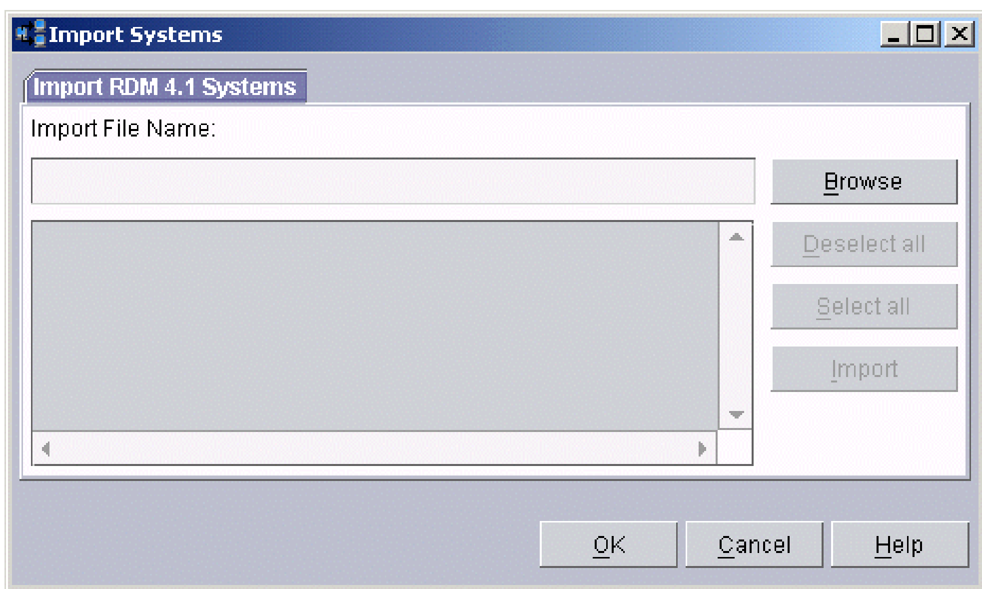


Figure 31. Import RDM 4.11Systems window

Export RDM 4.1 Systems. For exporting an RDM 4.11client. Browse to the file or directory and give it a name with a .txt file extension. Export this file to the location you specify.

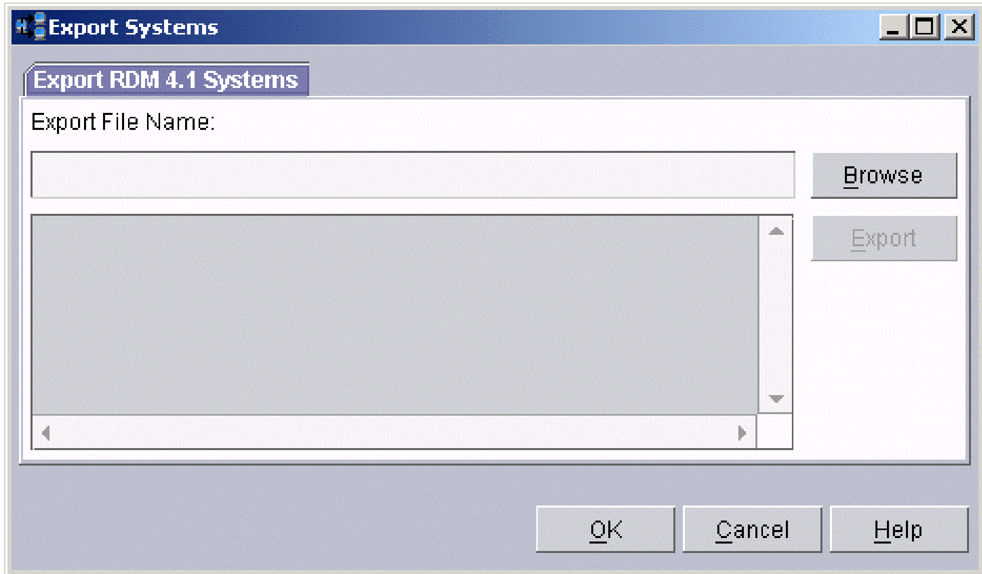


Figure 32. Export RDM 4.11Systems window

Wakeup tool

The wakeup tool is a tool for waking up arbitrary systems. It collects a list of MAC addresses (and subnets) for systems that you want to scan, and issues wakeup packets for each of them at intervals.

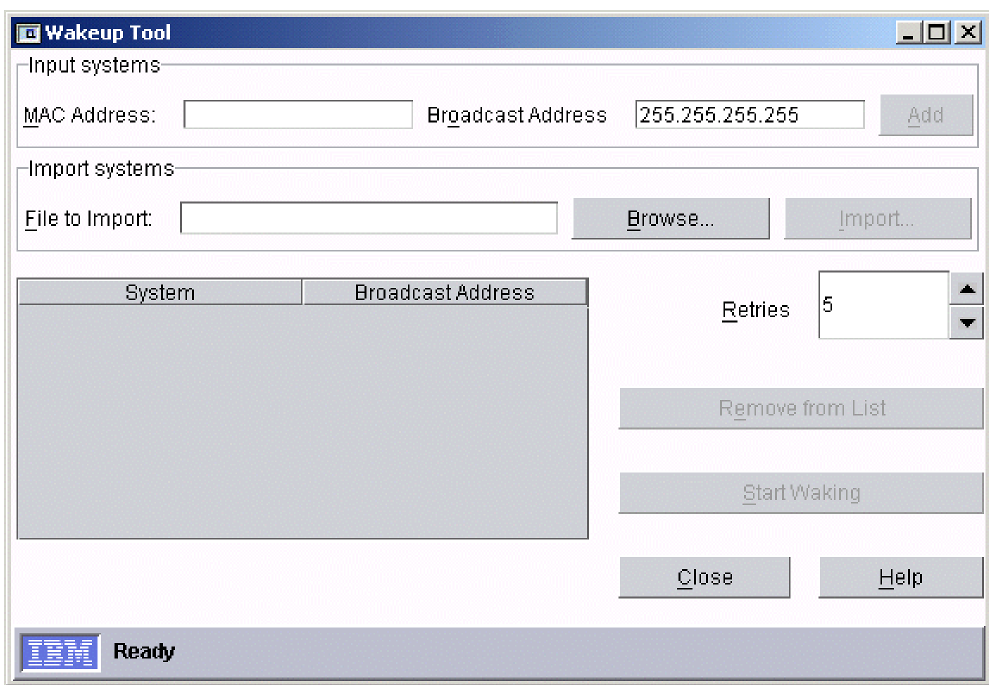


Figure 33. Wakeup Tool window

To wake systems, you must get their MAC addresses and broadcast addresses into the list box before you click **Start Waking**. There are several ways to fill the list box:

- Type data in both Input systems Entry fields (MAC Address, Broadcast Address) and click **Add**.
- Type a file name in the applicable Import systems field (File to import), and click **Import**.
- Use **Browse** to navigate to a file, and click **Import**.
- Start the Wakeup Tool using IBM Director Console by clicking **Tasks → Remote Deployment Manager → Wakeup Tool**.
- Select one or more systems in the IBM Director Console, right-click one of the selected systems, and select **Wakeup Tool**.

You can select one or more systems in the list box and click **Remove from List** to delete the selected systems from the list box.

Note that when the information provided in the window is retrieved through an import file this information is not entered into the system database. This information is merely passed to the Wake System tool as its input to start waking up those systems. Wake system is not a task that can be scheduled; it simply runs when you click **Start Waking**. There is no job or history information kept for this task.

Troubleshooting

There are many variations possible across different systems. Most IBM systems work well, although some older systems have their quirks. Here is some general setup information in case the Wakeup Tool does not wake your systems:

- Ensure that your system hardware supports the Wake on LAN feature. For example, older servers do not (although most xSeries servers do).
- Ensure that you have an up-to-date BIOS level on the system.
- Ensure that the Wake on LAN feature is enabled in the BIOS code setup (press F1 during POST to change the settings).
- Ensure that one of the following is true:
  - The system is on the same physical subnet as the server (in this case, you can use the default broadcast address 255.255.255.255).
  - You specify the subnet broadcast address of the system (so that the broadcast can be routed to the correct subnet).
- Ensure that the Wake on LAN feature is enabled for your NIC in the NIC boot agent.

  On some Intel network adapters, the boot agent can be accessed by pressing **Ctrl+S** during system startup when the prompt `Initializing Intel Boot Agent Version x.x` appears on the screen. Make sure the Legacy OS Wakeup Support option is enabled. For other adapters, go to the Web site of the manufacturer and search on Boot Agent. Download the appropriate file for activating the Wake on LAN feature. For example, search for Boot Agent on the Intel Web site for the PRO/1000 XT adapter, and download the file Proboot.exe. This file produces the ibautil.exe utility described in the *Remote Deployment Manager 4.11 Compatibility Guide* for this adapter. The utility explains how to enable the Wake on LAN feature.
- Double-check that the MAC specified is the MAC shown in the BIOS code setup windows. If you have a server with multiple network adapters, you should see multiple entries in the Wakeup Tool (a MAC address for each adapter).

Chapter 3. RDM tasks

This chapter describes the RDM templates and how to create new tasks from these templates. The templates are:

CMOS Update

Use the CMOS Update task to update the CMOS configuration settings on target systems.

To use this task, you must do the following:

1. Use the LCCMOS.BAT file on a BIOS update diskette (required for some, but not all, systems).
2. Capture CMOS settings from a donor system.
3. Create an RDM task that uses that image.
4. Deploy systems with the task.

You can use multiple CMOS images in a task. At run time, the correct CMOS image for each system is selected. CMOS images are created from a donor system, using a program contained on the BIOS flash diskette. The CMOS image is tied to a specific BIOS product code and BIOS code level.

You must have a valid BIOS image for every product code where you want to use the task. BIOS product codes may apply to more than one machine type. See “System Firmware Flash” on page 96

Using the LCCMOS.BAT file

During a remote update of the CMOS settings, RDM runs one of the following programs, LCCMOS.BAT, CMOSUTIL.EXE, or SRCMOSxx.EXE, depending on the BIOS image. Here is an example of the command RDM runs:

```
CALL LCCMOS.BAT %CMOSFILE%
CALL CMOSUTIL.EXE %CMOSFILE% /UPDATE /NOREBOOT /QUIET
CALL SRCMOSNV.EXE %CMOSFILE% /UPDATE /NOREBOOT /QUIET
```

Note: If you thoroughly understand the CMOS process, you might create or modify an LCCMOS.BAT file to customize this process. Refer to the readme file on the BIOS flash diskette for more information.

CMOSUTIL.EXE programs for different Netfinity®, xSeries, or BladeCenter™ servers might require different command-line syntax. For example, to perform a CMOS update on an xSeries 330 server, you must create an LCCMOS.BAT file. The default RDM file cannot be used because the required syntax is different. For example:

```
REM LCCMOS.BAT file created by the customer for xSeries 330
REM to override the default syntax for CMOSUTIL.EXE.
cmosutil.exe /R %1
```

Note: Any system whose cmosutil program uses -s and -r to save and restore, versus /s and /r, requires an LCCMOS.BAT file. Make a note of what syntax each particular system uses when you create the .cms file initially. Use one of the following commands in your batch file:

```
cmosutil.exe -r filename.cms
cmosutil.exe -r %1
```

Capture the CMOS settings

To capture the CMOS settings, use the CMOSUTIL.EXE or SRCMOSxx.EXE (where xx will be two characters identifying the system board type) program. You will find the appropriate program on the BIOS flash diskette.

Note: CMOS utilities for Thinkpad® systems can be found at http://www-1.ibm.com/support/docview.wss?uid=psg1MIGR-41472

You create the CMOS-settings file on a donor system that has the correct BIOS code level installed. Perform the following steps on the donor system:

1. Start the system and access the Configuration/Setup Utility program. On many IBM systems, you can access this program by pressing F1 while the system is starting.
2. Change and save the new settings as required. In particular, put “diskette” ahead of “network” in your alternate boot sequence.
3. Exit from the Configuration/Setup Utility program (saving your changes) and power off the system.
4. Insert a DOS boot diskette that contains the appropriate CMOSUTIL.EXE or SRCMOSxx.EXE program into the donor system diskette drive.
5. Restart the donor system using the Wake on LAN feature. You can use the RDM wake tool to do this.

   Use the CMOSUTIL.EXE or SRCMOSxx.EXE program to save the current settings of the donor system to a file that you will name with the .cms file extension. Enter:

   ```
   CMOSUTIL \path\file_name.CMS /capture
   ```

   or

   ```
   CMOSUTIL - s \path\file_name.CMS
   ```

   or

   ```
   SRCMOSxx \path\file_name.CMS /capture
   ```

   where *xx* is the two-character system board identifier, and path is any accessible directory name of your choice.

   Note: For the CMOSUTIL utility, check the BIOS diskette for documentation on the exact syntax for capturing CMOS settings. This information should either be in the file readme.txt or cmosutil.txt.

Give the file a unique name that you can identify later. For example, the file no35disk.cms could be the name of a file that has settings that restrict system access to diskette drives.

Use this .CMS file with the CMOS Update task or with the Image Manager (IM) to create the CMOS image.

6. If you want to create another CMOS image that uses different settings, return to step 1 and repeat the procedure, saving the results to a different file name.

Create a CMOS Update task

Complete the following steps to create a CMOS Update task:

1. Right-click **CMOS Update** and click **Create new task**.

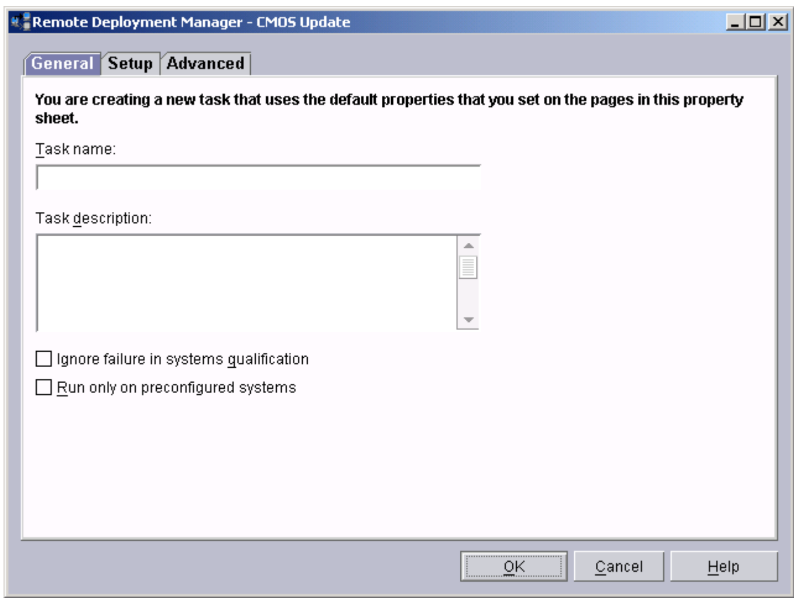


Figure 34. General page for CMOS Update

2. Enter the General and Advanced tab information. The **General** and **Advanced** properties are discussed in “Property sheets” on page 10. This section details the CMOS Setup properties.
3. Click the **Setup** tab. Type your values for each of the following categories:

   Images

   Password

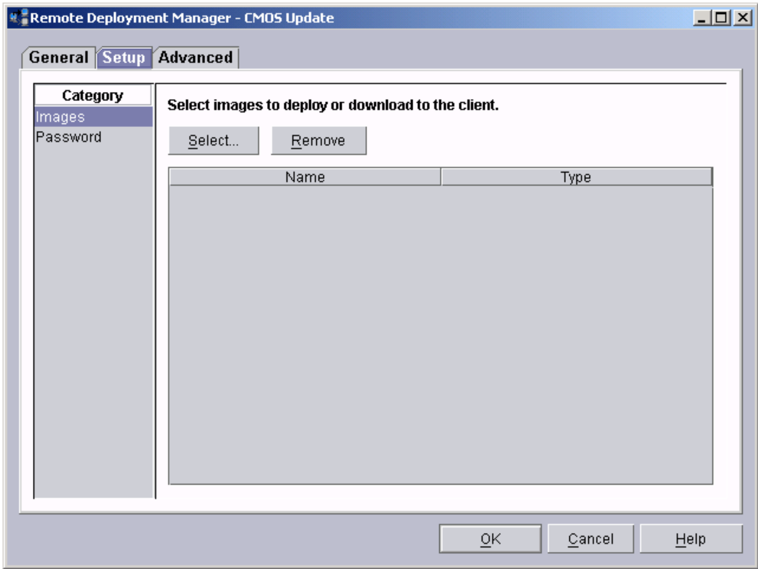


Figure 35. Setup page for CMOS Update

Select an image from the list box, or click **Select** to add an image to the RDM repository and to the list in this window. If you are going to create a new CMOS Update image, a corresponding System Firmware Flash image must already exist.

To remove an image from the list, select the image (within the list), and then click **Remove** (this does not remove the image from the RDM repository).

Select an image from the list box, or click **Select** to add an image to the RDM repository and to the list in this window. If you are going to create a new CMOS Update image, a corresponding System Firmware Flash image must already exist. To remove an image from the list, select the image (within the list), and then click **Remove** (this does not remove the image from the RDM repository).

Creating a new image

Complete the following steps to create a new image:

a. From the Setup page of the CMOS Update template, click **Select**. This opens the "Image Selection" window.

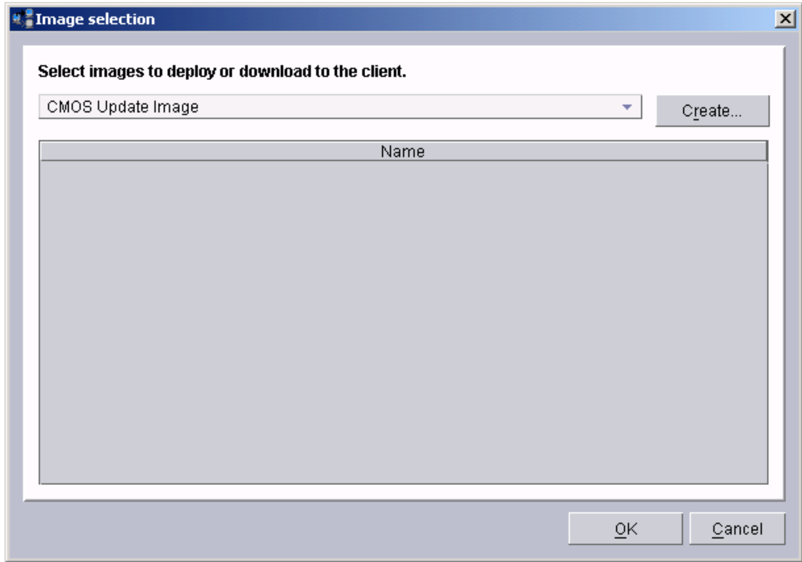


Figure 36. “Image Selection” window

b. Click **Create**.

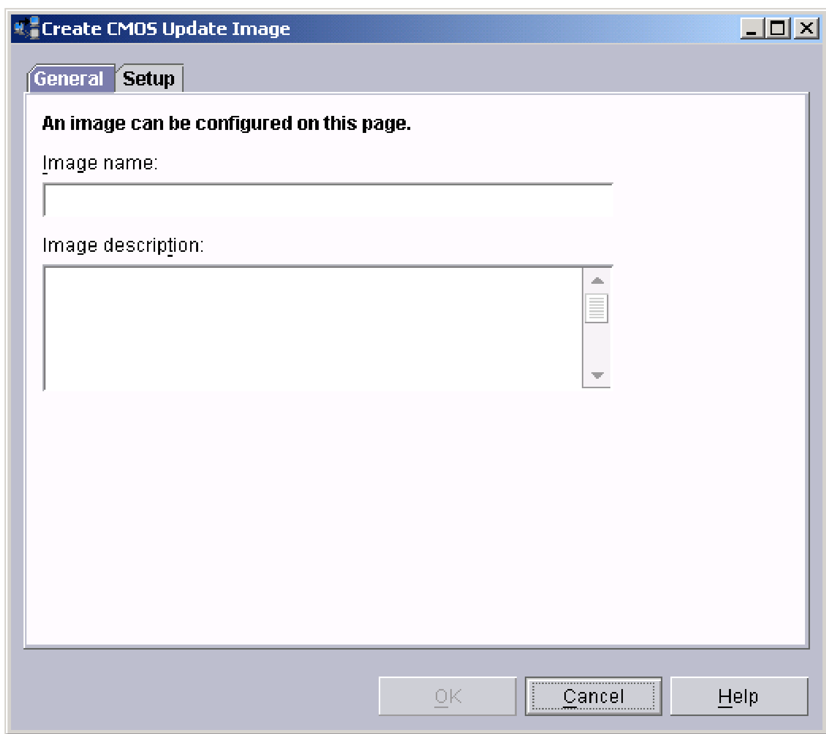


Figure 37. General page of “Create CMOS Update Image” window

c. On the General page, type a name and optional description for the new image to create.

d. Click the **Setup** tab, select the corresponding BIOS code (the System Firmware Flash image) and specify or browse to the source of CMOS clone file to be imported. The Executable name and Executable parameters will be filled in automatically.

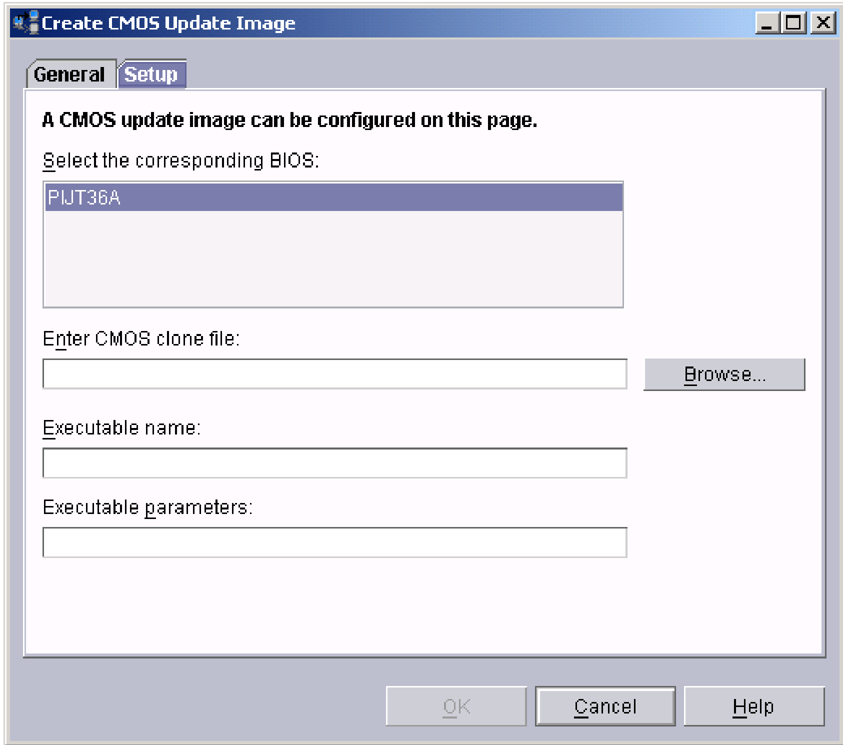


Figure 38. Setup page of "Create CMOS Update Image" window

If you click **Browse**, the file you are looking for is called out in the title of the browse box.

e. Click **OK**.

Password

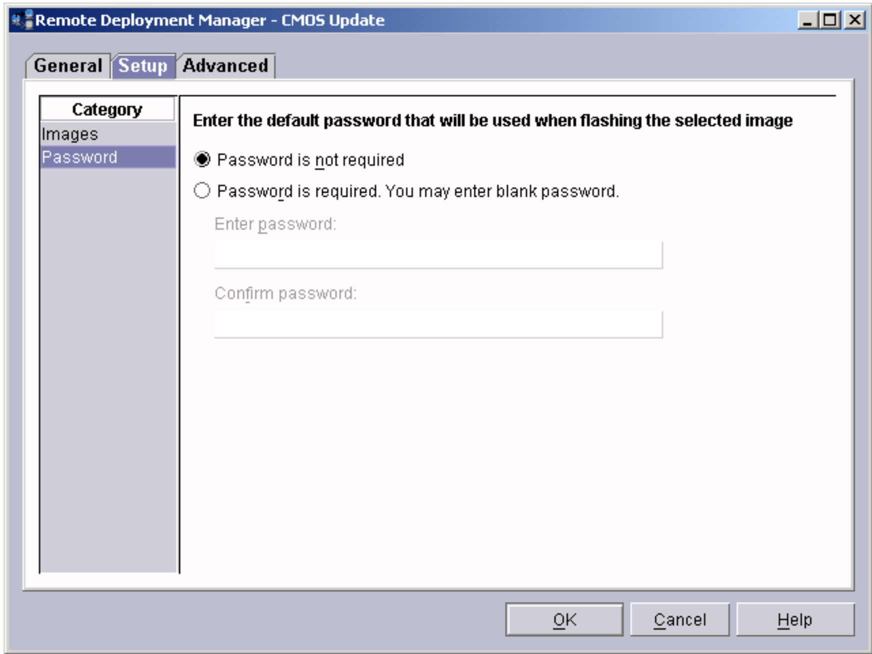


Figure 39. Password category for CMOS Update

You can choose whether or not to require a password for flashing the selected image. Click **Password is required** to enable the Enter password and Confirm password entry fields. A blank password is allowed.

4. Click **OK** to create the task.

   The task appear in the Tasks pane under **CMOS Update**. Right-click the new task to copy, edit, or delete the task.

Deploy the CMOS settings image

To apply the newly created CMOS settings image to selected systems, create a CMOS Update task. When creating the CMOS Update task, you can select which CMOS image to use or create a new CMOS image to use; then, by dragging systems with the correct BIOS code levels to this task, the CMOS is updated.

Note: You need to know the corresponding BIOS level when creating a CMOS Update task for the task to operate properly.

CMOS updates are not be made until the scheduled update time and the system is powered off and restarted. If the CMOS settings update fails, an error code appears in the "Progress and Errors" window. The meanings of the error codes vary depending on the BIOS code level. To decipher the error codes:

1. Insert the applicable BIOS flash diskette into the diskette drive.
2. At a command prompt, type:

   `A:\CMOSUTIL /?`

   or

   `A:\SRCMOS`*`xx`*` /?`

   where *xx* is a two-letter model-specific designation.

Any error codes and their meanings are displayed.

Custom

Use the Custom task template to define your own processes to run on a target system. The task consists of the following:

- A command list containing the commands that are to be run as part of the task. Batch files can be run within the command list. Commands are run in the order they appear in the command list.
- One or more optional image files containing all the supporting files required by the commands. Use the RDM Image Manager to create and store images in the RDM Master Repository. When you run the Custom task, it uses an MTFTP call to access the images in the repository.

Creating a Custom task

Use these steps to create a Custom task:

1. Expand **Remote Deployment Manager** in the Tasks pane.
2. Right-click **Custom**. The Custom menu is displayed.
3. Click **Create new task** on the Custom menu to access the property pages. There are two pages:
   - **General**: Accesses basic information about the task.
   - **Advanced**: Accesses the command list, user parameters, and task folder for the task.
4. Enter the task information on the General page.

   Note: System qualification is not applicable for Custom tasks.
5. Click the **Advanced** tab. The available information categories are displayed in the left pane: Command list, User parameters, and Task folder. Click a category to display the associated properties.
6. Add any commands needed for the task in the command list. The command list is a list of RDM and DOS commands to perform the Custom task. There is no syntax checking or command verification. Click **Reload** to restore the command list to its original state.

   Refer to Appendix A, "Command list commands", on page 185 for information on commands and syntax within a command list.
7. Add and select the user parameters needed for the task.
8. Click **OK** to create the new task.

The task will appear under the Custom template in the IBM Director Tasks pane. Right-click the new task to edit or delete the task.

Donor Image

Use the **Donor Image** → **Get Donor** built-in task to create an image from a donor system. The donor and target system must use the same HAL (Hardware Abstraction Layer). The best results are achieved when the donor hardware configuration matches the target system. You can attempt non-matching hardware donors if you believe the hardware differences would not be an issue. The image is stored in the RDM Master Repository. Once stored, you can deploy the image to target systems through the Windows Clone Install task.

The **Get Donor** task runs PowerQuest code (PQIDplyZ.exe) on the donor system. The donor must be prepared with the sysprep utility prior to creating the clone image, creates a clone image from the donor system, and stores it in the RDM Master Repository.

Note: The PowerQuest software can only obtain an image from an ethernet-connected donor system. Systems networked with Token Ring cannot be used to obtain a donor image.

Creating and using a Donor image

There are multiple steps required to obtain and deploy a donor image:

Step 1: Prepare the donor system.

Step 2: Prepare IBM Director Agent 4.1 (if it is present on the donor system).

Step 3: Create a clone image.

Step 4: Create a Windows Clone Install task.

Step 1: Prepare the donor system

1. Ensure that the donor system is set as part of a workgroup, not as part of a domain.
2. Ensure that the built-in Administrator password is blank.
3. If you are including applications as part of the image:
   a. Log on to the donor system as a user account that has administrative privileges. Do not use the built-in Administrator account.
   b. Install and configure the applications as necessary.

      Note: If you are planning to deploy systems with Power Restore partitions, setup your donor system with a Power Restore partition to ensure the donor partition is not too large for the target systems.
   c. Log off the donor system.
   d. Log on to the donor system using the built-in Administrator account.
   e. Copy the user profile you used to install the applications to the Default Users folder.
4. There are two utilities available from Microsoft: sysprep.exe and setupcl.exe. They are available on the Windows 2000 and Windows XP operating system CDs (in the support\deployment\deploy.cab directory) or you can download updated versions from www.microsoft.com.

   Create a directory for the Microsoft utilities, for example, c:\winnt\support\deployment
5. Copy the sysprep.exe and setupcl.exe programs to the new directory on the donor.
6. Close all windows on the donor system.
7. Open a “Command Prompt” window on the donor system. For example, **Start → Run → cmd**.
8. Run sysprep, for example:

   ```
   c:\winnt\support\deployment\sysprep
   ```

   The sysprep utility prepares the donor for imaging. System settings are removed so there are not conflicts when you deploy the image.

9. Click **OK** for sysprep to complete. The donor system should shut down. For Microsoft Windows XP Professional, a new window opens. Select **MiniSetup** and make sure **Shutdown** is shown in the drop-down box; click **OK** for sysprep to complete. The donor system should shut down.

After running sysprep on most mobile systems, the system does not shut down automatically. You can manually shut down the system without any errors when the blue screen with the mouse pointer appears after a few minutes.

RDM uses sysprep.exe to personalize the system with data from the sysprep.inf file. You can modify sysprep.inf options and store them directly on the target system hard disk drive after downloading the image.

The MiniSetup option that is used with sysprep for Windows XP Professional has limitations on its definition of new users. A system deployed with a PowerQuest clone installation of Windows XP Professional which uses the new-style login screen will not show the RDM-assigned user. Instead, press the Ctrl+Alt+Del key combination twice in rapid succession to bring up the "classic" login screen.

Step 2: Prepare IBM Director Agent

This section is only needed if IBM Director Agent 4.1 is present on the donor system.

When IBM Director Agent 4.1 is installed on a Windows 2000 or Windows XP system, certain files and settings are saved by IBM Director Agent to uniquely identify the system. If not handled properly, a donor image that includes IBM Director Agent may incorrectly cause IBM Director Server to identify all the target systems as the same system. This section describes a procedure that may be used to ensure that when a donor image with IBM Director Agent 4.1 is deployed to multiple target systems, each system will be uniquely identifiable by IBM Director Server.

Donor system preparation: A donor system which includes IBM Director Agent 4.1 is prepared the same way as other donor systems with one important caveat: If IBM Director Agent includes Web-based Access, the IBM Director Agent browser should be run once to ensure that it is initialized and working properly. To do this, select **IBM Director Agent browser** from the IBM Director folder in the Applications section of the Start menu. You may find that to successfully initialize the browser that you will need to install additional files. Once you are able to log in to the browser, your IBM Director Agent installation should be ready.

Before continuing with donor preparation, note in which directory IBM Director Agent has been installed. By default, this directory is:

C:\Program Files\IBM\Director

If you have included Web-based Access for IBM Director Agent, go to the IBM Director Agent installation folder, then enter the websrv folder, and then the conf folder. Copy the httpd.conf file to a floppy diskette or network drive in order to get it to a folder on the management server. If IBM Director Agent has been installed in the default directory, the full path of that file will be:

C:\Program Files\IBM\Director\websrv\conf\httpd.conf

This file will be modified in order to facilitate making Web-based Access unique for each target machine.

Close the IBM Director Agent browser, and then complete the steps needed to prepare the donor, such as installing other applications and running Microsoft SysPrep.

RDM task modifications: Once you have captured the donor image and created the RDM Clone Install task, you can then make the necessary modifications to ensure that IBM Director Agent will be unique on each target system. First, identify the folder in which your task data is located.

Identifying the task folder

1. Right-click on the task and choose **Edit Task....**
2. In the Task Notebook, choose the **Advanced** tab.
3. In the left-hand pane, select **Task folder**. The task folder location is shown in the main panel.
4. You can close the Task Notebook by selecting **Cancel** or **OK**.

Now that you have located the task folder, open that folder in Windows Explorer. We will be adding files to that directory and modifying the Command List.

DA-FIX.BAT

This file will be run in the Windows environment after the clone image has been deployed to the target system. Create a file named da-fix.bat and include the following content:

```
del "c:\program files\ibm\director\data\twgmach.id" /F
del "c:\program files\ibm\director\data\netdrvr.ini" /F
"c:\program files\ibm\director\bin\twgipccf" /r:c:\diragent.rsp
REM This line only needed if web-based access is included
move /Y "c:\httpd.con" "c:\program
files\ibm\director\websrv\conf\httpd.conf"

regedit /s c:\DirRest.reg
```

Note that one of the lines will not be needed if Web-based Access was not included in the IBM Director Agent installation.

DIRAGENT.RSP

This file is used in the da-fix.bat script to configure IBM Director Agent. Create a file named diragent.rsp and include the following content:

```
[Agent]=Y
Driver.TCPIP=1
WakeOnLan=1
ReqUserAuthToScreen=0
DisableScreenSaver=0
DisableWallpaper=0
;AddKnownServerAddress=TCPIP::xx.xx.xx.xx
ShutdownDoesPoweroff=0
```

Optionally, if the comment is removed before the `AddKnownServerAddress` statement (that is, delete the semicolon), the IP Address of the management server is substituted for `xx.xx.xx.xx`, and if the Discovery Preference of IBM Director Server has been specified as “Automatically Add Unknown Systems That Contact The Server”, the new system will automatically be “discovered” and inventoried.

DIRAGT.BAT

This file is run in the DOS environment after the clone image has been deployed to the target system. Create a file named diragt.bat and include the following content:

```
mtftp get %SERVER_IP% TEMPLATE\%TASKTEMPLATEID%\%TASKTOID%\da-fix.bat a:\da-fix.bat
PQAccD /copy a:\da-fix.bat 1:\da-fix.bat
mtftp get %SERVER_IP% TEMPLATE\%TASKTEMPLATEID%\%TASKTOID%\diragent.rsp a:\diragent.rsp
PQAccD /copy a:\diragent.rsp 1:\diragent.rsp
mtftp get %SERVER_IP% TEMPLATE\%TASKTEMPLATEID%\%TASKTOID%\dirrest.reg a:\dirrest.reg
PQAccD /copy a:\dirrest.reg 1:\dirrest.reg

del A:\custimg\pqagent.bat
mtftp get %SERVER_IP% TEMPLATE\%TASKTEMPLATEID%\%TASKTOID%\pqagent.bat A:\custimg\pqagent.bat
del A:\custimg\pqagent.reg
mtftp get %SERVER_IP% TEMPLATE\%TASKTEMPLATEID%\%TASKTOID%\pqagent.reg A:\custimg\pqagent.reg
REM These next 4 lines needed if web-based access is included in Director Agent
mtftp get %SERVER_IP% environment\dos\lccustom.exe A:\lccustom.exe
mtftp get %SERVER_IP% TEMPLATE\%TASKTEMPLATEID%\%TASKTOID%\httpd.con a:\httpd.con
lccustom a:\httpd.con
PQAccD /copy a:\httpd.con 1:\httpd.con
```

Note that there are 4 lines which should not be included if the IBM Director Agent installation did not include Web-based Access.

DIRREST.REG

At the end of the GUI setup, the IBM Director Agent services are temporarily set to Manual so additional changes can be made. Create a file named direst.reg and include the following content:

```
Windows Registry Editor Version 5.00
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\TWGIPC]
"Start"=dword:00000002
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\DirWbs]
"Start"=dword:00000002
```

Note that the text in italics is only needed if the Director Agent installation includes Web-based Access.

HTTPD.CONF

This file is only necessary (and available) if IBM Director Agent was installed with Web-based Access on the donor system.

As stated in a previous section, this file should have been copied from donor system and placed on the management server. Move httpd.conf to the task directory on the management server, and rename it httpd.con (i.e., without the 'f'). Now open the file in a text editor and find the line with the text string "DirectorAgentServerName". Change the original system name to %COMPUTERNAME%:

```
define DirectorAgentServerName %COMPUTERNAME%
```

PQAGENT.BAT

In order to include customizing of IBM Director Agent as part of the clone task work, some of the RDM files will be copied into the task folder and modified.

Copy pqagent.bat from local\env\71c\custimg under the RDM installation directory. If you installed RDM in the default location, the full path for the file is:

C:\Program Files\IBM\RDM\local\env\71c\custimg\pqagent.bat

Add one line to the file as indicated below (in bold):

```
...
REM Setup up cleanup for next boot
regedit /s c:\pqclean.reg
call c:\da-fix.bat
REM RUN Windows RDAgent
...
```

PQAGENT.REG

Copy pqagent.reg from local\env\71c\custimg under the RDM installation directory. If you installed RDM in the default location, the full path for the file is:

C:\Program Files\IBM\RDM\local\env\71c\custimg\pqagent.reg

Make the following changes:

```
Windows Registry Editor Version 5.00

[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\RunOnce]
"PQAgent"="c:\\pqagent.bat"

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\TWGIPC]
"Start"=dword:00000003

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\DirWbs]
"Start"=dword:00000003

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\ComputerName\ComputerName]

"TWGMachineID"=hex:
```

Command List: The Command List for the task can either be edited from this directory or through the **Advanced** tab in the Task Notebook. The following shows the complete Commandlist file for the tasks:

```
;This is the command list for clone Full deployment task
BOOTTYPE !LOADDOS !ENVIRONMENT/DOS71C
WAKE
!!SETENV
TIMEOUT 240
!deploy\deploy.bat
!!REBOOT
!custimg\setUser.bat
!!SETENV
!mtftp get %%SERVER_IP%% template\%%TASKTEMPLATEID%%\%%TASKOID%%\diragt.bat diragt.bat
!mtftprc
!diragt.bat
!custimg\custimg.bat
BOOTTYPE !BOOTLOCAL
!!REBOOT
!!SHUTDOWM
END
```

Summary: Here is a recap of the steps necessary for including IBM Director Agent in a Windows Clone Install task:

1. If the IBM Director Agent installation includes Web-based Access, copy the httpd.conf file to the management server before running Microsoft SysPrep.
2. Create **da-fix.bat** in the task folder.
3. Create **diragent.rsp** in the task folder.
4. Create **diragt.bat** in the task folder.
5. Create **direst.reg** in the task folder.
6. Copy **httpd.conf** to the task folder and rename it **httpd.con**, and then modify it.

7. Copy **pqagent.bat** to the task folder and modify it.
8. Copy **pqagent.reg** to the task folder and modify it.

After these steps have been completed, the task should be able to deploy a Windows Clone image and enable the installed IBM Director Agent software to uniquely identify the target system.

Step 3: Create a clone image

1. Expand **Remote Deployment Manager** in the Tasks pane so that **Donor Image** is visible.
2. In the Group Contents pane, right-click the donor system and drag it to the **Donor Image** task. If the donor system does not appear in the Group Contents pane, run the Scan task.
3. Click **Configure Systems**. RDM sends a wake up to the donor system. A command window opens on the donor to display progress. A progress window also opens on the RDM console to monitor the creation of the image file. The file is of type .pqi (power quest image). The resulting image can be several gigabytes in size.

   Note: Creating too many large clone files can cause the RDM server to run out of disk space. RDM does not monitor server hard disk space for the Get Donor task; you must make sure there is enough disk space to perform the task. Clone image size is dependent on the data you are cloning; there is no way to predict how large a cloned image will be.

   Note: Do not run more than a few Get Donor tasks concurrently due to system resource limitations.
4. When configuration is complete, right-click **Get Donor** and click **Run**. This step adds the donor image to the Master Repository so it is accessible to other tasks. You can edit the following fields:

DonorOSType	Name of the operating system used for the image. This is a drop-down list.
DonorExternalName	Descriptive name for the image.
DonorDescription	Description of the image.

   Click **Save** to add the image to the repository.

   Note: When running the Get Donor task on a client attached to a Remote D-Server, the client may be suspended for a time contacting the server after capture.bat is completed. During this time, the Remote D-Server is replicating the donor image to the Master D-Server. If you cancel the Get Donor task while the task is running, you may have a problem running the task again until the canceled task finishes copying the donor file to the Master D-Server.

   When replication is complete, the client shuts down and the task is complete.

Step 4: Create a Windows Clone Install task

1. Create a Windows Clone Install task using the PowerQuest donor (.pqi) file as input.
2. Deploy the cloned image to other systems by dragging system-to-task or task-to-system within IBM Director Console.

3. Update the sysprep.inf file with personalization on the cloned systems by using RDM remote DOS boot and the Pqaccess.exe program.
4. Reboot the cloned systems to their hard disk drive. The sysprep program personalizes the systems with data from sysprep.inf.

Scheduling a Get Donor task

To schedule a Get Donor task:

1. Right-click **Donor Image → Get Donor** in the Tasks pane.
2. Click **Configure systems** to open the “System/Task Configuration” window.

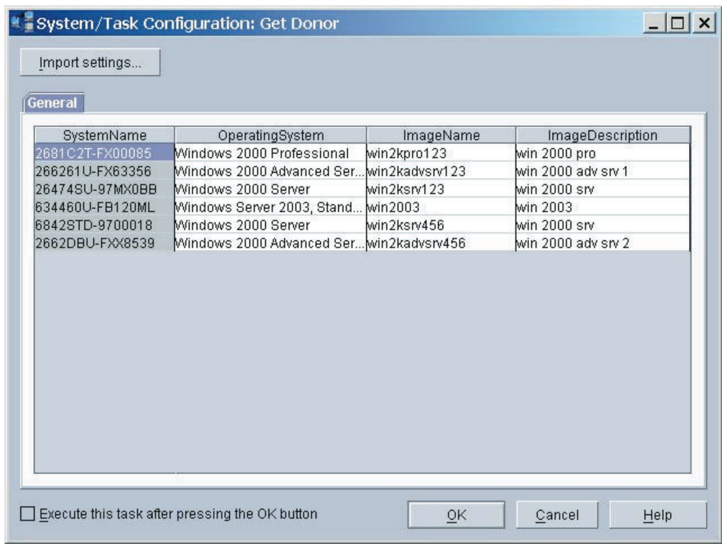


Figure 40. “System/Task Configuration: Get Donor” window

3. Select an operating system, type an image name, and select **Execute this task**.
4. Click **OK**.

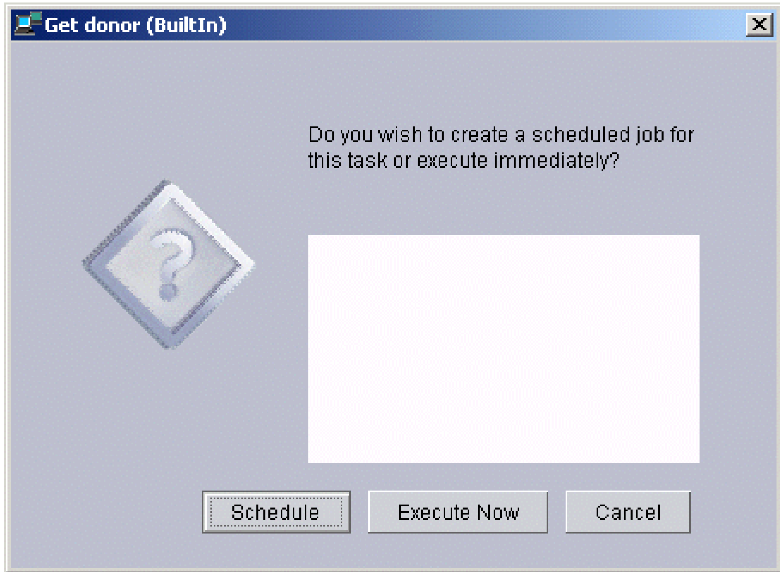


Figure 41. “Get Donor (Built-in)” window

5. Click **Schedule**.

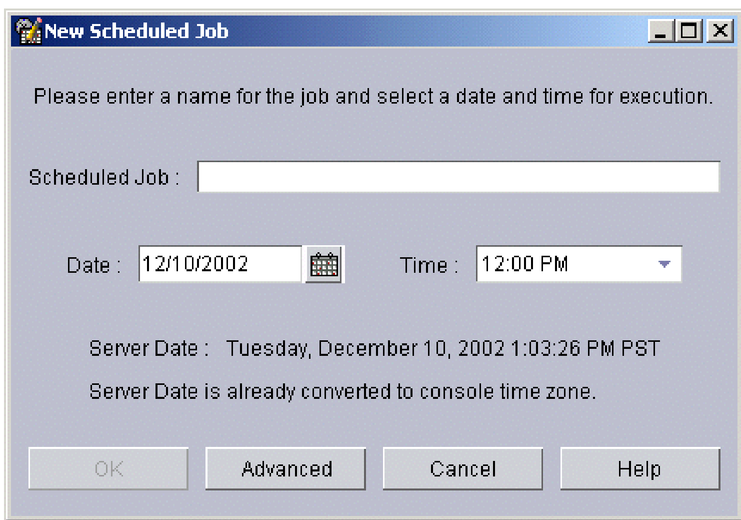


Figure 42. “New Scheduled Job” window

6. Type the job name, date, and time for job execution and click **OK**.

Upgrading to Deploy Center version 5.5

The Get Donor task uses a subset of Deploy Center. To upgrade to the full version of Deploy Center 5.5:

1. Extract the following files from your Deploy Center version 5.5 Install CD:

```
PQImgCtr.exe
PQdplctr.rtc
```

Note: Files may be located in a cab file.

You can also get these files by created a PQImgCtr DOS boot disk from the PowerQuest BootDisk builder.

2. Copy the files PQImgCtr.exe and PQdplctr.rtc into the directory '%rdmpath%\local\env\71c'.
3. Run the mkimages.bat files in the '%rdmpath%\local\env' directory.

You are now using the full version of Deploy Center whenever you run the Get Donor or Windows Clone Install tasks.

You can take advantage of the full version of Deploy Center functionality by modifying the files capture.bat and pqstore.scr, located in the directory %rdmpath%\local\env\71c\capture.

Linux Native Install

The Linux Native Install (LNI) task provides several different methods of gathering operating system and application installation information in advance. After the systems have been assigned their individualized information, the operating system and applications installation and configuration to these systems takes place without further user attendance.

Right-click **Linux Native Install** in the Tasks pane to display two options:

- *Create New Task* - starts the Linux Native Install wizard. You are guided through a series of windows in a predefined order. The data you enter is validated for each window when you click **Next**. Most of the wizard pages are very similar to the tabs in the property sheet for this task. All the crucial information on each page can be changed by clicking **Back**.

  Click **Finish** on the last page of the wizard to complete the task. A Linux install task folder is created in the RDM 4.11 Master Repository. The name of the folder is the task number. The unattended answer file is also generated and saved in the folder.
- *Edit Template* - accesses the template notebook containing all of the properties for the template. The values set in the template notebook are the defaults used when you create a new Linux Native Install task.

When you create a task, it is added to the Tasks pane under **Linux Native Install**. Right-click the new task to edit, delete, or copy the task.

Note: LNI task configuration uses the client system name to be the client computer name, if the client computer name does not exist.

If the assigned computer name is invalid, the computer name is automatically changed by using the following rules:

- Remove spaces and invalid characters from computer name. Valid characters are alphanumeric and a dash (-). For example, *pearl rfrsh* changes to *pearlrfrsh*.
- Truncate from the end to make it shorter or equal to 64 characters long, if the computer name is too long (greater than 64 characters).
- Add -1, -2, and so on, to the end of the duplicate computer name, if the computer name is duplicated.

Linux Native Install properties

The properties are the same, whether you are creating a new task with the wizard, editing the default values in the template, or editing an existing LNI task:

- **General**: Accesses basic information about the task. The General properties are the first window you see.
- **Setup**: Accesses the LNI setup properties for images, partition, boot loader, regional, TCP/IP, password, firewall, and X Windows.
- **Advanced**: Accesses the command list, user parameters, and task folder for the task.

The **General** and **Advanced** properties are discussed in “Property sheets” on page 10. This section details the LNI Setup properties.

Images

Click Images on the Setup tab. Use this window to manage the Linux installation images.

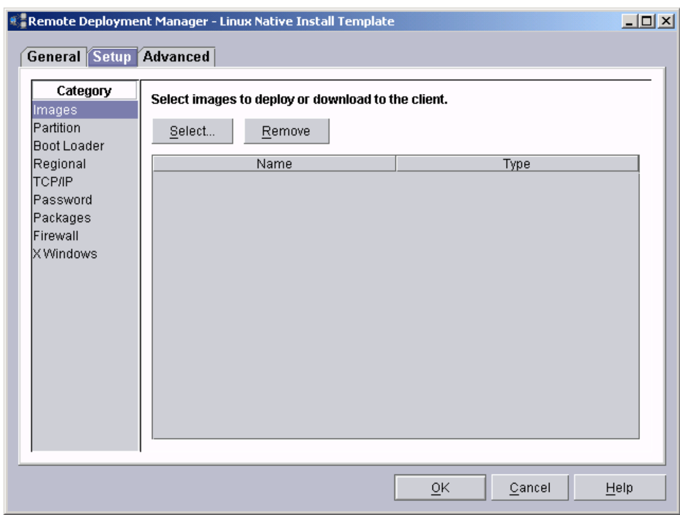


Figure 43. Images page of the Linux Native Install

The list box contains all the selected installation images.

Click an image in the list box, or click **Select** to add an image from the RDM repository to the list.

To remove an image from the list, select the image, and click **Remove**.

Creating a new image

1. From the Setup page of the Linux Native Install template, click **Select**. This opens the Image Selection window that lists all Red Hat operating system images, Linux applications, and Linux IBM Director Agent software built by IM and collected in the Master Repository. Application images are listed by name alphabetically and installed in that order.

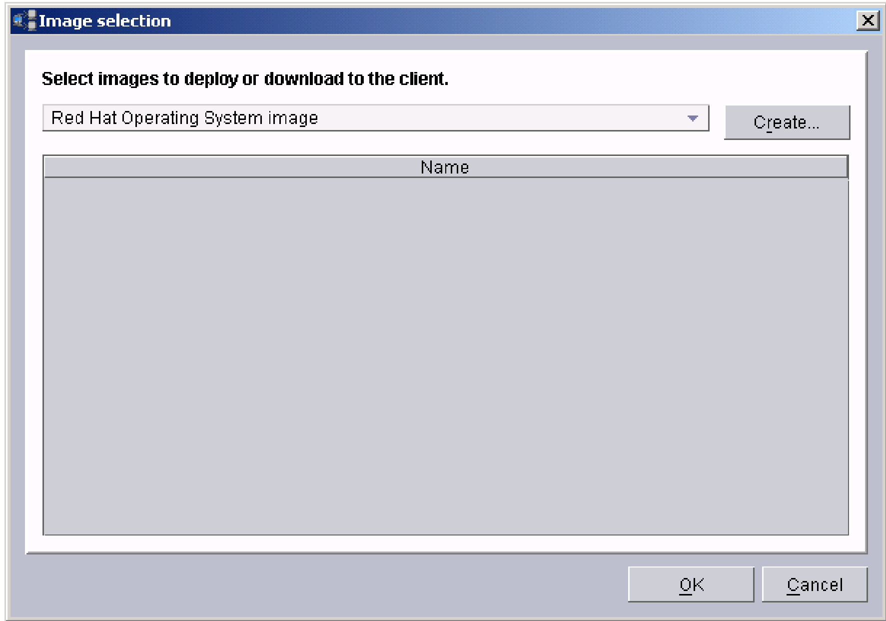


Figure 44. "Image selection" window for Linux Native Install task

2. Click **Create**.

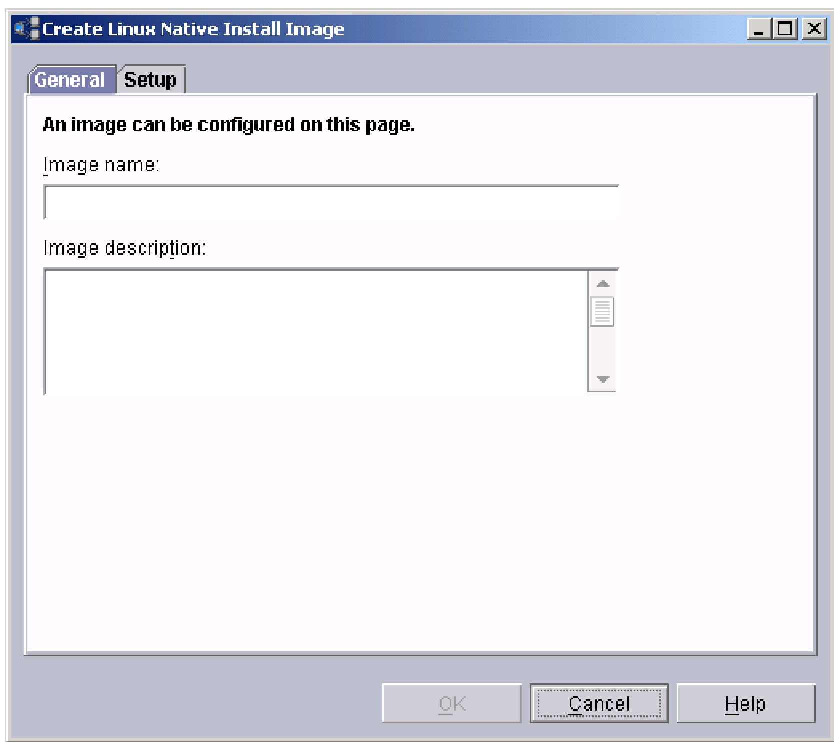


Figure 45. General page of the "Create Linux Native Install Image" window

3. On the General page, type a name and description for the new image to create.
4. Click the **Setup** tab and select the operating system image. Specify, or browse to, the source of the operating system to be imported.

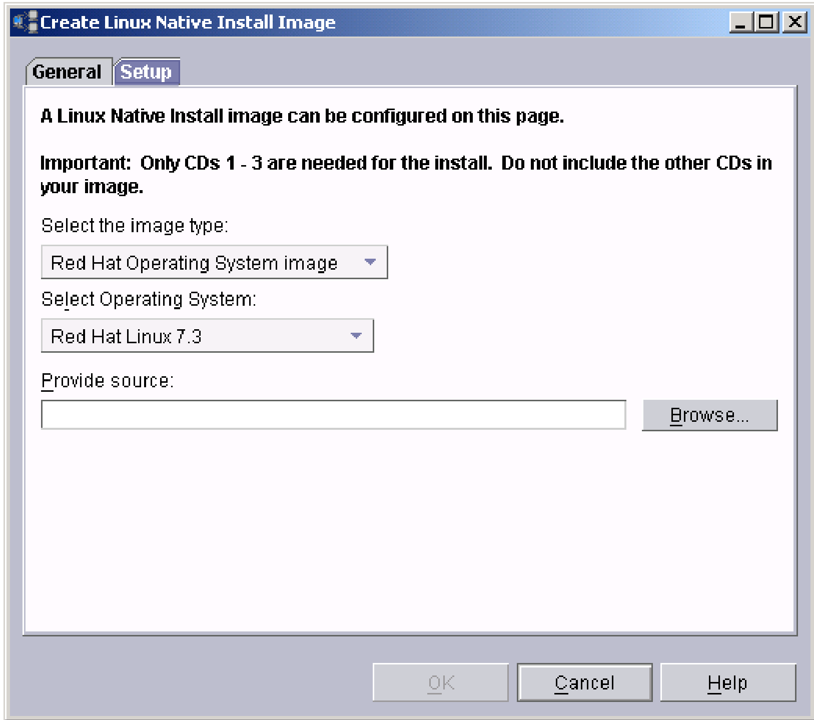


Figure 46. Setup page of the “Create Linux Native Install Image” window

If you click **Browse**, the file you are looking for is called out in the title of the browse box.

5. Click **OK**.

To install IBM Director Agent as part of a Linux Native Install task:

1. Copy the IBM Director Agent installation files from the IBM Director CD to a folder on your hard drive.
2. Edit the dirinstall script if required for your installation. Refer to the IBM Director Agent installation information for details.
3. Create a Linux Native Install Application image. On the **Setup** tab:
   a. Use *Linux Director Agent* as the image type.
   b. For **Provide Source**, type the directory containing the IBM Director Agent files. For example, if the files are on the IBM Director CD-ROM, and the CD-ROM drive is designated D:, the path is D:\director\agent\linux\i386
   c. For **Executable name**, type *dirinstall*
4. Click **OK**.

When creating your Linux Native Install task, after you choose your Operating System image, click on the drop-down menu and select *Linux Director Agent*. The Linux IBM Director Agent image you prepared should be listed. Check this box to include it in the install task, and continue with task creation.

Partition

Select Partition from the Setup tab. Use this window to define and modify partitions for the Linux installation.

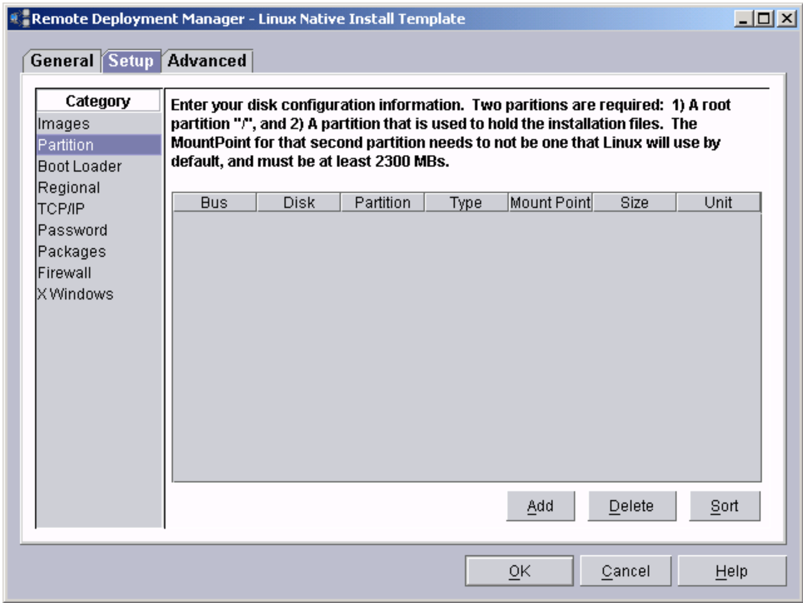


Figure 47. Partition category for Linux Native Install

Click **Add** to enter data for a new partition.

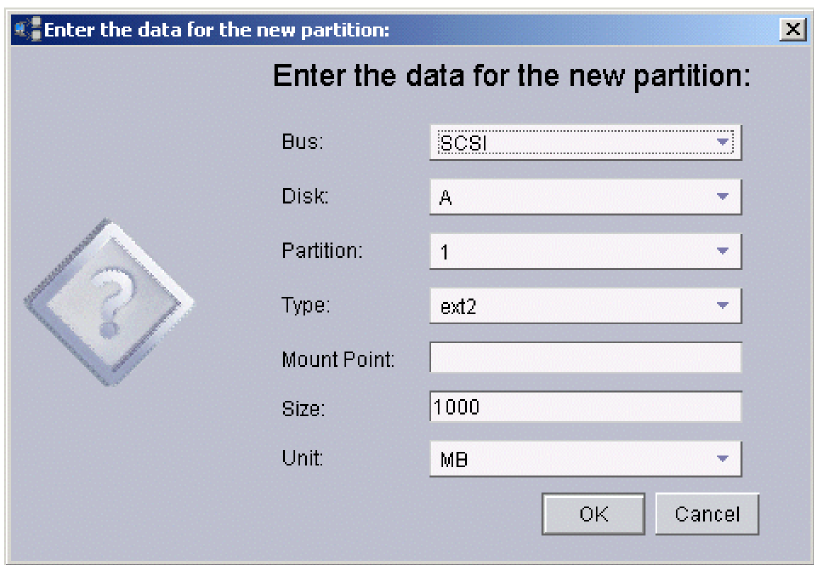


Figure 48. "New partition data" window for Linux Native Install

To change the values of the listed partitions, either click the individual cells to select from drop-down menus of the available values or, in the case of the Mount Point and Size columns, edit the values directly within the cell.

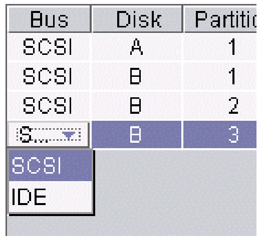


Figure 49. Drop-down menus of listed partitions

Enter the data for the partition and then click **OK**:

Bus
This column lists if the hard disk drive is connected to a SCSI or IDE bus. Each entry has a drop-down menu with the two choices.

Disk
This column lists the disk letter for each hard disk drive. The values are always upper case A through Z. It can go further starting with AA and going through DX for a total of 128 possible values. Each entry has a drop-down list with those values.

Partition
This column lists the partition number within each hard disk drive. Partitions 1 through 4 are primary partitions. Partitions 5 through 16 are within an extended partition.

A partition 1 is required on each hard disk. If you have logical partitions (5 - 16), they must start at 5 and be contiguous.

Type
This column lists the type of the partition. Only ext2, ext3, swap, and extended are supported. Each entry has a drop-down list with those values.

Mount Point
This column is an entry field for a valid Linux pathname. When you click **Next**, there must be a partition whose mount point is “/”. There are rules about which disk the “/” mount point, or the “/boot” mount point (if you define one) must go. It must be one of the first two SCSI Disks or one of the first two IDE Disks. There also needs to be a partition defined that is both big enough (approximately 2 GB) to hold the installation files that are downloaded and whose mount point is not a normal Linux directory.

Appendix D, “Linux directories”, on page 195 lists mount points that are normal Linux directories. Avoid using these directories for the mount point you specify for the installation.

Size
This column is an entry field for valid numbers that are associated with the Unit column. Type in any number which is validated when you click **Next**.

Unit
This column has one of two values: MB for megabyte, or % rem for the percent remaining after the MB values are allocated. For example, suppose you want one partition to have 400 MB, and then two other partitions that split up the remaining room on the drive evenly. You would specify one entry as 400 MB, and then the following two entries as 50%rem. Order does not matter for these. You can intermix % rem and MB values. MB values are added up before the % rem values are calculated.

The percentages in the primary partitions (1-4) cannot exceed 100%; however, the percentages for the logical partitions (5-16) within the extended partition can also add up to 100%. They are considered 100% of the extended partition. For example, if primary partition 3 is an extended partition and is 50 GB, then the logical partitions (5-16) can add up to 100% of the 50 GB. This makes it possible to have the primary partitions (1- 4) add up to 100%, and have logical partitions (5-16) also add up to 100%.

Boot loader

Select **Boot loader** from the **Setup** tab. Use this window to configure the boot loader.

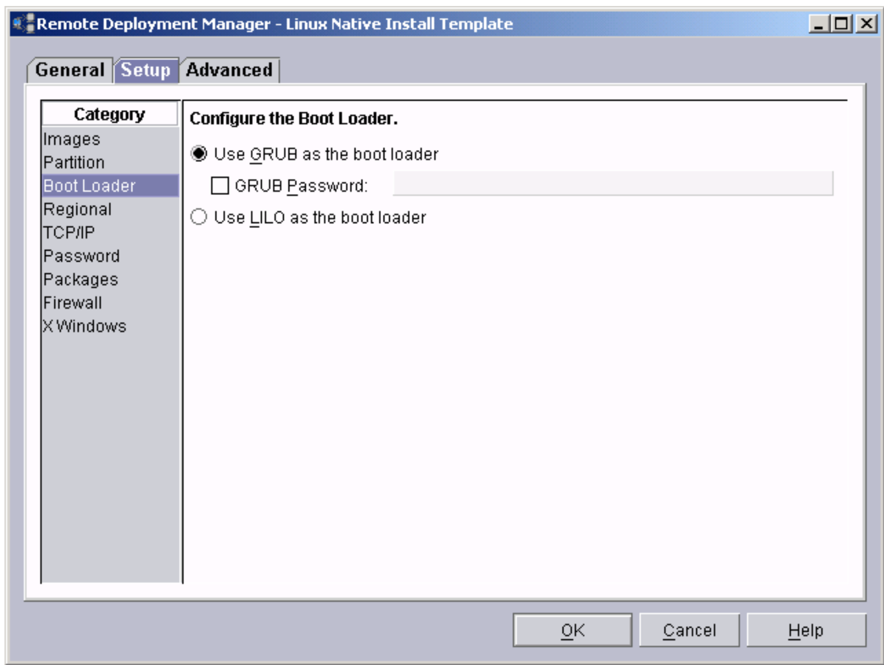


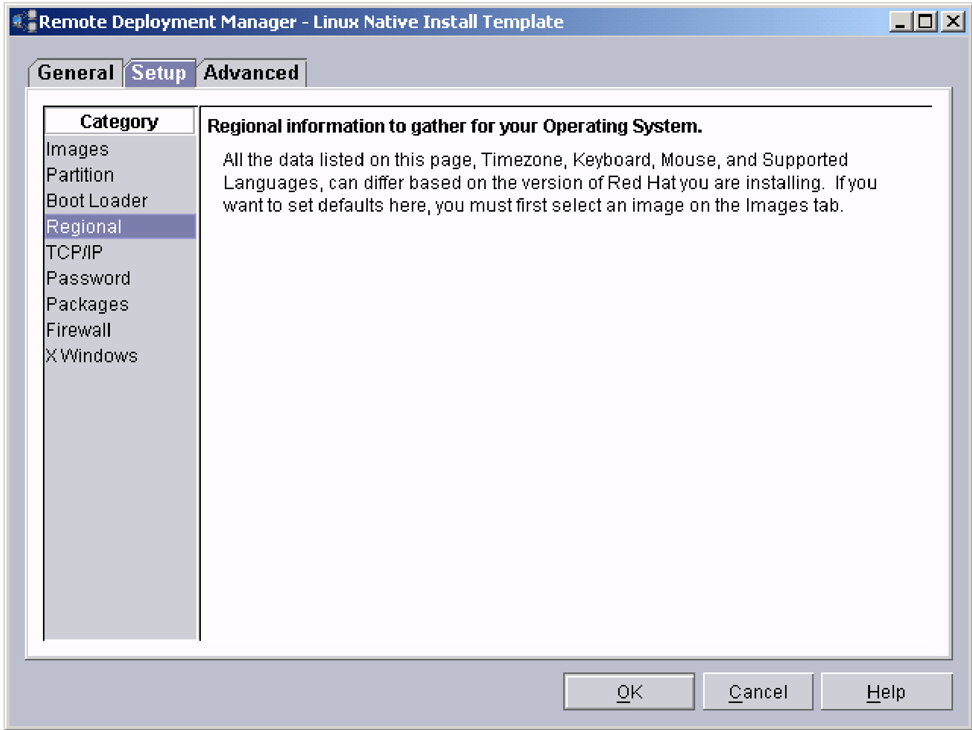
Figure 50. Linux Native Install Boot loader category

Use GRUB as the boot loader
Select this option to use GRUB. This is the default. Select the **GRUB Password** option to specify the password.

Use LILO as the boot loader
Select this option to use LILO.

Regional

Select **Regional** from the **Setup** tab. You select the regional information for time zone, keyboard, mouse, and supported languages.



Field descriptions

Time zone
Select the time zone from the list.

Keyboard
Select the keyboard type from the list.

Mouse
Select the mouse type from the list. Select **Emulate three button mouse** to enable emulation.

Supported Languages
This section lists all of the supported languages. In the **Default** column, only one language can be selected. In the **Supported** column, select each language you want supported on the target system. Click **Select all** to select all the languages.

TCP/IP

Click **TCP/IP** from the **Setup** tab. Use this window to set up the TCP/IP protocol settings to be used on the target system. Access this window from the Setup tab or in the wizard. You can specify TCP/IP settings to be assigned through DHCP or to be configured manually.

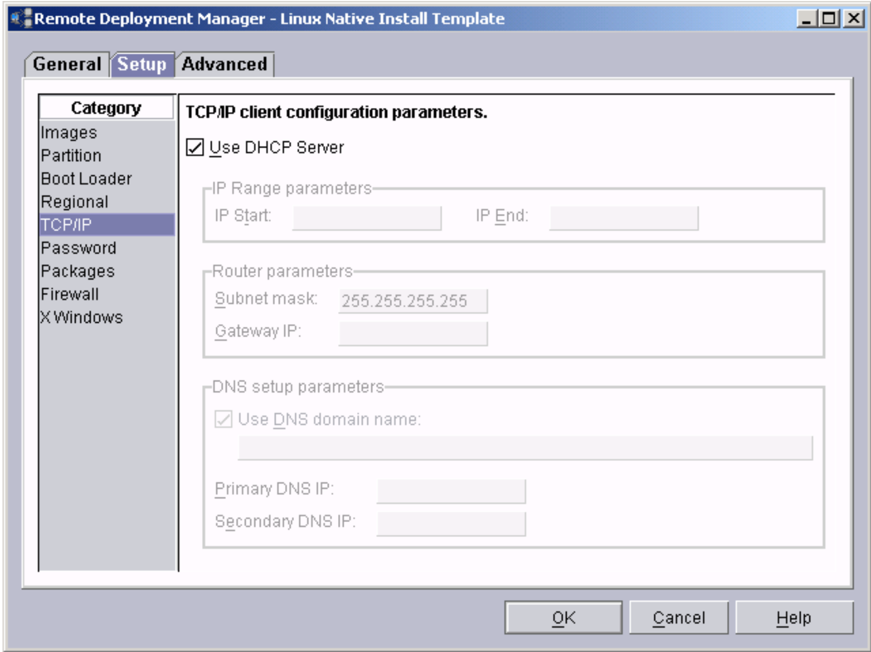


Figure 51. Linux Native Install TCP/IP category

Select **Use DHCP** for automatic configuration, or leave it unchecked for manual configuration.

Note: If **Use DHCP** is selected, no other values are needed. A DHCP server must be present on the network. If **Use DHCP** is not selected, the other Entry fields are enabled, and their set up notebook is available in the Category list and through the wizard.

Manual configuration

You have two choices for implementing manual configuration:

1. You can leave the IP address range blank. You then manually assign an IP address to each system during System Task Configuration (STC). This option is the best choice if either of the following conditions apply:
   - You have multiple subnets. RDM does not check for unique IP addresses on multiple subnets.
   - You use multiple installation tasks of a single type, or multiple types of installation tasks (such as Windows Clone, Windows Native, and Linux Native). RDM validates unique IP addresses within a single task, not across multiple tasks. If there is any overlap of address ranges within tasks, duplicate IP addresses are possible.
2. You can specify an IP address range. RDM then assigns an IP address to each system during system qualification. This option can be used for deploying tasks on a single subnet. An example is a classroom lab where you redeploy the same image on all systems before every class. You could set up a classroom installation task with the reserved range of addresses for the classroom.

For manual configuration, the following Entry fields are enabled:

Starting IP address
Type the starting IP address for the range of available addresses to be

assigned to target systems. RDM uses the IP address range to select a unique IP address for each target system when the system is qualified. The range of values can be obtained from your network administrator. You can leave this field blank. If you specify a Starting IP address, you must also specify an Ending IP address.

Note: If you specify a range of IP addresses, you must make sure there is no overlap of the range with any other installation task. RDM validates unique IP addresses within the individual task, not across multiple tasks.

Ending IP address
Type the ending IP address for the range of available addresses to be assigned to target systems. This parameter is required if you specify a Starting IP address.

Subnet mask
Type the subnet mask for your network. The default value is 255.255.255.255.

Gateway IP
Type the IP Address for the default gateway to use on the target system. This setting is optional. Obtain this value from your network administrator.

DNS domain name
If selected, type the DNS Domain name. The name can be left blank until the System/Task Configuration phase.

Primary DNS IP
If **DNS domain name** is selected, a primary DNS IP address is required. The address can be left blank until the System/Task Configuration phase.

Secondary DNS IP
Type the IP address for the secondary DNS server. This server is used if the primary DNS server is not available. This is an optional field.

Password

Select **Password** from the **Setup** tab. You manage your security options from this window.

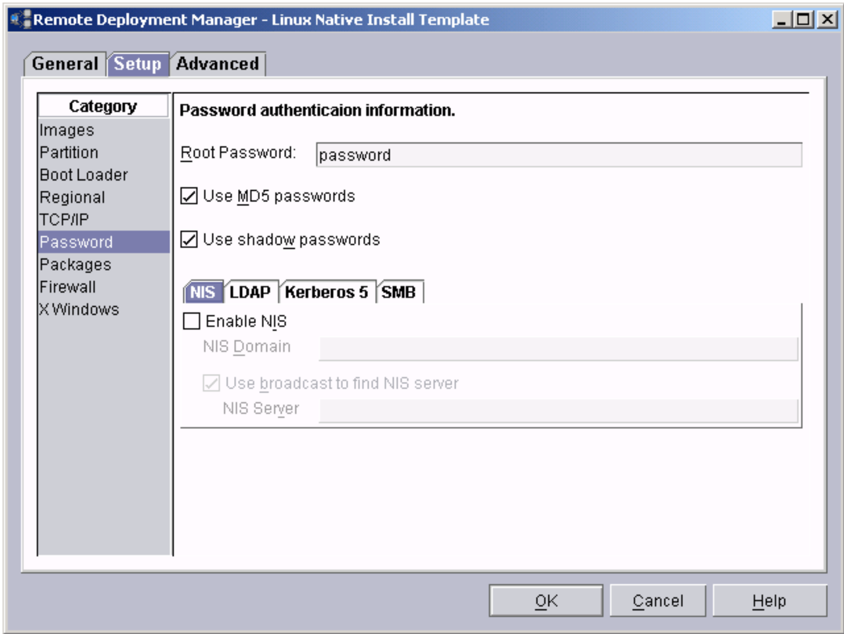


Figure 52. Linux Native Install Password category

Field descriptions

Root password
Type the password for the root account.

Use MD5 passwords
Enable passwords up to 256 characters (standard is eight or less).

Use shadow passwords
Red Hat provides improved security. Encrypted passwords are placed in a file that requires a higher level of access permission.

Enable NIS, LDAP, Kerberos 5, and SMB
Four tabs are available to access these features.

NIS
Allows groups of systems in the same Network Information Service (NIS) domain, using common password and group files. Type values for both of the following options:

- **NIS Domain** Specifies to which domain or group of systems your system belongs.
- **NIS Server** Forces your system to use a specific NIS server, rather than broadcasting a message to the Local Area Network asking for any available server to host your system.

LDAP
Enables LDAP support.

- **LDAP Server** Specifies the server your system uses for LDAP services.
- **LDAP Base DN** Specifies the base directory name for LDAP services.
- **Use TLS lookups** Enables TLS lookups on the LDAP Server.

Kerberos 5
Enables Kerberos 5 support.

- **Realm** Specifies the realm to use for Kerberos services.
- **KDC** Specifies the Kerberos Domain Controller.

- **Admin Server** Specifies the administration server to use for Kerberos services.

SMB
Enables SMB authentication

- **SMB Server** Specifies the SMB server to use for SMB authentication.
- **SMB Workgroup** Specifies the SMB workgroup for your system.

Packages

Click **Packages** from the **Setup** tab. Use this window to select the packages to be installed on the target system.

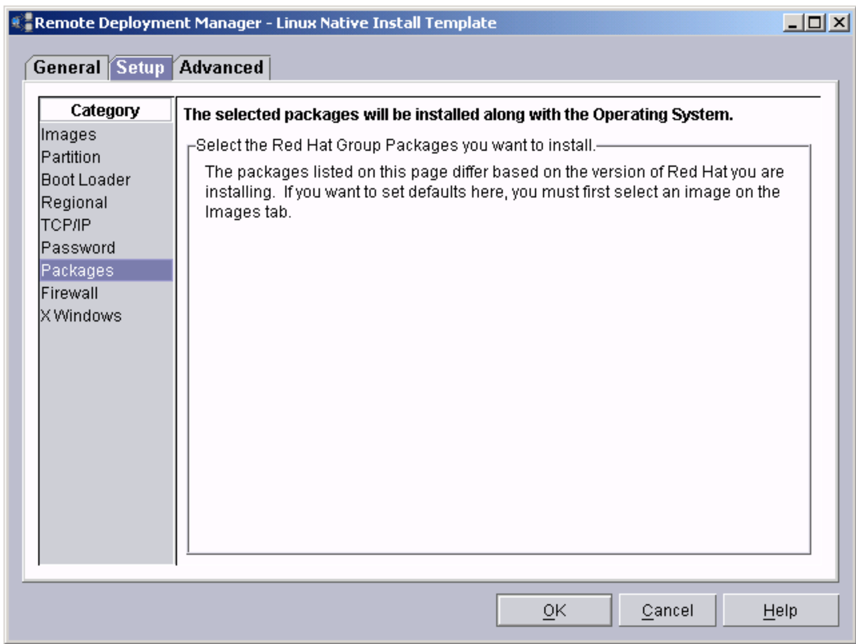


Figure 53. Linux Native Install Packages category

Available optional packages are listed. Select each group of packages to be installed. Selected groups are indicated with a check mark. To select all groups, click **Select All**.

Required packages are installed automatically as part of the installation options.

Note: If X Windows is selected, the Classic X Window System (RedHat 7.3) and the X Window System (RedHat 7.3 and 8.0) packages are required. They are installed even if they are not selected.

Firewall

Click **Firewall** from the **Setup** tab.

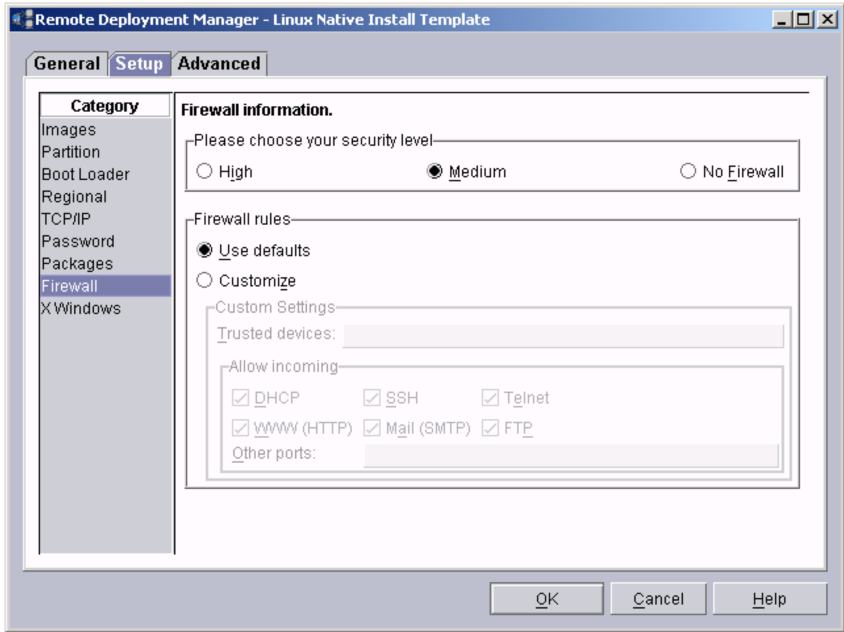


Figure 54. Linux Native Install Firewall category

Security Levels

High

If you choose High, your system will not accept connections (other than the default settings) that are not explicitly defined by you. By default, use only the following connections:

- DNS replies
- DHCP - so any network interfaces that use DHCP can be properly configured

If you choose High, your firewall will not allow the following:

- Active mode FTP (passive mode FTP, used by default in most clients, should still work)
- IRC DCC file transfers
- RealAudio
- Remote X Window system clients

If you are connecting your system to the Internet, but do not plan to run a server, this is the safest choice. If additional services are needed, you can choose Customize to use specific services through the firewall.

Medium

If you choose Medium, your firewall will not allow remote systems to have access to certain resources on your system. By default, access to the following resources are not allowed:

- Ports lower than 1023 - the standard reserved ports, used by most system services, such as FTP, SSH, telnet, and HTTP
- The NFS server port (2049)
- The local X Window system display for remote X clients
- The X Font server port (by default, xfs does not listen on the network, it is disabled in the font server)

- If you want to use resources such as RealAudio, while still blocking access to normal system services, choose Medium. Select Customize to allow specific services through the firewall.

No Firewall
No firewall provides complete access to your system and does no security checking. Security checking is the disabling of access to certain services. This should only be selected if you are running on a trusted network (not the Internet) or plan to do more firewall configuration later.

Choose **Customize** to add trusted devices or to use additional incoming services:

- **Trusted Devices**
  Selecting any of the Trusted Devices allows access to your system for all traffic from that device; it is excluded from the firewall rules. For example, if you are running a local network, but are connected to the Internet through a PPP dialup, you can check eth0 and any traffic coming from your local network will be allowed. Selecting eth0 as trusted means all traffic over Ethernet is allowed, but the ppp0 interface is still blocked by a firewall. If you want to restrict traffic on an interface, leave it unchecked.

  It is not recommended that you make any device that is connected to public networks, such as the Internet, a Trusted Device.
- **Allow Incoming**
  Enable these options to use specified services to pass through the firewall. Note, during a workstation installation, the majority of these services are not installed on the system.
  - **DHCP**
    If you allow incoming DHCP queries and replies, you allow any network interface that uses DHCP to determine its IP address. DHCP is normally enabled. If DHCP is not enabled, your system can no longer get an IP address.
  - **SSH**
    Secure SHell (SSH) is a suite of tools for logging into and executing commands on a remote system. Use this option if you plan to use SSH tools to access your system through a firewall. Install the openssh-server package to access your system remotely, using SSH tools.
  - **Telnet**
    Telnet is a protocol for logging into remote systems. Telnet communications are unencrypted, and provide no security from network snooping. Allowing incoming Telnet access is not recommended. If you do want to allow inbound Telnet access, you will need to install the telnet-server package.
  - **WWW (HTTP)**
    The HTTP protocol is used by Apache (and by other Web servers) to serve Web pages. Use this option if you plan on making your Web server publicly available. This option is not required for viewing pages locally or for developing Web pages. Install the Apache package if you want to serve Web pages.
  - **Mail (SMTP)**
    Use this option for incoming mail delivery through your firewall so that remote hosts can connect directly to your system to deliver mail. You do not need to use this if you collect your mail from your ISP server using POP3 or IMAP, or if you use a tool such as fetchmail. An improperly configured SMTP server can allow remote systems to use your server to send spam.
  - **FTP**
    The FTP protocol is used to transfer files between systems on a network. Use

this option if you plan on making your FTP server publicly available. Install the wu-ftpd (and possibly the anonftp) package for this option.

– **Other ports**
  You can access ports that are not listed here by listing them in the Other ports field. Use the following format: port:protocol. For example, if you want to allow IMAP access through your firewall, you can specify imap:tcp. You can also explicitly specify numeric ports; to allow UDP packets on port 1234 through the firewall, type 1234:udp. To specify multiple ports, separate them with commas.

X Windows

Click **X Windows** on the **Setup** tab.

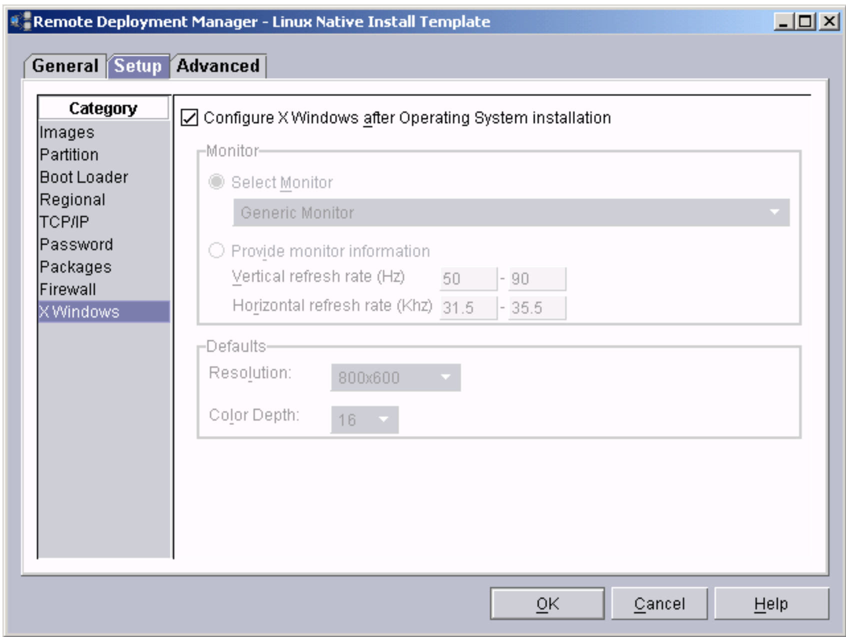


Figure 55. Linux Native Install X Windows category

If the **Configure X Windows after Operating System installation** check box is not selected, fill in the specific set of information pertaining to your monitor for the video. Select either a specific model of monitor or, if not listed, type the vertical and horizontal refresh rates.

If you allow the default monitor (Generic Monitor) to remain, and do not select the actual monitor that you will be using, Linux will ignore any resolutions higher than 800x600. If you pick your actual monitor (and it allows higher resolutions), the resolution you specify is used.

Resolution
Valid values are:

640x480
800x600
1024x768
1152x864
1280x1024
1400x1050
1600x1200

Color Depth
Valid values are: 8, 16, 24, and 32.

Configuring X Windows for systems with a Remote Supervisor Adapter II

RDM 4.11cannot configure X Windows support for machines with a Remote Supervisor Adapter II. For X Windows support, you must configure it after the installation is complete. Be sure to select the “X Window System” and “Classic X Window System” packages for Red Hat 7.3 and the “X Window System” package for Red Hat 8.0. Once you have the system installed, complete the following steps for either Red Hat 7.3 or Red Hat 8.0:

For Red Hat 7.3

1. From a shell prompt, run the following command:
   ```
   Xconfigurator --expert
   ```
2. When the screen that allows you to select your video adapter driver is displayed, select the following driver:
   ```
   VESA driver (generic)
   ```
3. For the resolution use:
   ```
   1024x768
   ```
4. For color depth use:
   ```
   16
   ```
5. When you get to the “Starting X” window where it asks “XConfigurator will now start X to test your configuration”, select OK. For the GUI prompt asking if you want to have X Windows start on reboots, select Yes.
6. Click **OK** on the informational message pop-up that follows.
7. You should now be back at a shell prompt. To go to X Windows, type the following command:
   ```
   init 5
   ```
   You should now have a graphical login screen.

For Red Hat 8.0

1. From a shell prompt, run the following command:
   ```
   redhat-config-xfree86 --set-driver='vesa' --forceui
   ```
   The Resolution and Color Depth settings are displayed. Pick **1024x768** for Resolution, and **Thousands of colors (16 bit)** for Color Depth. On the **Setup** tab, you can select your Monitor Type and Video Card. The Video Card value is already set to what is needed so do not change it, but you should select your Monitor Type. Click **OK** when finished.
2. Back at a shell prompt, type the following command:
   ```
   Xtest
   ```
   At the *Can you see this message?* prompt, click **Yes**. At the *Would you like to have your computer start up in graphical mode when your system starts up?* prompt, click **Yes**.
3. You should now be back at a shell prompt. To go to X Windows, type the following command:
   ```
   init 5
   ```
   You should now have a graphical login screen.

Power Restore

Power Restore performs backups and restores of the boot partition and the Master Boot Record. The task uses the Power Restore program, a light version of the Image Center technology from PowerQuest Deploy Center. Power Restore can be run as an RDM task, or can be run locally with IBM Boot Manager.

Note: Power Restore is backwards compatible with Power Restore backups created with RDM 3.1 and later. It is incompatible with backups created with LCCM 3.0 and earlier. If you attempt to perform a Save operation on a system with an LCCM 3.0-style Rapid Restore partition, the partition is replaced with an RDM 4.1-style Power Restore partition and a new Power Restore-style backup image is created. If you attempt to perform a Restore operation on a system with an LCCM 3.0-style Rapid Restore partition, RDM indicates a restore failure.

Power Restore has the following restrictions:

- The Power Restore backup partition must be the same size as the boot partition
- The Power Restore backup partition must exist on the same drive as the boot partition
- The Power Restore backup partition must be the fourth partition table entry in the Master Boot Record
- Power Restore backups can only be made of the boot partition and the Master Boot Record; no other partitions might be backed up with Power Restore
- No more than two backup “image file” collections can exist in the Power Restore backup partition
- Restoring the Master Boot Record from a backup copy can repair a corrupted Master Boot Record but it cannot restore other changes made to the partitions when a tool like FDISK is used to add, delete or change partitions

Power Restore tasks

Right-click **Power Restore** in the Tasks pane to display two options:

- *Create New Task* - accesses the task notebook. All of the property sheets are available for editing.
- *Edit Template* - accesses the template notebook containing all of the properties for the template. The values set in the template notebook are the defaults used when you create a new Power Restore task.

When you create a task, it is added to the Tasks pane under **Power Restore**.

Note: Power Restore can also be run as a local task. Refer to the Power Restore documentation on the Power Restore media.

Power Restore properties

The properties are the same, whether you are creating a new task, editing the default values in the template, or editing an existing Power Restore task:

- **General**: Accesses basic information about the task. The General properties are the first window you see.
- **Setup**: Accesses the Power Restore setup properties for Operations.
- **Advanced**: Accesses the command list, user parameters, and task folder for the task.

The **General** and **Advanced** properties are discussed in “Property sheets” on page 10. This section details the Power Restore Setup properties.

Operations

Click **Operations** from the **Setup** tab. Use this window to select the Power Restore operations and options.

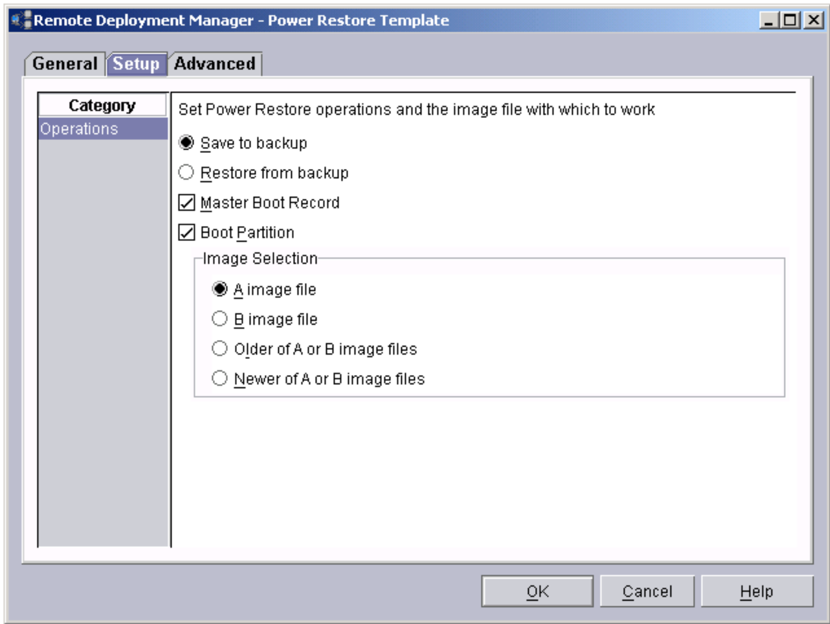


Figure 56. Power Restore Operations category

There are two main types of operations for Power Restore tasks: **Save to backup** and **Restore from backup**.

You can save the **boot partition**, the **Master Boot Record**, or select both. You can only restore one item at a time.

Backups of the boot partition are saved in image files. If **Boot Partition** is selected, the image file options are active. There can be up to two active image files: the **A image file** and the **B image file**. You can select either of the images, or you can choose to save to or restore from the **Older of A or B image files** or the **Newer of A or B image files**, if both image files exist on the system. If no image files exist on the system, save to the **A image file**. The restore task fails if an image file does not exist.

The new task appears in the IBM Director Tasks pane under Power Restore. Right-click the new task to edit, delete, or copy the task.

Power Restore as a local task

Power Restore tasks, including creating the Power Restore partition and backing up or restoring the boot partition and the Master Boot Record, are normally run as RDM tasks. However, they can also be run without RDM as a “local” task. You will also have the following abilities:

- Start the Power Restore backup and restore operations from a startable diskette or CD-ROM.

- Start the Power Restore backup and restore operations by pressing a function key, such as **F11**, during the boot process on the PC (provided IBM Boot Manager has been installed).
- Create the Power Restore partition from a startable diskette or CD-ROM.
- Install IBM Boot Manager from a startable diskette or CD-ROM.

When run as a “local” task, Power Restore accesses a familiar style interface. If the System has a video card capable of a 640 x 480 resolution, 256-color graphics mode and the Power Restore executable is set for use with ASCII (as opposed to Double-Byte Character Set) codes, the interface looks like this:

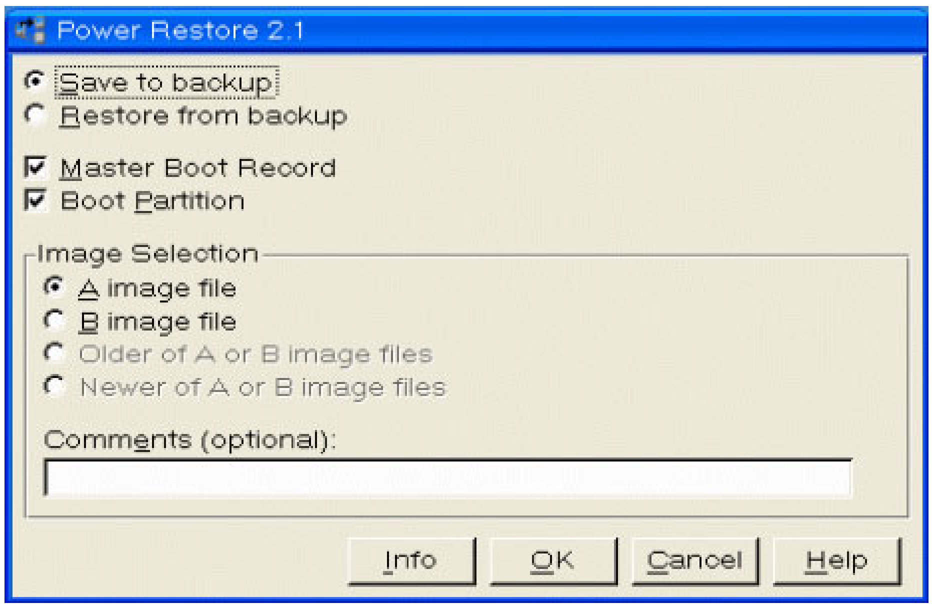


Figure 57. Power Restore graphics-based user interface

If the System is not capable of a 640 x 480 resolution, 256 color graphics mode or if the Power Restore executable is set for use with Double-Byte Character Set (as opposed to ASCII) codes, the interface uses a text-mode variation on the windowed interface:

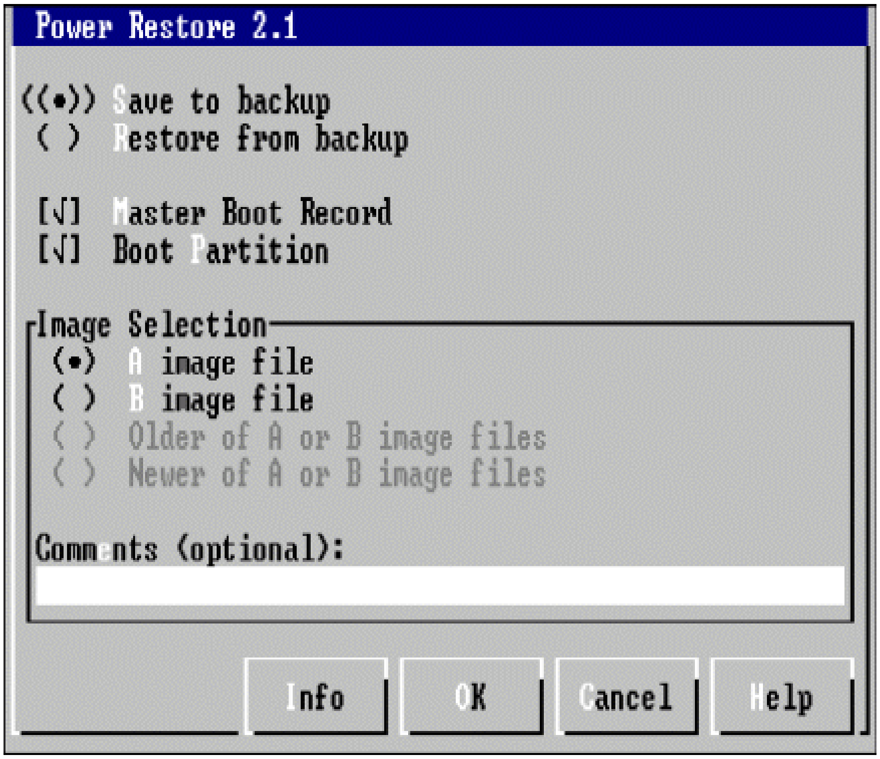


Figure 58. Power Restore text-based user interface

Use the user interface to perform the following tasks:

- Select whether to perform a Save operation or a Restore operation
- Select whether to perform the operation on the Master Boot Record, the boot partition or both
- Select which image file to save the boot partition to or restore it from (if applicable)
- Define optional comments related to the selected image file on Save operations
- View optional comments related to the selected image file on Restore operations
- View the dates of the image files (if they exist)
- View a help window on the use of the user interface
- View information about the partition table on the boot drive

The user interface is designed to prevent you from making inappropriate choices, such as attempting to restore the boot partition from a non-existent image file.

Installing/starting Power Restore from startable diskette or CD-ROM

You can install or start Power Restore from a startable disk (either a diskette or a CD-ROM). In fact, both processes use the same disk. However, you must first prepare the diskette, and then create the startable CD-ROM from the diskette image to use a startable CD-ROM. Preparing the diskette involves formatting it as a boot diskette and then copying specific files onto it. Next, you have to change the BIOS settings on the system to boot from the diskette or CD-ROM, depending on which type of disk you want to use. Typically, managed systems try to boot from the network first, and then from the hard disk drive. The next step is to insert the applicable disk and reboot or power-up the system. After that, you either follow the onscreen instructions or wait until the system powers off.

There are several states in which a system could be when it is booted from the Power Restore diskette or CD-ROM. These states and their resulting actions include:

State	Action
RDM 4.1-style Power Restore partition is on system	Power Restore interface is displayed
RDM 3.1-style Power Restore partition is on system	Power Restore partition and files are updated to RDM 4.1-style and Power Restore interface is displayed
LCCM 3.0-style ″Rapid Restore″ or ″Rave″ partition is on system	Rapid Restore/Rave partition is removed and replaced with an RDM 4.1-style Power Restore partition and Power Restore interface is displayed
No Rapid Restore/Rave or Power Restore partition is on system, but adequate* free space exists on system	Power Restore partition is created and Power Restore interface is displayed
No Rapid Restore/Rave or Power Restore partition is on system and no adequate* free space exists on system	Error message is displayed
*The Power Restore partition uses the same space as is used by the boot partition. Additional partitions (such as extended partitions with logical drives defined on them) might exist on the system prior to adding a Power Restore partition. No more than four partitions, including the Power Restore partition, might exist on a system.	

When the Power Restore interface is displayed, you select which actions are to be performed, and then click **OK** to perform them or **Cancel** to exit without performing any Save or Restore actions. When the selected action (if any) has finished, the system will power off. Note that some systems cannot be powered off by software and must be powered off manually.

Creating the Power Restore installation/start diskette or CD-ROM

To create a startable Power Restore Installation/Start diskette, complete the following steps:

1. Insert a blank diskette into drive A on the RDM server
2. From the rdm\repository\environment\dos\restore folder on the RDM server, run the **build_pr.bat** batch file

A startable Power Restore Installation/Start CD-ROM can be made using any of several popular CD-authoring software packages, a CD-ROM recorder, a CD-R or CD-R/W disc and the Power Restore Installation/Start diskette as the boot image.

Starting Power Restore from IBM Boot Manager for Power Restore

IBM Boot Manager can also be used to run Power Restore on a system. Instead of booting from a startable diskette or CD-ROM, the system is booted from the hard disk drive. A message will briefly appear, prompting you to press a key (usually the **F11** key) if you wish to run Power Restore. If you press the key during the first few seconds after the prompt appears, the system will boot from the Power Restore partition and run Power Restore. If you do not press the key during that time, the system will boot from the normal boot drive. This approach requires both Power Restore and a customized version of IBM Boot Manager to have been installed on the system.

Note: All partitions on the system must be formatted prior to installing IBM Boot Manager. If an unformatted partition is present, the installation will not complete.

Installing IBM Boot Manager for Power Restore

IBM Boot Manager for Power Restore cannot be installed as an RDM task. To install IBM Boot Manager for Power Restore on a system, set the system to boot from the diskette drive or CD-ROM, insert the IBM Boot Manager Installation diskette or CD-ROM in the appropriate drive, and power up the system. The installation is automatic and requires one reboot. When it is finished, it will prompt you to remove the diskette or CD-ROM and to power the system off.

Note: All partitions on the system must be formatted prior to installing IBM Boot Manager. If an unformatted partition is present, the installation will not complete.

Installing IBM Boot Manager for Power Restore requires Power Restore to be present on the system.

Creating the IBM Boot Manager for Power Restore installation diskette or CD-ROM

To work with IBM Boot Manager, the Power Restore partition must be formatted as a startable FAT32 drive. IBM PC DOS 7.1, while it does understand the FAT32 file system, cannot be used if the physical start of the partition is more than approximately four gigabytes from the physical start of the drive. As most modern hard disk drives are much larger than eight gigabytes, versions of Microsoft DOS that work with FAT32, such as those that came with Windows 98 and Windows 98 Second Edition, must be used. IBM does not have the legal right to provide the files needed to make startable diskettes using Microsoft DOS. You will have to provide Microsoft Windows 98 or Windows 98 Second Edition.

To create a startable IBM Boot Manager for Power Restore Installation diskette, perform the following steps:

1. From Microsoft Windows 98 or Windows 98 SE, format a diskette with system files by either using the `format a: /s` command from a Command Prompt window or right-click the diskette icon in My Computer or Windows Explorer, choosing the Format option, and then select **Copy system files** in the Format window.
2. Copy the sys.com, himem.sys, and ramdrive.sys files from the Windows 98 or Windows 98 SE system to the diskette (in default installations, the files himem.sys and sys.com can be found in the \windows folder and the file ramdrive.sys can be found in the \windows\command folder).
3. Insert the diskette into drive A on the RDM server.
4. Run the build_bm.bat batch file from the rdm\repository\environment\dos\restore folder on the RDM server.

A startable IBM Boot Manager for Power Restore Installation CD-ROM can be made using any of several popular CD-authoring software packages, a CD-ROM recorder, a CD-R or CD-R/W disc and the IBM Boot Manager for Power Restore Installation diskette as the boot image.

Removing IBM Boot Manager for Power Restore

To remove IBM Boot Manager for Power Restore, perform the following steps:

1. Create a startable DOS diskette
2. Copy the following files from the IBM Boot Manager for Power Restore Installation Diskette or CD-ROM to the new IBM Boot Manager for Power Restore Uninstall Diskette:

   BMGR.EXE
   BMGR.SCR
   BOOT.BIN
   PR2.COM
3. Boot the system using the IBM Boot Manager for Power Restore Uninstall Diskette
4. Run the following commands, either directly or from a batch file:

   ```
   BMGR /R PR2 /U
   ```
5. Remove the IBM Boot Manager for Power Restore Uninstall Diskette and power the system down

Removing the Power Restore partition

To remove the Power Restore partition, perform the following steps:

1. Create a startable DOS diskette
2. Copy FDISK.COM or FDISK.EXE (depending on whether you are using IBM PC DOS or Microsoft MS DOS) to the new Power Restore Uninstall Diskette
3. Copy the PR2.COM file from the Power Restore Installation Diskette or CD-ROM to the new Power Restore Uninstall Diskette
4. Boot the system using the IBM Boot Manager for Power Restore Uninstall Diskette
5. Run the PR2 /F command, either directly or from a batch file
6. Run FDISK
7. Choose the option to delete a partition or logical drive
8. Choose the option to delete a non-DOS partition
9. Select the *last* non-DOS partition and delete it
10. Exit FDISK
11. Remove the Power Restore Uninstall Diskette and power the system down

Note that this process frees up the space used by the Power Restore partition but does not add that space to any existing partitions. Also note that failure to perform step 5 will cause subsequent attempts to install Power Restore on the system to fail as the Power Restore installation process will incorrectly deduce that a Power Restore partition still exists on the system.

Remove IBM Boot Manager for Power Restore if you are removing the Power Restore partition.

RAID Clone Configuration

Use the RAID Clone Configuration task to clone a RAID configuration onto homogeneous systems (that is, systems with the exact same number and size hard disk drives attached to the exact same channels on the exact same type of RAID adapter).

Note: You must install ServeRAID™ with IBM Director in order for RDM RAID functions to work.

Clone files

RDM supports cloning configurations on ServeRAID controllers (model 4.0 and later), and on selected integrated SCSI controller with RAID capabilities. There are two basic types of clone files for RDM:

- Configuration backup file (equivalent to the .ips file in RDM 3.1). This file is created as output from a backup command to the controller and might or might not be human readable. It is not intended to be manually modified but rather passed to the controller using an equivalent restore command for cloning. It can also be extracted locally at the managed system using the ipssend or cfg1030 (available in the rdm\local\env\71s subdirectory) command line utilities for ServeRAID controllers and Integrated SCSI controllers, respectively.
- Configuration command file (equivalent to .rds file in RDM 3.1). You manually create this file that consists of a set of commands to create a configuration using the controller command line utility. In RDM 3.1, a separate utility existed to aid you in creating a .rds file. This utility has been dropped in RDM 4.1. You can modify existing RDM 3.1 .rds files to RDM 4.11syntax or create new .rds files with a regular text editor. Ideally, however, you may find it simpler to create RAID Custom Configuration tasks to accomplish the detailed configurations previously accomplished in .rds files.

Each type of clone file is further subdivided by the controller type it supports:

- ServeRAID Command File - A DOS batch file comprised of appropriate ipssendl commands, comments, and error-handling to configure a ServeRAID controller. The ipssendl command is a light version of the ServeRAID ipssend command-line configuration utility that supports a subset of the ipssend command set. RDM 3.1 .rds files cannot be used “as is”. Their “%LCCMPATH%\ipssend” entries must be changed to “ipssendl”.

  The following is an example of a ServeRAID Command file:

  ```
  REM ServeRAID Command File for RDM 4.1
  IPSSENDL SETCONFIG 1 DEFAULT NOPROMPT
  if ERRORLEVEL 1 goto RDS_ERROR
  IPSSENDL STRIPESIZE 1 32
  if ERRORLEVEL 1 goto RDS_ERROR
  IPSSENDL CREATE 1 LOGICALDRIVE NEWARRAY 500 1 1 0 3 0 NOPROMPT
  if ERRORLEVEL 1 goto RDS_ERROR
  IPSSENDL CREATE 1 LOGICALDRIVE A MAX 1 1 0 3 0 NOPROMPT
  if ERRORLEVEL 1 goto RDS_ERROR
  IPSSENDL CREATE 1 LOGICALDRIVE NEWARRAY MAX 5E 1 3 3 4 1 7 3 6 NOPROMPT
  if ERRORLEVEL 1 goto RDS_ERROR
  IPSSENDL SETSTATE 1 4 0 HSP
  if ERRORLEVEL 1 goto RDS_ERROR
  :RDS_ERROR
  ```

  Note: You are responsible for correct syntax in a .rds file.
- ServeRAID Configuration Backup File - A file <cfgfile> created by booting the ServeRAID Utility diskette on a donor system and executing the following command:

  ```
  ipssend backup <controller#> <cfgfile>
  ```

  The data format in <cfgfile> is a ServeRAID proprietary binary format.

  Note: The donor system should have the ServeRAID controller already configured before executing the backup command.
- LSI53C1020/1030 Command File - A DOS batch file comprised of appropriate cfg1030 commands, comments, and error-handling to configure an

LSI153C1020/1030 controller. cfg1030 is the LSI command-line configuration utility. The following is an example of an LSI53C1020/1030 command file:

```
REM LSI53C1020/1030 Command File for RDM 4.11
CFG1030 SETCONFIG 1 DEFAULT NOPROMPT
if ERRORLEVEL 1 goto RDS_ERROR
CFG1030 CREATE 1 LOGICALDRIVE NEWARRAY 500 1 1 0 1 1
if ERRORLEVEL 1 goto RDS_ERROR
CFG1030 SETSTATE 1 1 2 HSP
if ERRORLEVEL 1 goto RDS_ERROR
:RDS_ERROR
```

- LSI53C1020/1030 Configuration Backup File - A file <cfgfile> created by booting a DOS boot diskette containing the cfg1030 utility on a donor system and executing the following command:

  ```
  cfg1030 backup <controller#> <cfgfile>
  ```

  The data format in <cfgfile> is an LSI proprietary binary format. The cfg1030 program can be copied onto a startable DOS diskette from the directory local\env\71s in the RDM installation path.

  Note: The donor system should have the Integrated SCSI controller already configured as desired before executing the backup command.

Clone Configuration tasks

Right-click **RAID Clone Configuration** in the Tasks pane to display two options:

- *Create New Task* - accesses the task notebook. All of the property sheets are available for editing.
- *Edit Template* - accesses the template notebook containing all of the properties for the template. The values set in the template notebook are the defaults used when you create a new RAID Clone Configuration task.

When you create a task, it is added to the Tasks pane under **RAID Clone Configuration**.

Clone Configuration properties

The properties are the same, whether you are creating a new task, editing the default values in the template, or editing an existing Clone Configuration task:

- **General**: Accesses basic information about the task. The General properties are the first window you see.
- **Setup**: Accesses the Clone Configuration setup properties for images.
- **Advanced**: Accesses the command list, user parameters, and task folder for the task.

The **General** and **Advanced** properties are discussed in "Property sheets" on page 10. This section details the Clone Configuration Setup properties.

Images

Select **Images** on the **Setup** tab.

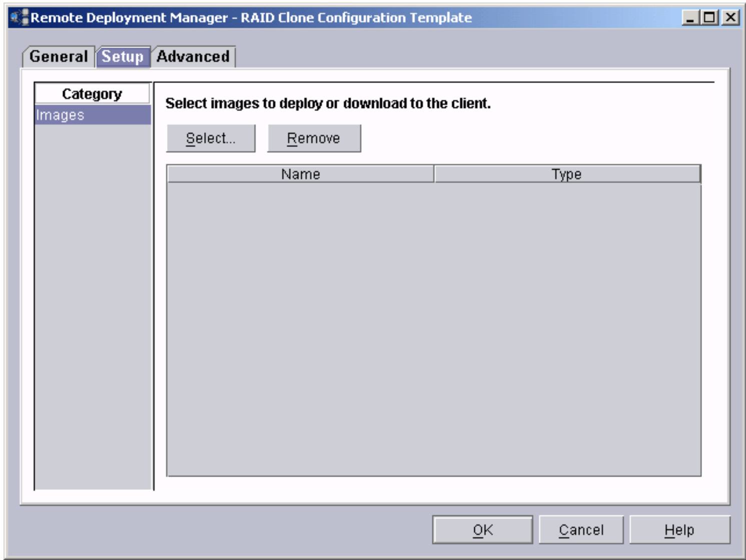


Figure 59. RAID Clone Configuration Images category

The list box contains all installation images previously selected.

Select an image from the list box, or click **Select** to add an existing image from the RDM repository to the list.

To remove an image from the list, select the image and click **Remove**.

Creating a new image

To create a new image:

1. Click **Select** from the **Images** category on the **Setup** tab. This opens the "Image Selection" window.

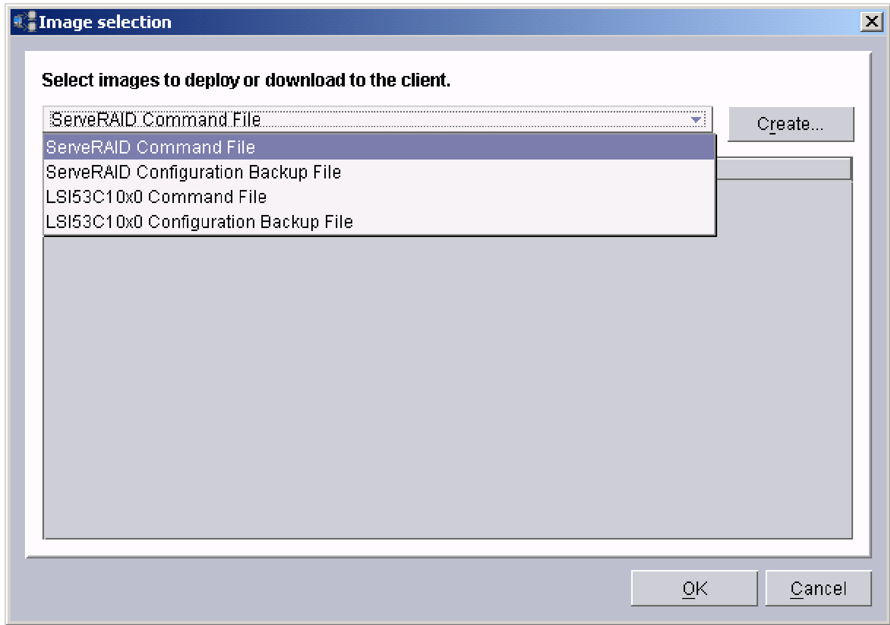


Figure 60. "Image selection" window

2. Click **Create** to open the "Create Image" window

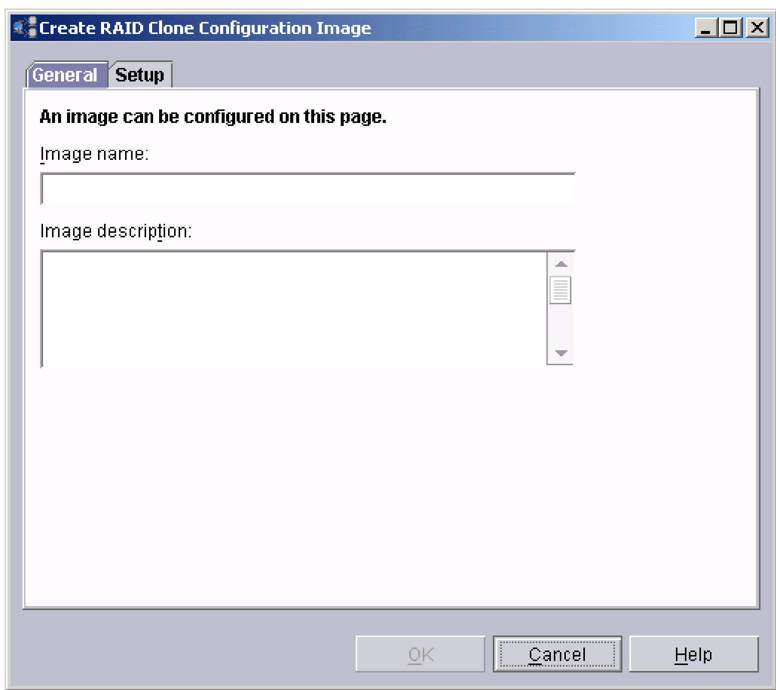


Figure 61. General page of the "Create RAID Clone Configuration Image" window

3. On the General page, type a name and description for the new image.
4. Click the **Setup** tab.

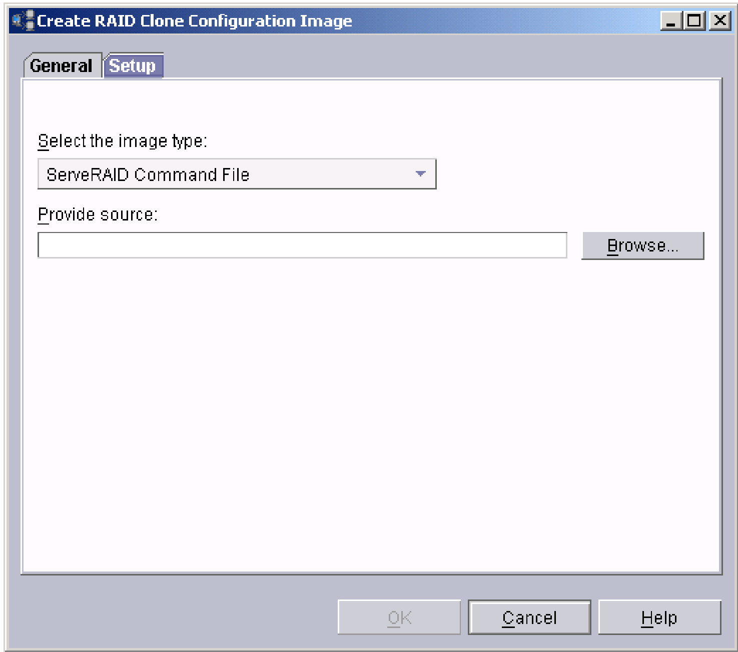


Figure 62. Setup page of the “Create RAID Clone Configuration Image” window

5. Select the image type from the list.
6. Click Browse to locate the RAID source file.
7. Click **OK**.

The new task appears in the IBM Director Tasks pane under RAID Clone Configuration. Right-click the new task to edit, delete, or copy the task.

RAID Custom Configuration

Use RAID custom configuration to establish rules in configuring RAID on your systems. You might designate the following parameters explicitly or by default:

- Stripe size
- Number of hot spares
- Number of arrays
- Maximum logical drive size
- RAID level of each array
- Number of physical drives in each array
- Number of logical drives in each array
- Explicit or relative size of each logical drive

Unlike clone configurations, which are specific to a particular hardware setup, custom configuration rules are general enough so that applications can use both heterogeneous and homogeneous systems.

A predefined set of the most general RAID configuration rules is installed as a built-in Express RAID Configuration task. These rules specify the following parameters:

- Stripe size - Default
- Number of hot spares - Default
- Number of arrays, RAID level, number of logical drives - Default
- Maximum logical drive size - Unlimited

The Express RAID Configuration task mirrors the logic performed by the ServeRAID Manager Express Configuration function today, without directly invoking the ServeRAID Manager itself.

Express Configuration performs the following actions:

- Creates arrays by grouping together same-sized physical drives.
- Creates one logical drive per array.
- Assigns a RAID level based on the number of physical drives in array:
  - An array with a single physical drive is assigned RAID level-0.
  - An array with two physical drives is assigned RAID level-1.
  - An array with three or more physical drives is assigned RAID level-5.
- Designates a hot-spare drive for the controller. If one or more arrays has four or more physical drives, the largest-sized drive from those arrays is designated the hot-spare drive.

For many customers who have no need to fine-tune their systems, Express Configuration is ideal. It provides redundancy and performance gains without the need to understand RAID in depth. You could assign multiple heterogeneous systems to the Express Configuration task and have each automatically configured differently based on their drive configuration. Express Configuration knows nothing about the operating system to be installed. Because of this, it might create logical drives larger than that supported by some operating systems. In this case, you could detect this in the STC and choose to use a different RAID setup method.

Customers who require more control over their RAID configurations can create their own RAID custom tasks.

Custom Configuration tasks

Right-click **RAID Custom Configuration** in the Tasks pane to display two options:

- *Create New Task* - accesses the task notebook. All of the property sheets are available for editing.
- *Edit Template* - accesses the template notebook containing all of the properties for the template. The values set in the template notebook are the defaults used when you create a new RAID Custom Configuration task.

When you create a task, it is added to the Tasks pane under **RAID Custom Configuration**.

Custom Configuration properties

The properties are the same, whether you are creating a new task, editing the default values in the template, or editing an existing Clone Configuration task:

- **General**: Accesses basic information about the task. The General properties are the first window you see.
- **Setup**: Accesses the Custom Configuration setup properties for controllers, arrays, and logical drives.
- **Advanced**: Accesses the command list, user parameters, and task folder for the task.

The **General** and **Advanced** properties are discussed in “Property sheets” on page 10. This section details the Custom Configuration Setup properties.

Controllers

Select **Controllers** from the Setup tab.

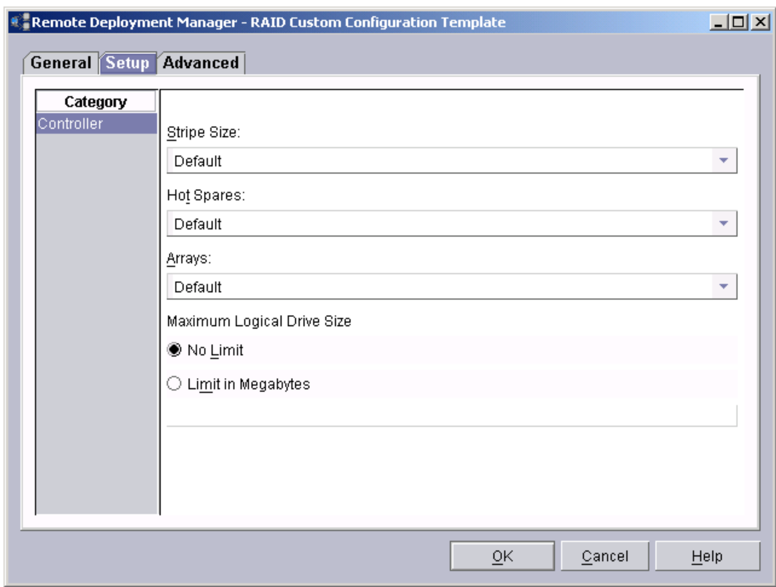


Figure 63. Controller category (with default values) of the “RAID Custom Configuration Template” window

Select values for stripe size, hot spares, arrays, and drive size.

With current support for just ServeRAID and Integrated SCSI controllers with RAID capabilities, the Stripe Size might be any of the following values: Default, 8 KB, 16 KB, 32 KB, 64 KB, 1 MB. The ServeRAID controller supports stripe sizes 8 KB, 16 KB, 32 KB, and 64 KB. The Integrated SCSI controllers with RAID capabilities only supports a 1 MB stripe size. If you create a task with a Default stripe size, ServeRAID controllers are deployed with an 8 KB stripe size and Integrated SCSI controllers with a 1 MB stripe size. Specifying a distinct stripe size (8 KB, 16 KB, 32 KB, 64 KB) for a task and applying that task to an Integrated SCSI controller does not disqualify the system. The Integrated SCSI controller will be configured to its normal 1 MB stripe size.

You might specify values Default, 0, 1, 2, 3, 4, 5, 6, 7, 8 for the number of hot spares. Default hot spares means 1, if a redundant array with no built-in hot spare is defined (that is, RAID level 1, 1E, or 5); otherwise, hot spares is 0.

You might specify values Default, 1, 2, 3, 4, 5, 6, 7, 8 for the number of arrays. Default arrays means to configure according to express configuration rules, grouping like-size drives into arrays. If you select value 1-8, two additional categories, **Arrays** and **Logical Drives**, are displayed in the left pane.

If this screen is left with all default values, the task created is identical to the Express RAID Configuration Task.

The maximum logical drive size is used to limit the size of logical drives allocated by percentage of space to conform to operating system restrictions. Specifying a maximum logical drive size will cause flagging if a fixed size in MB is selected and the fixed size exceeds the maximum logical drive size.

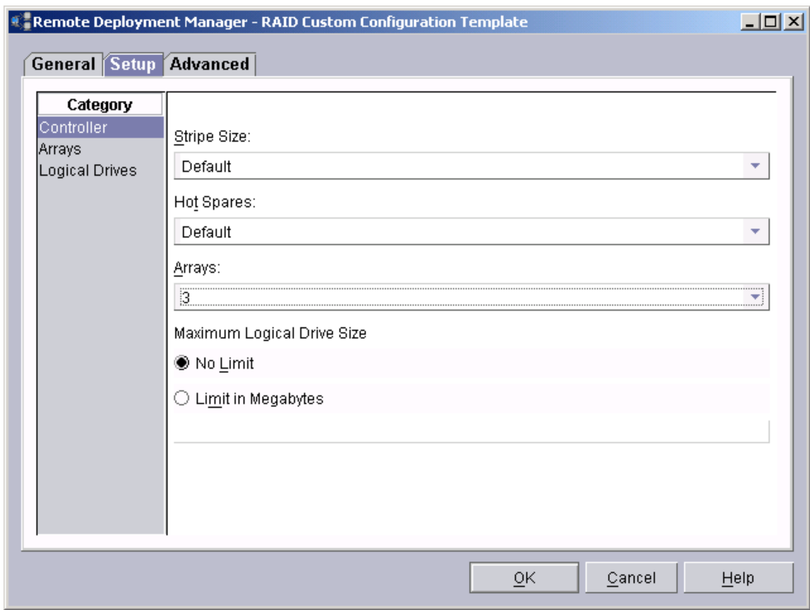


Figure 64. Controller category (with non-default values) of the “RAID Custom Configuration Template” window

Arrays

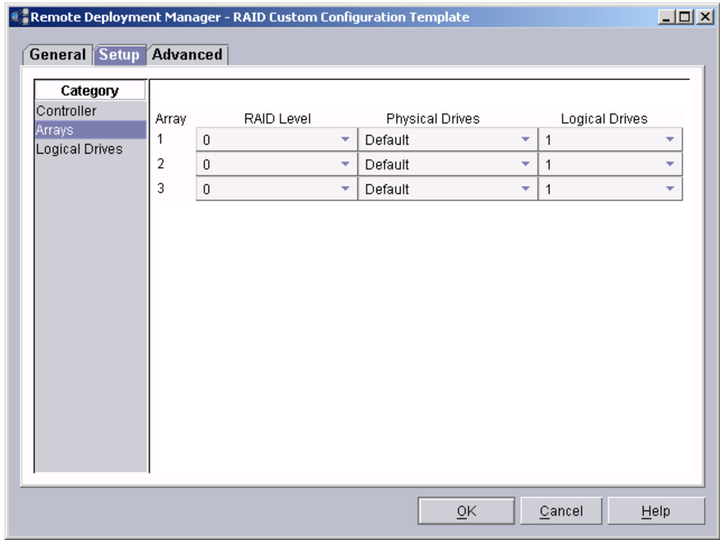


Figure 65. Arrays category of the "RAID Custom Configuration Template" window

The number of array lines correspond to the number of arrays selected in the Controller pane. For each array, select the number of physical drives that make up the array, the number of logical drives the array should be divided into, and the RAID level of all logical drives in the array. The RAID Custom Configuration task does not support heterogeneous RAID levels in a single array as it blocks logical drive migration.

Select one of the following RAID levels: 0, 1, 1E, 5, 5E, 5EE.

You might specify values Default, 1-16 for the number of physical drives. If Default is selected for an array, and it is not the last array, the minimum number of drives required for the specified RAID level will be allocated. If Default is selected for an array, and it is the last array, the maximum number of drives possible for the specified RAID level will be allocated constrained by the availability of same sized drives.

The selectable values for the number of logical drives will be controlled by the GUI such that a maximum of eight logical drives can be allocated. Therefore, if you select 8 arrays, you have no other choice for the number of logical drives in each array except 1. If, for example, you select 2 arrays, the selection boxes for the number of logical drives would initially have choices 1-7 for each with 1 currently selected. If you then change the number of logical drives for the first array to 5, the selection box for the number of logical drives for array 2 would automatically change to only allow selections 1-3.

Logical Drives

Select **Logical Drives** from the **Setup** tab. This page is only available if the number of logical drives is specified on the **Controller** page.

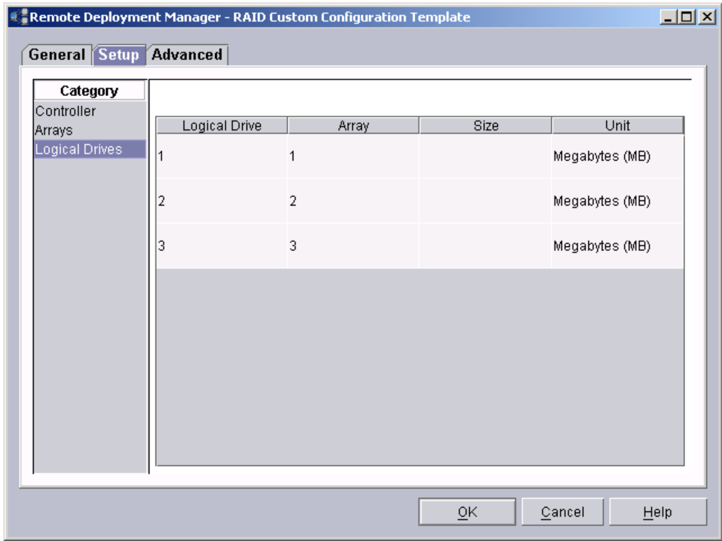


Figure 66. Logical Drives category of the "RAID Custom Configuration Template" window

In the Logical Drives category, there is one line for each logical drive in the configuration.

For each logical drive, the associated array number is displayed. You designate the size of the logical drive to be allocated either as an explicit value in megabytes or as a percentage of the remaining available space. During the configuration resolution process, all logical drives in an array specified with an explicit megabyte value will be allocated before the logical drives with relative percentage sizing in that array. What this means is that if you designate 3 logical drives in an array, with sizes 2000 MB, 50% Remaining, and 4000 MB, and the total available array space was 16 GB then logical drive 2 would be allocated 5 GB of space (.50 * (16 GB - 6 GB)) as opposed to 7 GB if the logical drives were simply allocated in numerical order.

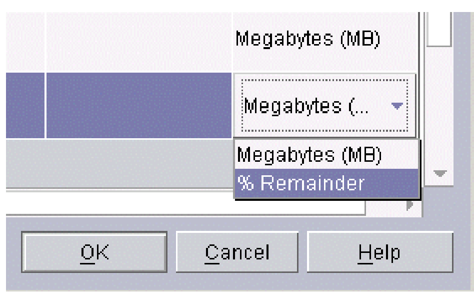


Figure 67. Drop-down menu options for unit values of Logical Drives

The new task appears in the IBM Director Tasks pane under RAID Custom Configuration. Right-click the new task to edit, delete, or copy the task.

Scan

Scan is the inventory and topology discovery process for RDM. The Scan task should be the first task you run. Most RDM tasks cannot run until a system has been scanned. Scan automatically detects new systems that are booting to the network using PXE. When it finds a new system, RDM interrogates the system for hardware information, such as the serial number and network address, and updates the system record in the database. Optionally, Scan can prompt the end user to enter information. Scan is a continuous process, which might be left running permanently or might be switched on or off as required (scan is running by default).

Note: Scan is different than the discovery process used by IBM Director. Scan does not require an agent or even an operating system to be present on the new system. Scan occurs during boot-time. The PXE service tells the system where to get its bootstrap image, and notifies RDM of the new system. RDM creates an entry in the IBM Director database displayed in the middle pane of IBM Director.

RDM includes a built-in Scan task. If you want to create your own, and set it as the default, use the menu option**Tasks → Remote Deployment Manager → RDM Options**.

To start the task, drag and drop a group from the Groups pane, or a system from the Group Contents pane, onto a Scan task in the Tasks pane. The Scan task refreshes the system database with the latest hardware, Asset ID™, and optional end user input.

Prior to running your first Scan procedure, set specific defaults for RDM so each scanned system is assigned the appropriate values.

The Scan function collects details about new systems that boot to the network during the scan operation and for which no details are currently recorded in the RDM systems database. The details collected from a scan include:

- Network address
- Type and model number
- Serial number
- Amount of random access memory (RAM) installed
- Hard disk drive capacity
- Network adapter
- Video adapter or chip set

Scan tasks

Right-click **Scan** in the Tasks pane to display two options:

- *Create New Task* - accesses the task notebook. All of the property sheets are available for editing.
- *Edit Template* - accesses the template notebook containing all of the properties for the template. The values set in the template notebook are the defaults used when you create a new Scan task.

When you create a task, it is added to the Tasks pane under **Scan**.

By default, there is one Basic Scan task provided. To modify any of the Basic Scan properties, click **Scan → Basic Scan → Edit task**.

Scan properties

The properties are the same, whether you are creating a new task, editing the default values in the template, or editing an existing Scan task:

- **General**: Accesses basic information about the task. The General properties are the first window you see.

- **Setup**: Accesses the Scan setup properties for prompts.
- **Advanced**: Accesses the command list, user parameters, and task folder for the task.

The **General** and **Advanced** properties are discussed in “Property sheets” on page 10. This section details the Scan Setup properties.

Prompts: Select **Prompts** from the **Setup** tab.

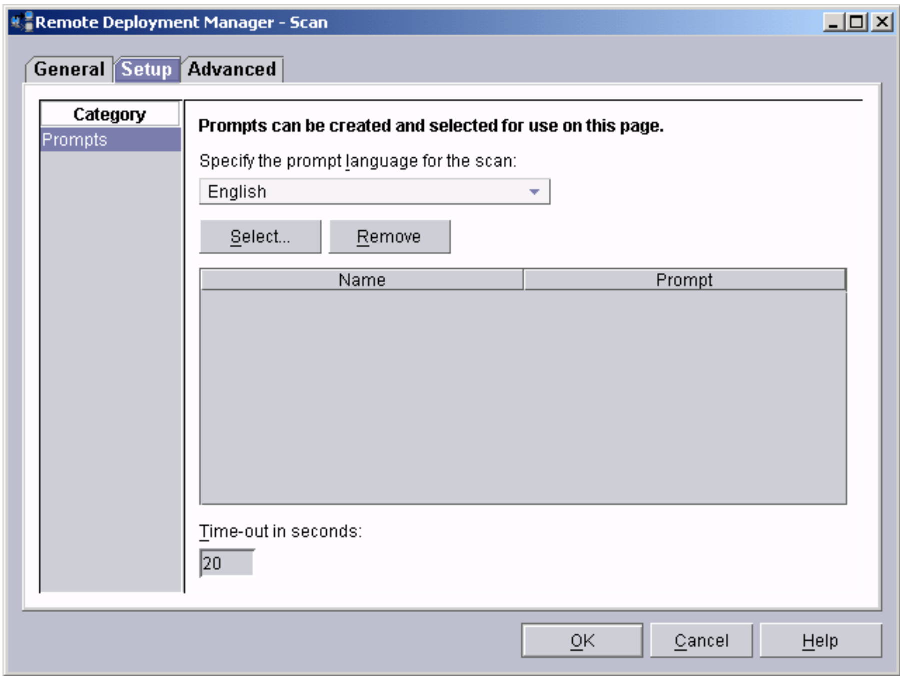


Figure 68. Prompts category for Scan

The prompts that will be used for every newly detected system are shown in the list. The list is empty until you add your prompts. Prompts are optional. They can be viewed, edited, and used as the value to display in lists of systems. If you do not specify user prompts, the scan process completes without end-user input.

There are two selections in this window:

Specify the prompt language
Select the language from the list.

Time-out in seconds
The number of seconds that the system waits for user input for each prompt. If no input is entered within that time, the scan process completes or the next prompt (if any) is displayed. The value of the timed-out prompt is not changed. If no timeout is specified, the scan process waits indefinitely for input.

Creating a user prompt

1. Click **Select** on the “Prompts” window to open the “User Prompts” window.

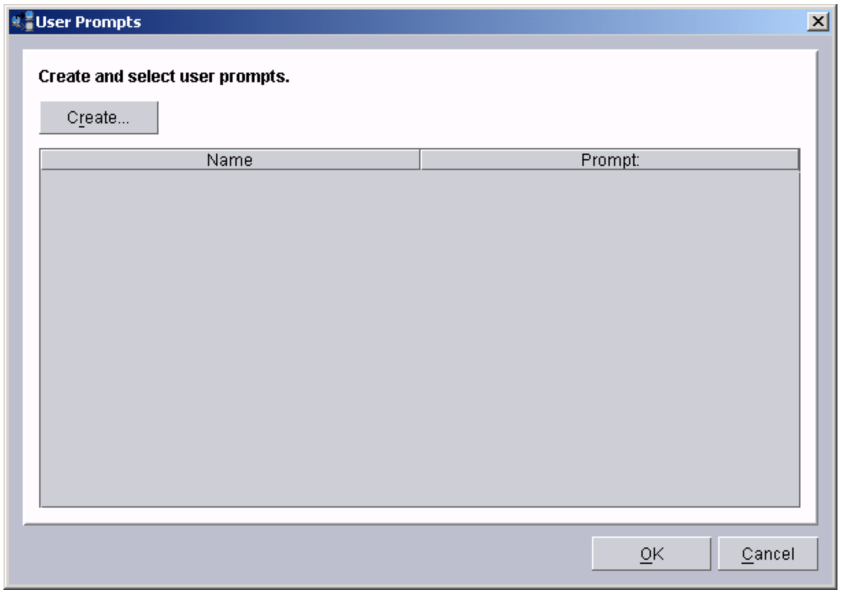


Figure 69. “User Prompts” window

2. Click **Create**. This opens the “Create User” Prompt window.

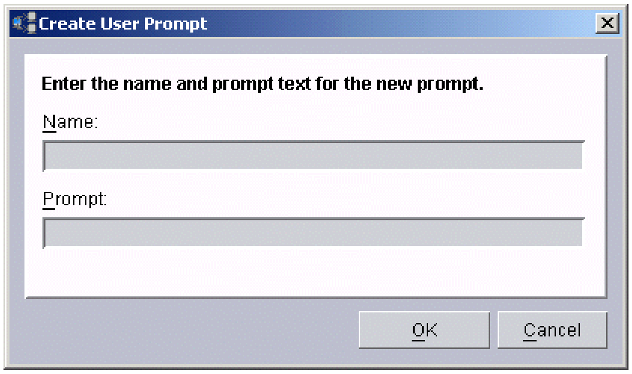


Figure 70. “Create User Prompt” window

3. Type a name and the actual text of the prompt. Click **OK**.

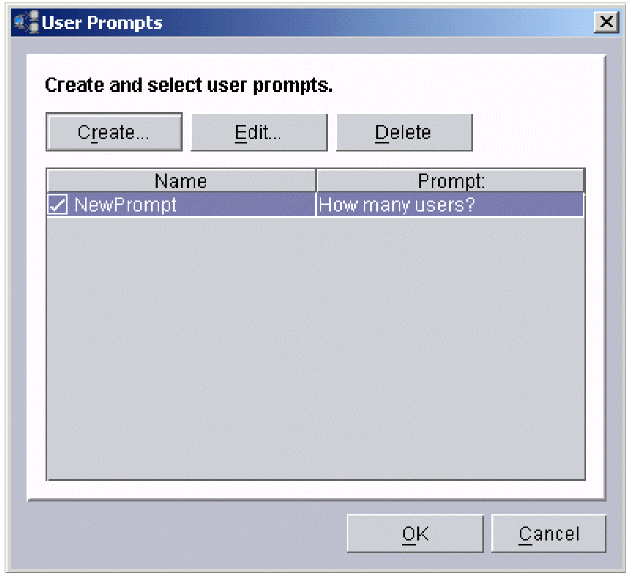


Figure 71. “User Prompts” window

4. Select the check box to use the prompt, and then click **OK** to have the prompt appear in the list box on the Setup page.
5. Click **OK** to create the task after you have entered all the information for the categories.

   The new task will appear in the IBM Director Tasks pane with the Scan template. Right-click the new task to edit, delete, or copy the task.

Troubleshooting Scan tasks

If during a scan a system did not boot to the network, follow these steps to troubleshoot the problem:

1. Check the *Remote Deployment 4.11 Compatibility Guide* for information about your system and its network adapter. The guide is available on the RDM home page. See “Preface” on page xi for more information.
2. Verify that the system contains a supported network adapter:
   - Integrated Ethernet or Token-Ring subsystem that supports PXE.
   - Ethernet or Token-Ring adapter that supports PXE.
3. Change the network adapter settings. These settings can be accessed by pressing CTRL+S (or some other key combination, such as CTRL+ALT+B, depending on which adapter you have) while the system is starting. The important settings are:
   - Network boot protocol: should be PXE.
   - Boot order: should be local drives first.

     Save the changed settings, and then reboot.
4. Change the system configuration. These settings can be accessed by pressing F1 while the system is starting (or some other key, depending on which model system you have). Save after changing the settings, and then reboot the system. The important settings are:
   - Start options, primary boot sequence. Make sure “network” is before any “hard drive”: 1. Diskette 0 2. CD-ROM 3. Network 4. Hard drive 0

- Start options, alternate boot sequence. Some systems do not have an alternate boot sequence. If present, the settings should be: 1. Diskette 0 2. Network

  Note: Some systems and network adapters have the ability to connect to the network when a specific key sequence is pressed after a manual power-on. If your system has this capability and it also has an alternate boot sequence, it is not necessary to set “network” before “hard drive” in its primary boot sequence.
- Wake on LAN. If supported, it should be enabled. You will have to turn on a system without the Wake on LAN feature manually every time you process it with RDM.

5. Although in most cases it is not necessary, you might need to flash update the firmware on your network adapter or the BIOS on your system before scanning it with RDM. If so, download the applicable driver or BIOS code update from the IBM Web site and follow the instructions, and then reboot the system.

Viewing the system log for a failing system

If you get an error during the initial scan of a system, no system log will be created. This means that there is no detailed error description available.

Complete the following steps to debug this situation:
1. If the IBM Director Console contains a new, incomplete entry in the Group Contents pane, delete it.
2. Power the system on again, in a way that forces a network boot. Press the system F8 key immediately after you see the “Starting PC DOS” message on the system monitor.
3. Step through the batch files, one statement at a time, by pressing the system Y key for each statement.

If the error recurs, you will be able to see the error on the system monitor. If the error does not occur, you can safely ignore the original error.

Script

The Script task is one of the most common tasks run. A Script task consists of a list of subtasks (existing tasks) that are delivered in the order you specify. Typically, a Script task consists of all the steps required to roll out a system, for example flash the system firmware, update CMOS, and install an operating system. You select from all available tasks to be included in the Script task.

Right-click **Script** in the Tasks pane to display two options:
- *Create New Task* - accesses the task notebook. All property sheets can be edited.
- *Edit Template* - accesses the template notebook containing all of the properties for the template. The values set in the template notebook are the defaults used when you create a new Script task.

When you create a task, it is added to the Tasks pane under **Script**.

The properties are the same, whether you are creating a new task, editing the default values in the template, or editing an existing Script task:

- **General**: Accesses basic information about the task. The General properties are the first window you see.
- **Setup**: Accesses the Script setup properties for task selection.

The **General** properties are discussed in “Property sheets” on page 10. This section details the Script Setup properties.

Qualification considerations

When you select **Ignore errors in Qualification** for a Script task, the selection only applies to that Script task and not its subtasks. The purpose for ignoring qualification errors on a Script task is to handle those situations in which one subtask depends upon the work of another subtask to be complete before its own qualification can pass. For example, a system with an unconfigured RAID array will generate errors when qualification for a Windows Native Install (WNI) task is run against that system. However, with a Script task, you can put a RAID Custom Configuration task before a WNI task to enable the RAID to be configured before the WNI task is run. The Script task runs the individual subtask qualifications as part of its own qualification and report errors in this situation unless you select the **Ignore errors in Qualification** check box in the Script task.

The previous situation could also be handled by selecting **Ignore errors in Qualification** on the WNI task. That solution might not be desired, especially if that task is also used on other systems outside of the Script task. Some errors that could be caught by qualification would not be realized until running the task against a system.

When two tasks are included in a Script task, and one task depends on the other to configure hardware, selecting the **Ignore errors in Qualification** check box in the Script task is the recommended course of action.

Task selection

Select **Task Selection** on the **Setup** tab.

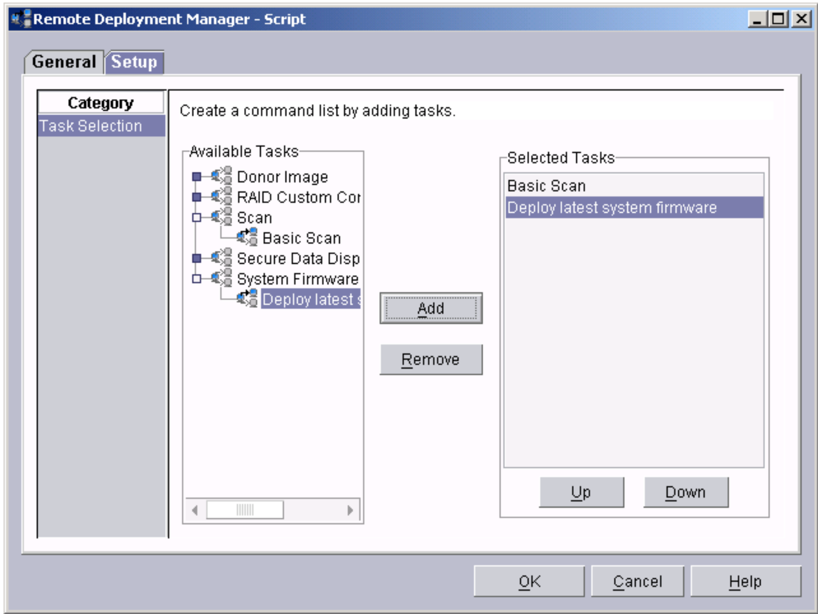


Figure 72. Task Selection category for Script

The **Available Tasks** box contains a tree view of all RDM tasks. The **Selected Tasks** box contains an ordered list of the tasks that are contained in this Script task. The tasks are run in the order in which they occur in this list (top task first).

In turn, select each of the tasks from the previous sections, and then click **Add**. When you click **Add**, the highlighted tasks are copied from the **Available Tasks** box to the **Selected Tasks** box. You could instead just drag each task to the **Selected Tasks** control.

Make sure that you order the tasks in the **Selected Tasks** box correctly. Drag each task up or down to its proper position. You can also move items up or down by using the **Up** and **Down** buttons. Highlight one item or multiple consecutive items, and then click **Up** or **Down** to change their order sequence.

When you click **Remove**, the highlighted tasks are removed from the **Selected Tasks** control.

Click **OK** to create the task.

The task appears in the Tasks pane under the Script task. Right-click the new task to edit, delete, or copy the task.

Secure Data Disposal

The Secure Data Disposal task scrubs (removes) data from the system hard disk drives prior to system disposal or redeployment. All drives and partitions that are accessible to the BIOS can be scrubbed.

Right-click **Secure Data Disposal** in the Tasks pane to display two options:

- *Create New Task* - accesses the task notebook. All properties can be edited.
- *Edit Template* - accesses the template notebook containing all of the properties for the template. The values set in the template notebook are the defaults used when you create a new Secure Data Disposal task.

When you create a task, it is added to the Tasks pane under **Secure Data Disposal**. Right-click on the task to edit, copy or delete it.

The properties are the same, whether you are creating a new task, editing the default values in the template, or editing an existing Secure Data Disposal task:

- **General**: Accesses basic information about the task. The General properties are the first window you see.
- **Setup**: Accesses the Secure Data Disposal setup properties for disposal.
- **Advanced**: Accesses the command list, user parameters, and task folder for the task.

The **General** and **Advanced** properties are discussed in “Property sheets” on page 10. This section details the Secure Data Disposal Setup properties.

Disposal

Select **Disposal** on the **Setup** tab.

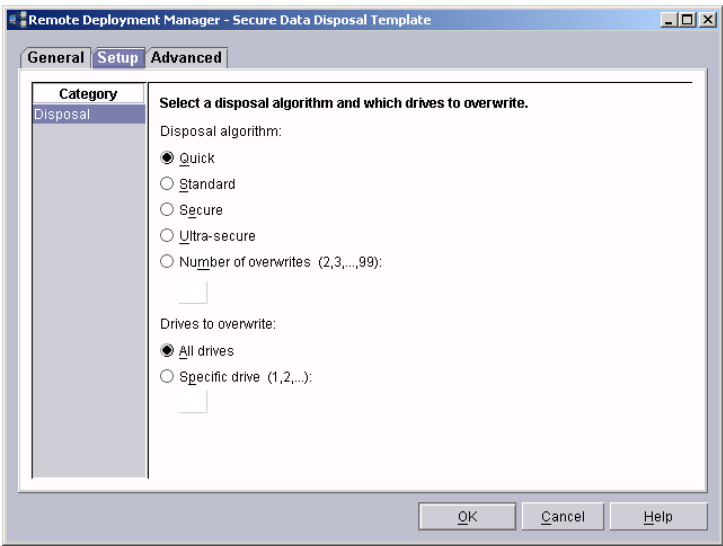


Figure 73. Disposal category for Secure Data Disposal

There are four built-in tasks, Levels 1-4, of disposal algorithms.

Quick
: Overwrites the Master Boot Record, the first 100 sectors of each partition, and the last 2 sectors on every hard disk drive installed on the system. The pattern used for the overwrite operation is 0x0000. It is intended to make files inaccessible to normal file-system-based tools. The disposal algorithm for Quick corresponds to the /L=1 parameter for SCRUB3.EXE.

Standard
: Overwrites every sector of every hard disk drive installed on the system with zeros (0x0000). It is intended to make data inaccessible by any software technique. The disposal algorithm for Standard corresponds to the /L=2 parameter for SCRUB3.EXE.

Secure
: Overwrites every sector on every hard disk drive installed on the system 4 times with the following patterns (in this order):

1. A random pattern.

2. The bit-wise complement of the first random pattern.
3. A different random pattern.
4. A 0x0000 pattern.

It is intended to make the data inaccessible by any technique. The disposal algorithm for Secure corresponds to the /L=3 parameter for SCRUB3.EXE. It meets the United States Department of Defense standards.

Ultra-Secure
Overwrites every sector on every hard drive installed on the system 7 times with the following patterns (in this order):

1. A random pattern.
2. The bit-wise complement of the first random pattern.
3. A different random pattern.
4. The bit-wise complement of the second random pattern.
5. A third random pattern.
6. The bit wise complement of the third random pattern.
7. A 0x0000 pattern.

It is intended to make the data inaccessible by any technique. The disposal algorithm for Ultra-secure corresponds to the /L=4 parameter for SCRUB3.EXE. It meets DoD standards.

Note: There might be sectors that are not accessible to the BIOS code calls, because of internal remapping of damaged sectors by the drive controller. This Task does not erase these sectors.

Number of overwrites
Corresponds to the /W=<m> parameter for SCRUB3.EXE. If you select this option, the adjacent entry field is enabled. You must type <m>, the total number of overwrites, as an integer (or use the spin button to select an integer).

All drives
Corresponds to the /D=ALL parameter for SCRUB3.EXE.

Specific drive
Corresponds to the /D=<n> parameter for SCRUB3.EXE. If you choose this option, type or select <n>, the drive number. Drive numbering starts at 1, not 0.

Click **OK** to create the task. The new task appears in the Tasks pane under Secure Data Disposal. Right-click on the task to edit, copy, or delete it.

System Firmware Flash

The purpose of the System Firmware Flash task is to update the system firmware (such as BIOS or embedded controller on 32-bit systems) on one or more client systems.

The BIOS code level of the system is part of the information collected during the scan process. Upgrade the BIOS code level if updates to the BIOS function are required or if a change to the system BIOS language is necessary.

If updates are required, IBM makes the new files available through bulletin board systems, publicly accessible servers, the World Wide Web, or similar means. BIOS code updates are distributed as self-extracting executable (.exe) files. Download the

.exe file and run it. The .exe file will prompt you with instructions for creating an update diskette. In the following procedure, this diskette is referred to as the BIOS flash diskette.

RDM uses the following BIOS naming convention:

```
XXYYZZz
XX = Product Code.
YY = Release Type. Supported types by RDM:
  JT = System BIOS Diskette for any language (includes Japanese).
   The diskette label must be set to XXJTZZz.
  J2 = System BIOS Diskette for Japanese systems.
   The diskette label must be set to XXJ2ZZz.
  KT = This is the value stored in the SMBIOS table.
   The value in SMBIOS will be set to XXKTZZz.

ZZz = Build Level.
  ZZ = Build ID. A numeric representation of the BIOS code build level.
   RDM treats the largest number as the most recent BIOS version.
  z = Revision. RDM ignores this character.
```

Note: Your BIOS diskette should have the first 2 digits/characters that match the BIOS type. If there is no match (for example, a non-IBM system), you can still flash the BIOS by selecting the Ignore failure in systems qualification check box when deploying the task.

Updating the BIOS code level for a system is a two-step process. First, you must create a BIOS Update image from the BIOS flash diskette, and then apply this image to update the BIOS code level for specific systems.

System Firmware Flash tasks

There are two distinct kinds of System Firmware Flash tasks in RDM:

- **Latest version** - The System Firmware Flash images used in this task are the latest versions available in the RDM Master Repository. When you install RDM, a built-in task of this type will be created. This task can also be a convenient way to test a new system firmware version before deploying it to production systems. There is one built-in task named **Deploy Latest BIOS** that is included with this template.
- **Specific version** - You can select specific System Firmware Flash images to be used in the task. A necessary condition is that all System Firmware Flash images selected (for a single System Firmware Flash Task) must have different Product Codes.

Right-click **System Firmware Flash** in the Tasks pane to display two options:

- *Create New Task* - accesses the task notebook. All of the property sheets can be edited.
- *Edit Template* - accesses the template notebook containing all of the properties for the template. The values set in the template notebook are the defaults used when you create a new System Firmware Flash task.

When you create a task, it is added to the Tasks pane under **System Firmware Flash**. Right-click on the task to edit, copy or delete it.

System Firmware Flash properties

The properties are the same, whether you are creating a new task, editing the default values in the template, or editing an existing System Firmware Flash task:

- **General**: Accesses basic information about the task. The General properties are the first window you see.
- **Setup**: Accesses the System Firmware Flash setup properties for images and flash condition.
- **Advanced**: Accesses the command list, user parameters, and task folder for the task.

Images

Select **Images** from the **Setup** tab.

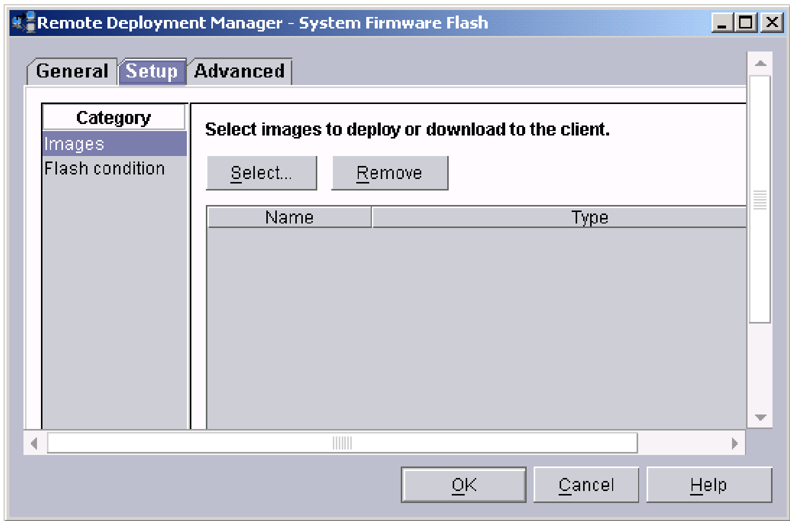


Figure 74. System Firmware Flash Images category

The list box contains all installation images previously selected.

Select an image from the list box, or click **Select** to add an image from the RDM repository to the list.

To remove an image from the list, select the image and click **Remove**.

Creating a new image

Complete the following steps to create a new image:

1. Click **Select** on the Setup page.

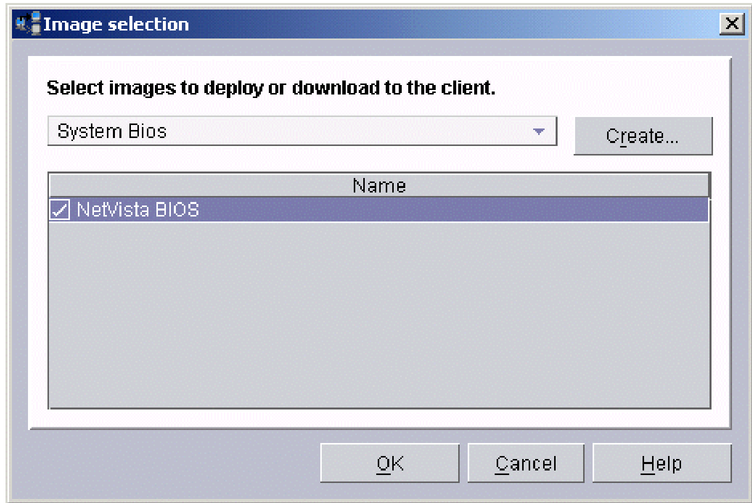


Figure 75. Image selection for System Bios image

2. Click **Create**. This opens the Image Management window.

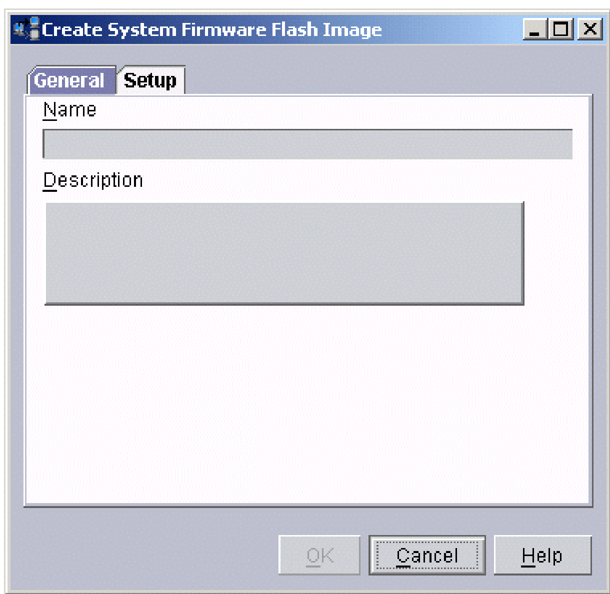


Figure 76. General page for "Create System Firmware Flash Image" window

3. On the General page, type a name and description for the new image.
4. Click the **Setup** tab and select the image type.

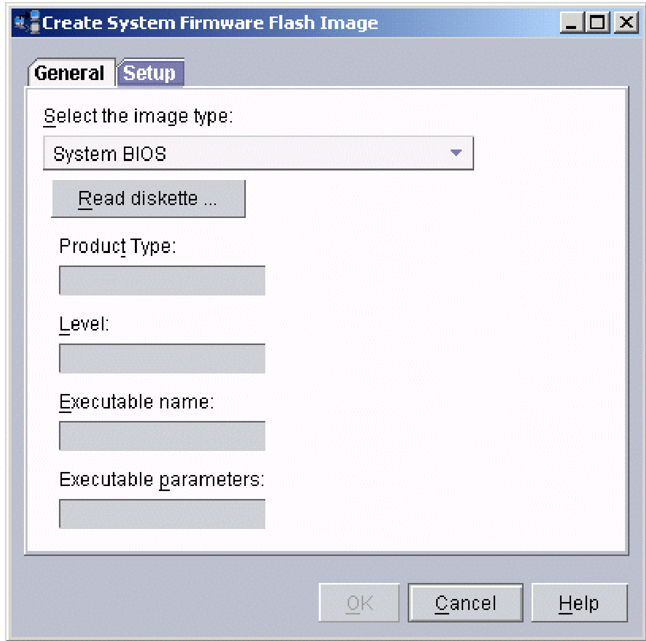


Figure 77. Setup page of the “Create System Firmware Flash Image” window

5. Insert your BIOS diskette into the system diskette drive and click **Read diskette**. Make sure your diskette is write-protected.

   The program reads the volume label of the diskette. All IBM BIOS diskettes have a volume label (7 to 8 characters) that indicates the type of systems for the BIOS, the level of BIOS, and the NLS type of the BIOS. With this information, the remaining Entry fields of the window (Product type, Level, Executable name, and Executable parameters) are filled in automatically.

   Note: The BIOS diskette for some SurePOS™ systems contains a volume label that does not conform to the standard. For RDM 4.11, copy the content of the diskette to another diskette with a volume label which reflects the name and level of the BIOS. The label for the diskette should be 7 characters long. Example: xxxxyya where xxxx is the model (machine type) the BIOS supports, yy is the level of the BIOS, a/b is the version. To create a label for the diskette, format a diskette and in the label or from a blank diskette, type “label”, then type the label name. After the diskette is created, use the RDM Image Management tool to create a BIOS image.
6. Click **OK** to create the firmware image.
7. Continue with the Flash condition properties.

Flash condition

Select **Flash condition** from the **Setup** tab.

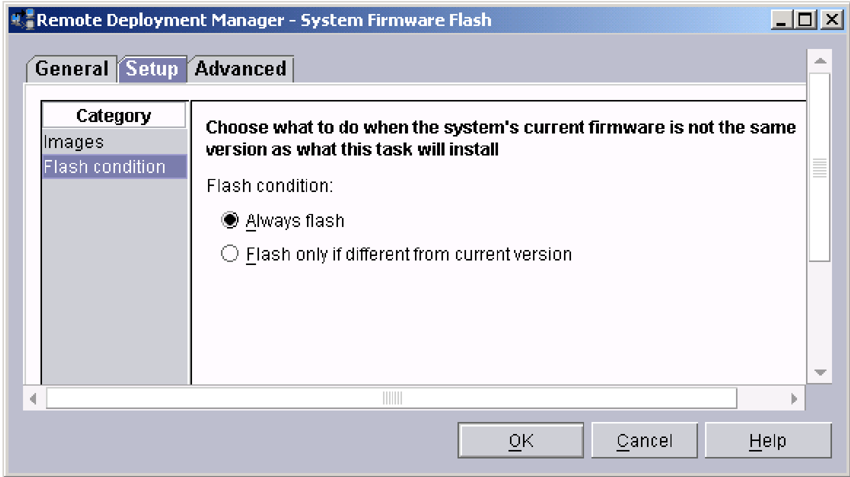


Figure 78. System Firmware Flash condition category

Apply Always
Always flashes the BIOS specified in the task, even if the BIOS on the target system is newer.

Apply only when the latest version is newer than the current system BIOS level
Only flashes the BIOS if the level specified in the task is newer than the level on the target system.

Click **OK** to create the task after you have entered all the information for the categories.

The new task appears in the Tasks pane under **System Firmware Flash**. Right-click the new task to edit, copy or delete the task.

Windows Clone Install

The Windows Clone Install performs unattended loading of a selected Windows clone image to one or more target systems. You select the image from a list of Windows clone images imported into the Master Repository. The same image can be downloaded to multiple systems.

Note: The PowerQuest software used to obtain the clone image, provides supports for Ethernet and Unicast protocols only. Token Ring and Multicast are not supported for this task. Multicast is supported for the rest of RDM. You can upgrade to the full-function version of the PowerQuest DeployCenter tool that does support Multicast.

The clone installation image contains the software designed to meet the requirements of a specific end user, department, or group of end users that perform similar tasks. The image consists of an exact bit-by-bit copy of a donor system. There are also batch files in the boot environment or in the template directory to control the RDM processing.

Refer to “Donor Image” on page 46 for complete information on obtaining a clone image.

Windows Clone Install tasks

Right-click **Windows Clone Install** in the Tasks pane to display two options:

- *Create New Task* - starts the Windows Clone Install wizard. You are guided through a series of windows in a predefined order. The data you enter is validated for each window.
- *Edit Template* - accesses the template notebook containing all of the properties for the template. The values set in the template notebook are the defaults used when you create a new Windows Clone Install task.

Note: In order to complete a Windows Clone Install task on an image that has a Windows XP operating system, you must run sysprep and make sure to select the "run mini-setup" check box.

When you create a task, it is added to the Tasks pane under **Windows Clone Install**. Right-click on the task to edit, copy or delete it.

Windows Clone Install properties

The properties are the same, whether you are creating a new task with the wizard, editing the default values in the template, or editing an existing Windows Clone Install task:

- **General**: Accesses basic information about the task. The General properties are the first window you see.
- **Setup**: Accesses the Windows Clone Install setup properties for images, personal, licensing, regional, network environment, network protocols, TCP/IP, WINS, and DNS.
- **Advanced**: Accesses the command list, user parameters, and task folder for the task.

Images

Select **Images** from the **Setup** tab.

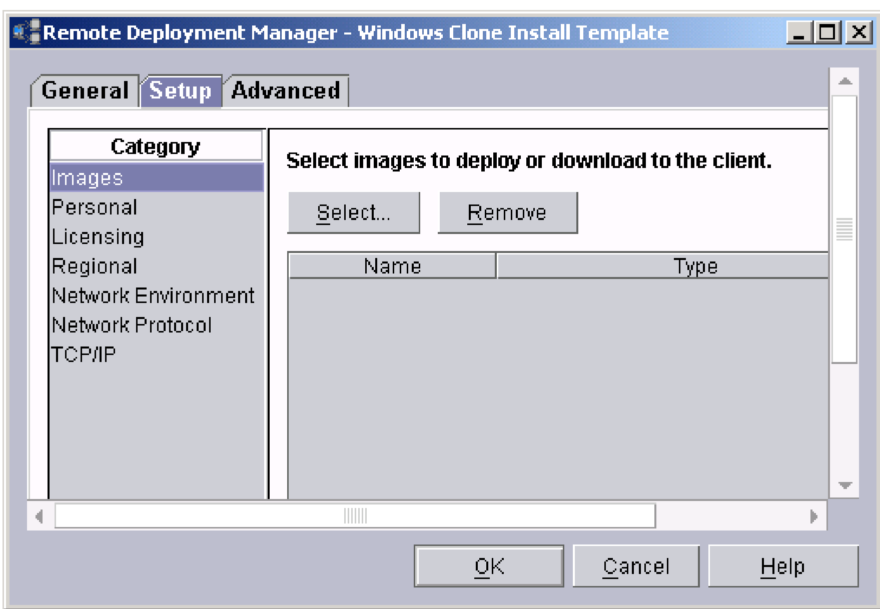


Figure 79. Windows Clone Install Images category

The list box contains all installation images previously selected.

Select an image from the list box, or click **Select** to add an image from the RDM repository to the list. Initially, the list box is empty. As you select images, an accumulative list is displayed.

To remove an image from the list, select the image, and then click **Remove**.

Creating a new image

Complete the following steps to create a new image:

1. From the Setup page of the Windows Clone Install template, click **Select**. This opens the "Image Selection" window.

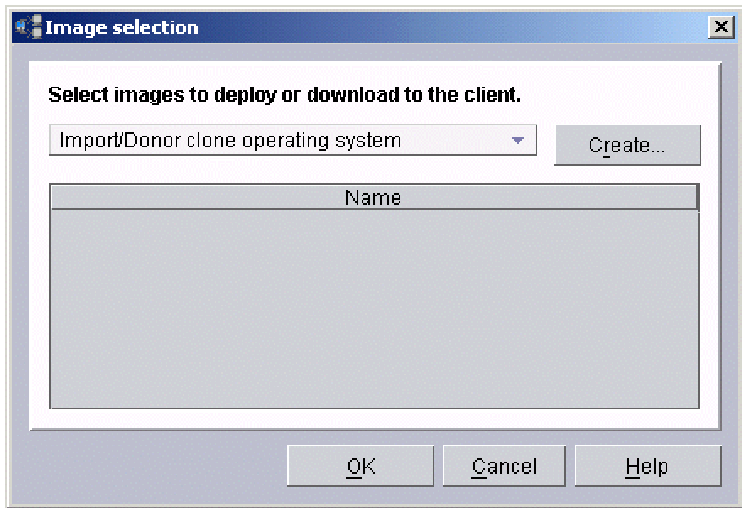


Figure 80. "Image selection" window

2. Click **Create**.

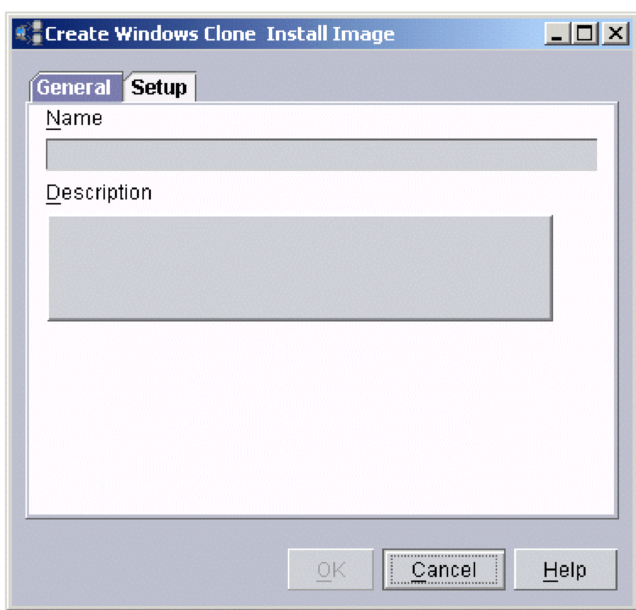


Figure 81. General page for the "Create Windows Clone Install Image" window

3. On the General page, type a name and description for the new image to be imported.
4. Click the **Setup** tab and select the operating system, type the product type (the 4 digit model number of the system the clone image was obtained from), and specify or browse to the source of the file to be imported.

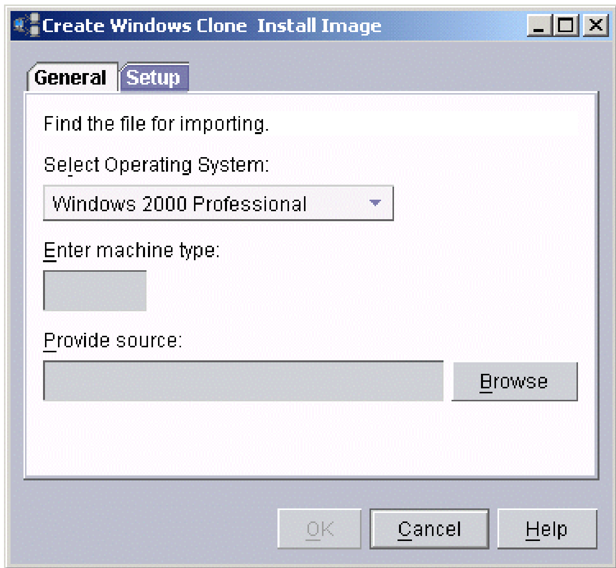


Figure 82. Setup page for Windows Clone Install

5. Click **OK**.

   A progress bar is displayed during the file transfer to IBM Director Server, if needed, and during image creation.

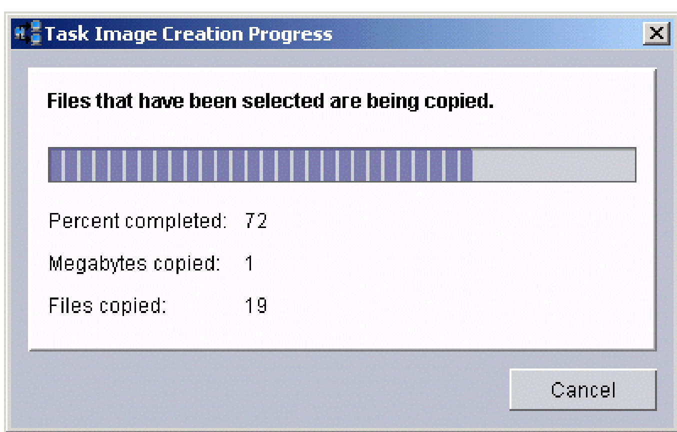


Figure 83. "Task Image Creation Progress" window

Personal

Select **Personal** from the **Setup** tab.

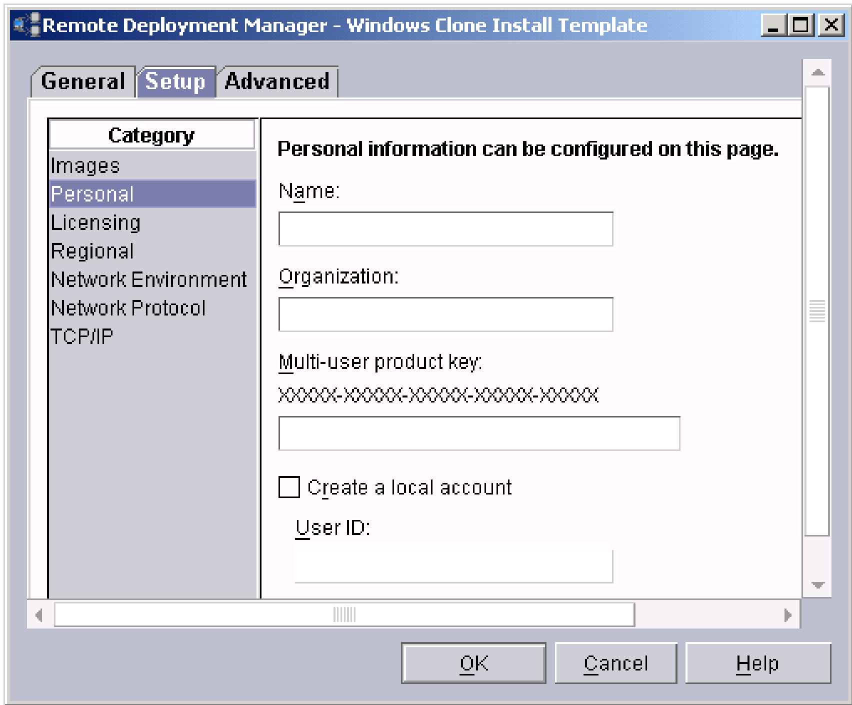


Figure 84. Windows Clone Install Personal category

Name
: The name of the registered user of the system, for example, John Doe.

Organization
: The company name for the system being deployed, for example, IBM Corporation.

Multi-user product key
: This is the Certificate of Authorization for the Windows operating system being deployed. The CD Key format has a length of 29 characters, formatted in five 5-character alphanumeric tokens separated by hyphens.

Create a local account
: Select this check box if you want to create a local user on the system being deployed.

User ID
: The name of the local userid that is created if you select the **Create a local account** box.

Licensing

Select **Licensing** from the **Setup** tab.

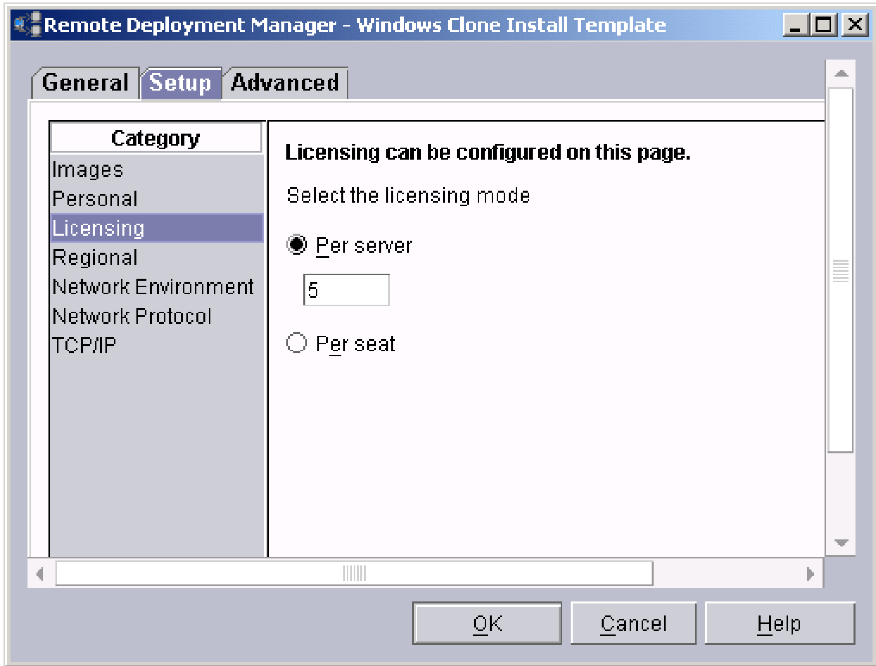


Figure 85. Licensing category for Windows Clone Install

Licensing modes
A choice of Per server or Per seat. If you select Per server, you must also type the number of system licenses you have purchased for this server.

Server licensing count
Minimum count is 5.

Regional

Select **Regional** from the **Setup** tab.

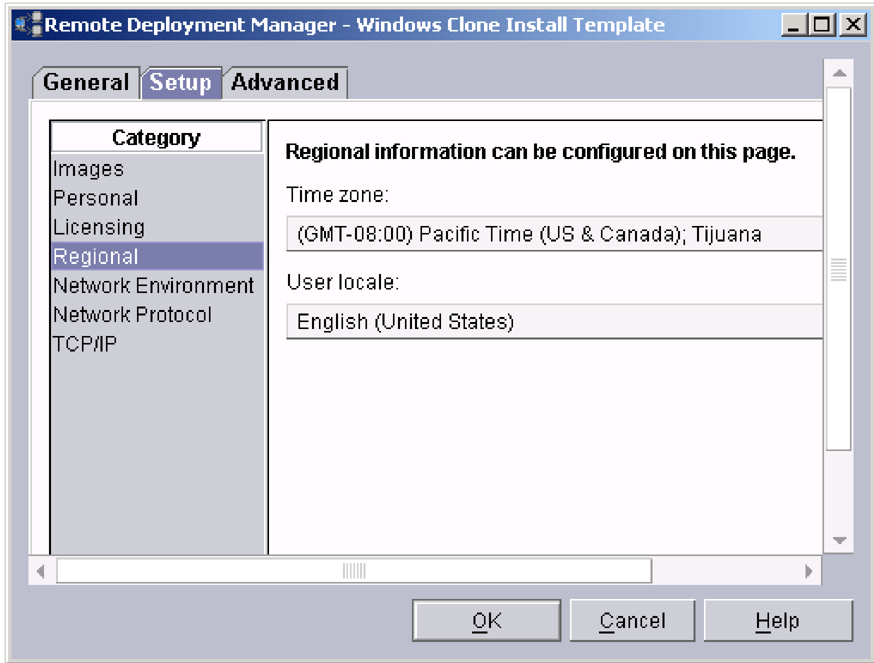


Figure 86. Windows Clone Install Regional category

Use the Regional category to select values for time zone and locale system-level task parameters:

Time zone
Select the entry from the list. The list is loaded from the database or master.ini file.

System language
Select the system language from a dropdown list.

User locale
Language to display.

Keyboard
Select the keyboard language from a dropdown list.

Network Environment

Select **Network Environment** from the **Setup** tab.

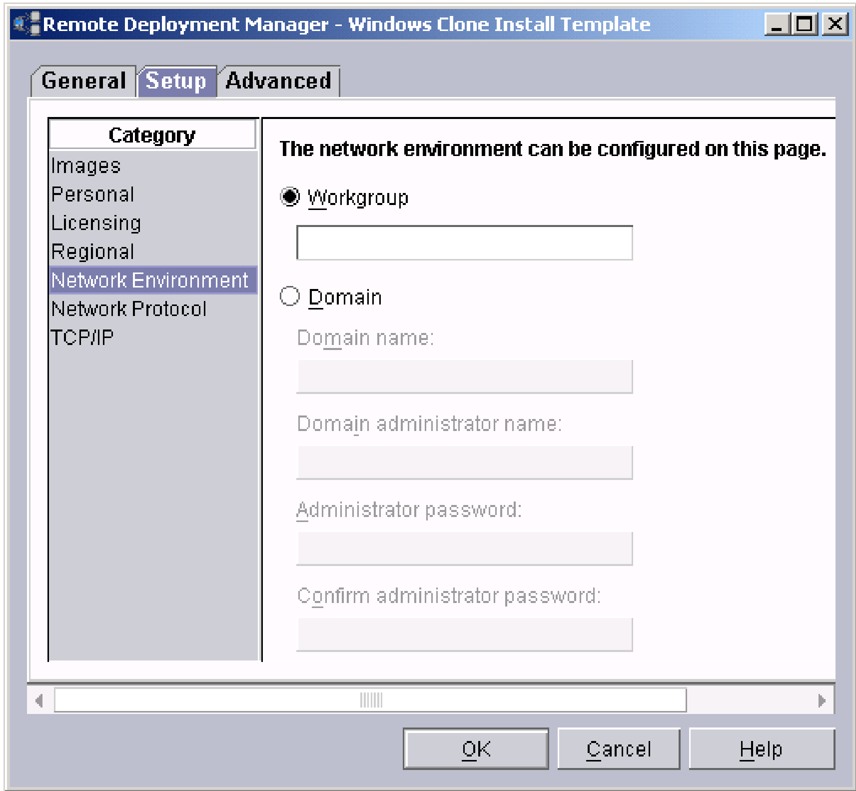


Figure 87. Windows Clone Install Network Environment category

Type the name of the workgroup or domain to which your system belongs. To join a workgroup, select **Workgroup** and type the workgroup name. To join a domain, select **Domain** and type the domain name. For Windows 2000 Professional and Windows XP Professional, you must also type the Administrator name and password.

Network Protocols

Select **Network Protocols** from the **Setup** tab.

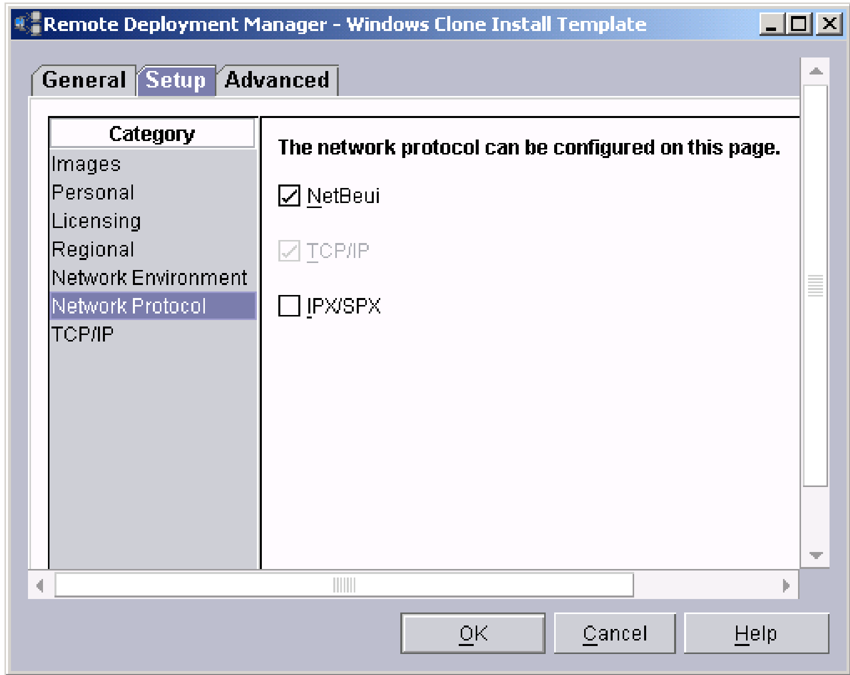


Figure 88. Windows Clone Install Network Protocol category

NetBEUI
A non-routable protocol for use within peer-to-peer networks.

TCP/IP
A routable protocol for use across networks. The TCP/IP protocol is always checked.

IPX/SPX
A connection service similar to TCP/IP used by Novell Netware operating systems.

TCP/IP

Select **TCP/IP** from the **Setup** tab.

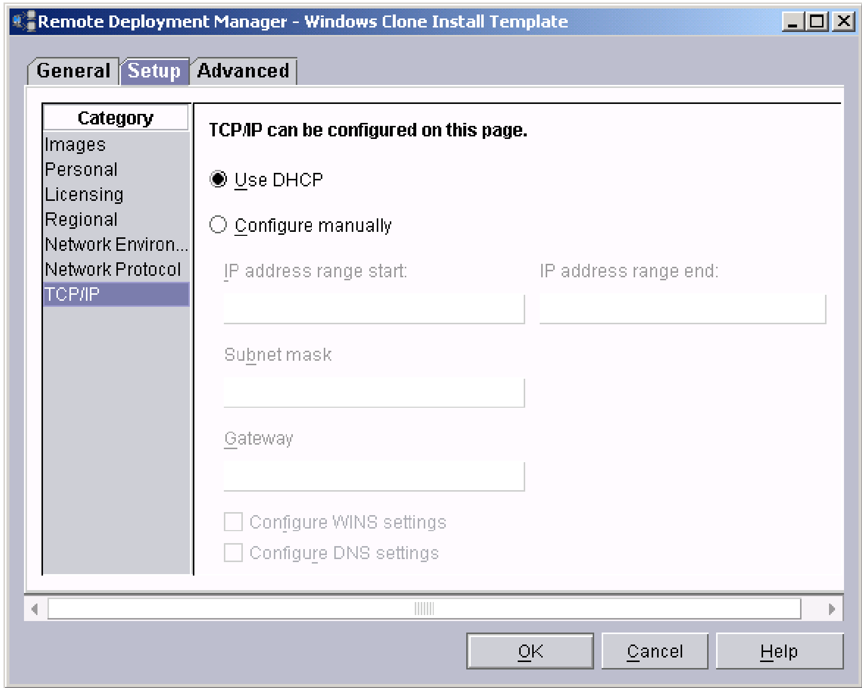


Figure 89. Windows Clone Install TCP/IP category

Select **Use DHCP** to automatically configure TCP/IP settings or select **Configure manually**.

Note: If **Use DHCP** is selected, no other values are needed. A DHCP server must be present on the network. If **Configure manually** is selected, the other Entry fields are enabled, and their set up notebook is available in the category list and through the wizard.

Manual configuration

You have two choices for implementing manual configuration:

1. You can leave the IP address range blank. You then manually assign an IP address to each system during System Task Configuration (STC). This option is the best choice if either of the following conditions apply:
   - You have multiple subnets. RDM does not check for unique IP addresses on multiple subnets.
   - You use multiple installation tasks of a single type, or multiple types of installation tasks (such as, Windows Clone, Windows Native and Linux Native). RDM validates unique IP addresses within a single task, not across multiple tasks. If there is any overlap of address ranges within tasks, duplicate IP addresses are possible.
2. You can specify an IP address range. RDM then assigns an IP address to each system during system qualification. This option can be used for deploying tasks on a single subnet. An example is a classroom lab where you redeploy the same image on all systems before every class. You could set up a classroom installation task with the reserved range of addresses for the classroom.

Field descriptions

For manual configuration, the following Entry fields are enabled:

Starting IP address
Type the starting IP address for the range of available addresses to be assigned to target systems. RDM uses the IP address range to select a unique IP address for each target system when the system is qualified. The range of values can be obtained from your network administrator. You can leave this field blank. If you specify a Starting IP address, you must also specify an Ending IP address.

Note: If you specify a range of IP addresses, you must make sure there is no overlap of the range with any other installation task. RDM validates unique IP addresses within the individual task, not across multiple tasks.

Ending IP address
Type the ending IP address for the range of available addresses to be assigned to target systems. This parameter is required if you specify a Starting IP address.

Subnet mask
The default value is set in the template property sheet. It is a required system parameter whose value is required before an unattended installation is to begin. The value can be entered now in the task creation phase or in the System Assignment and Configuration phase.

Gateway IP
The default value is set in the template property sheet. It is an optional system parameter whose value is not required.

If you select to configure either WINS or DNS settings, WINS and DNS categories are added to the category list.

WINS

Select **WINS** from the **Setup** tab. WINS is only available if you selected WINS Configuration on the TCP/IP page.

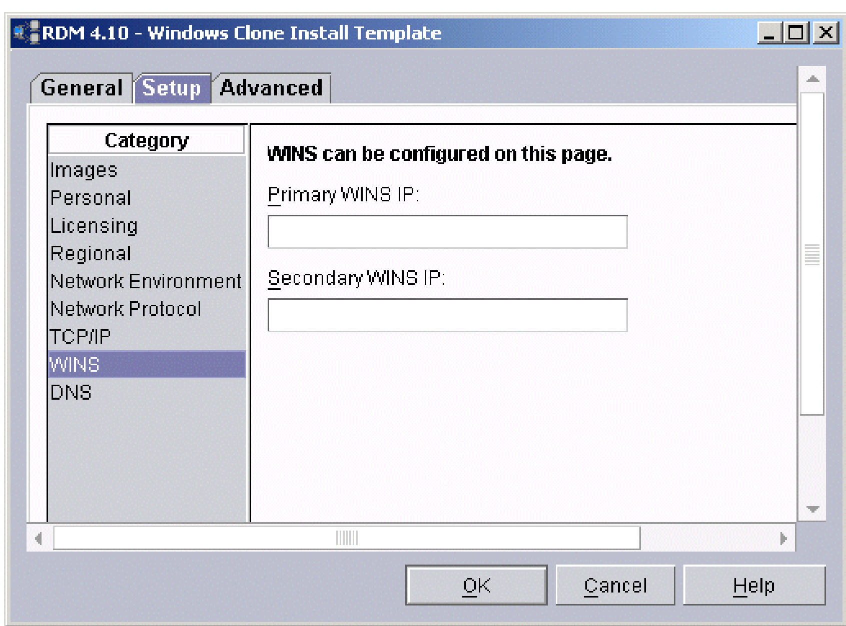


Figure 90. Windows Clone Install WINS category

Primary WINS IP
The default value is set in the template property sheet. When the task is customized to configure the WINS settings, the primary WINS Server IP address becomes a required system parameter that the user must provide a value. The value can be entered in the task phase or in the System Assignment and Configuration phase.

Secondary WINS IP
The default value is set in the template property sheet. It is an optional system parameter whose value is not required.

DNS

Select **DNS** from the **Setup** tab. DNS is only available if you selected WINS Configuration on the TCP/IP page.

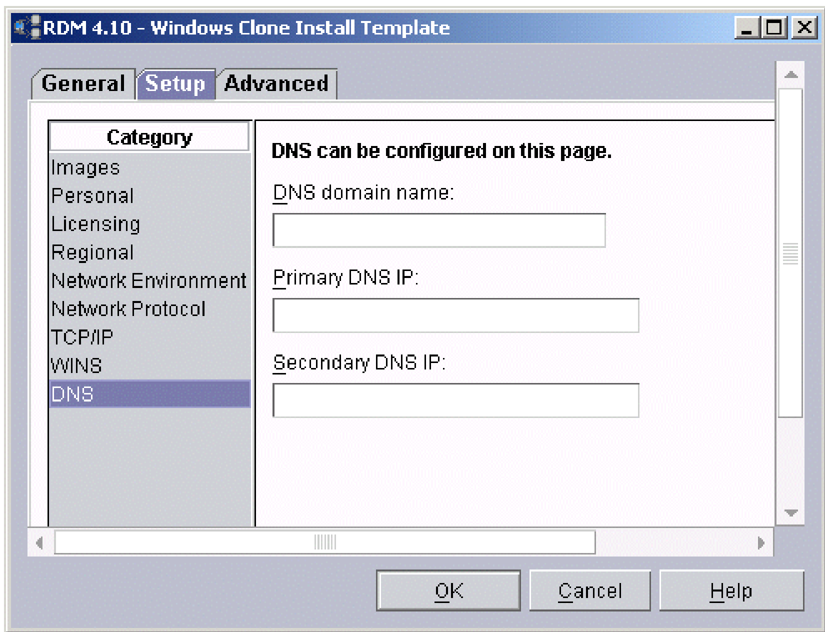


Figure 91. DNS category for Windows Clone Install

DNS domain name
The default value is set in the template property sheet. When the task is customized to configure the DNS settings, the DNS domain name and the primary DNS Server IP address become required system parameters for which you must provide values. The secondary DNS Server IP address is optional. Those values can be entered in the create task phase or in the System Assignment and Configuration phase.

Primary DNS IP
The default value is set in the template property sheet. You must enter a value for this option. The value can be entered in the create task phase or in the System Task Configuration phase.

Secondary DNS IP
The default value is set in the template property sheet. It is an optional system parameter whose value is not required.

Modifying the Windows Clone Install answer file

When you clone a system that has a Windows administrator password on the image, RDM assumes you have a blank administrator password for any image used by the Windows Clone Install task; however, this is not always the case. If an administrator password exists, you must modify the answer file associated with the Windows Clone Install task using that image.

To modify the Windows Clone Install answer file, complete the following steps:

1. Create a Windows Clone Install task with the template wizard.
2. Edit the Answer File in the appropriate Task Folder. Determine the Task Folder by completing these steps:
   a. Right-click the newly created Windows Clone Install task.
   b. Click **Edit**.
   c. Click the **Advanced** tab.
   d. Click **Task Folder** in the Category pane, where a directory location is specified.
3. Navigate to the specified directory and open the file, Answer2.txt. (The creation of the task produces answer2.txt in the Task folder.)
4. Find the [GUIUnattended] section of the Answer2.txt file.
5. Edit the AdminPassword=* key to equal your password, for example:
   ```
   AdminPassword="myPassword"
   ```
6. Exit the folder and run the newly-created Windows Clone Install task from the RDM Console.

Windows Native Install

The Windows Native Install (WNI) task deploys operating system and application installation information to target systems. After systems have been assigned their individualized information, the operating system and applications installation and configuration to these systems can take place without any further user attendance. A successfully completed new task will have a folder created for it in the RDM Server with the folder name derived from the task name.

Windows Native Install tasks

Right-click **Windows Native Install** in the Tasks pane to display two options:

- *Create New Task* - starts the Windows Native Install wizard. You are guided through a series of windows in a predefined order. The data you enter is validated for each window.
- *Edit Template* - accesses the template notebook containing all of the properties for the template. The values set in the template notebook are the defaults used when you create a new Windows Native Install task.

When you create a task, it is added to the Tasks pane under **Windows Native Install**. Right-click on the task to edit, copy or delete it.

Note: If you create a windows application image that is a batch file, the last command in the batch file must be an exit command; otherwise, the Windows Native Install task will never complete.

Windows Native Install properties

The properties are the same, whether you are creating a new task with the wizard, editing the default values in the template, or editing an existing WNI task:

- **General**: Accesses basic information about the task. The General properties are the first window you see.
- **Setup**: Accesses the WNI setup properties for drivers, disk configuration, operating system images, other images, personal, licensing, regional, network environment, network protocols, TCP/IP, WINS, and DNS.
- **Advanced**: Accesses the command list, user parameters, task folder and miscellaneous properties for the task.

Note: Windows Native Install task configuration uses the client system name to be client computer name, if the client computer name does not exist.

If the assigned computer name is invalid, the computer name is changed using the following rules:

- Remove spaces and invalid characters from computer name. Invalid characters include: `~!@#$%^&*()=+[]{}\|;:’”,<>/?.

  For example, *pearl rfrsh* would be changed to *pearlrfrsh*.
- Truncate from the end to make it shorter or equal to 63 characters long, if the computer name is too long (greater than 63 characters).
- Append the letter a in front (for example, 12345 would be changed to a12345), if the computer name contains all digits.
- Add _1, _2, and so on, to the end of the duplicate computer name, if the computer name is duplicated.

Drivers

Select **Drivers** from the **Setup** tab.

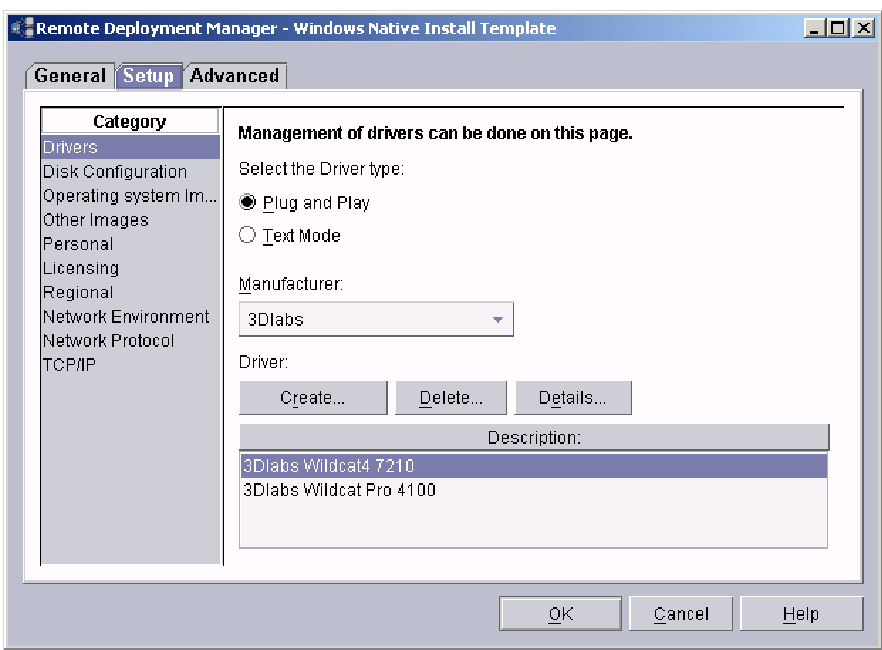


Figure 92. Windows Native Install Drivers category

Driver Type
: Selects the type of driver to add. Select **Plug and Play** to add PNP drivers, or **Text Mode** for text mode drivers.

Manufacturer
: Lists drivers sorted by their manufacturer. Select a driver and click **OK**.

Delete

Details
: Provides details of the selected driver, including the version number. Click **OK** to close the "Driver Details" window.

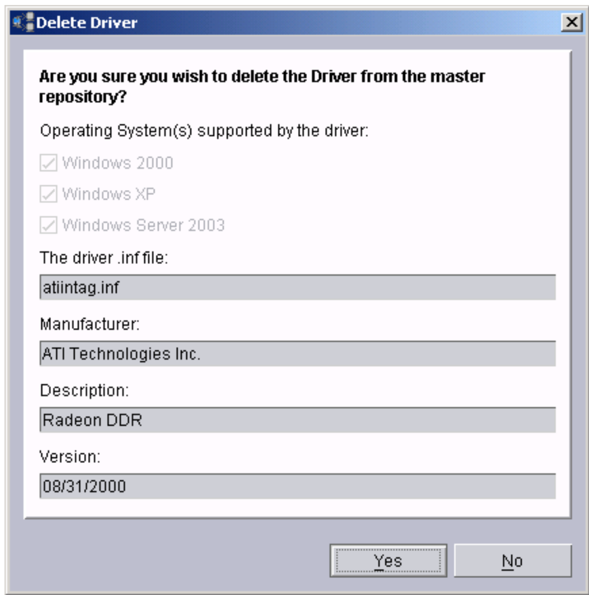


Figure 93. "Driver Details" window

Adding a device driver

Click **Create** to open the "Create Driver" window.

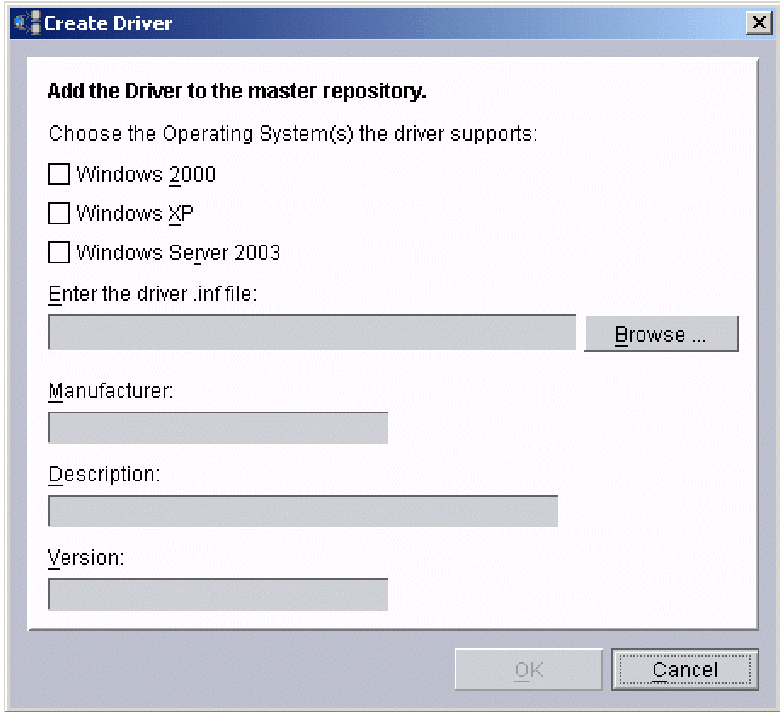


Figure 94. "Create Driver" window

1. Select the OS type this driver supports.
2. Click **Browse** to point RDM to the driver's inf file or textsetup.oem file if text mode is selected.
3. Verify the version number of the driver. RDM does not verify compatibility of the driver with other installed components.
4. Click **OK** if the information collected by RDM is correct.

The new driver is added to the Master Repository to be used by Windows Native Install OS deployments.

Deleting a device driver

1. Select the driver to delete.

   Note: Drivers are sorted by manufacturer name. To get to the correct driver, you must select the manufacturer name.
2. Click **Delete** to open the "Delete Driver" window.

Figure 95. "Delete Driver" window

3. The driver details are displayed. Click **OK** to delete driver from the Master Repository; otherwise, click **Cancel** to close the window.

Viewing device drivers

To view a device driver from RDM, complete the following steps:

1. Select the driver to delete.

   Note: Drivers are sorted by manufacturer name. To get to the correct driver, you must select the manufacturer name.
2. Click **Detail**.
3. Click **OK**.

Adding a HAL driver

Note: Before adding the HAL, you need to know the model or machine type that this HAL driver will support.

To add a HAL driver to the RDM repository, complete the following steps:

1. Use the same method of adding a text mode driver to add the HAL.
2. Go into the RDM repository, c:\program files\ibm\rdm\repository. Under this directory is the subdirectory wnihal. Open the hal.properties file using a text editor.
3. Create a new entry in the hal.properties file with a key "newXX=", for example:
   ```
   new34=f000.lca
   ```
   Replace the key "newXX" with the actual model type of the machine, for example:
   ```
   6833=f000.lca
   ```

In this example, the new HAL supports model type 6833.

4. Save the file and exit text editor. Deploy the client.

Disk Configuration

Select **Disk Configuration** from the **Setup** tab.

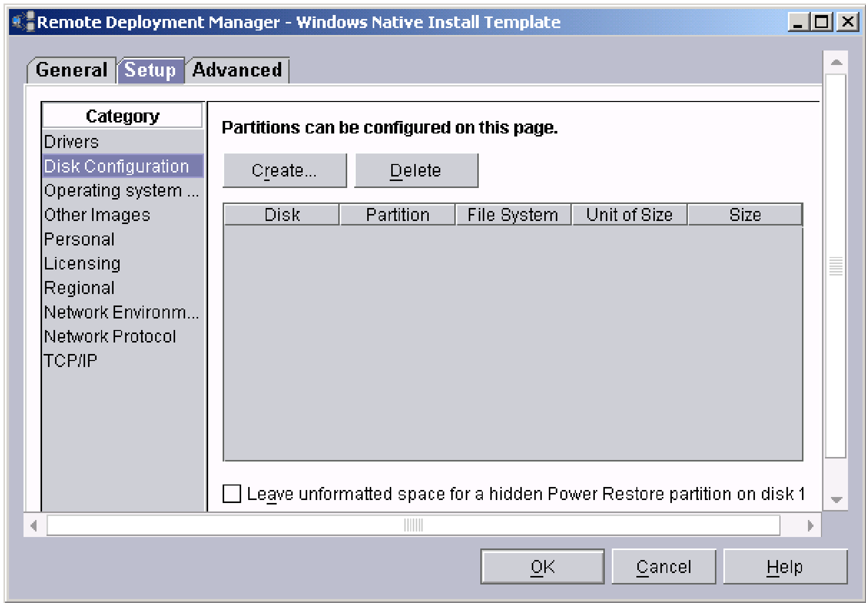


Figure 96. Disk Configuration category for Windows Native Install

Click **Leave unformatted space for a hidden Power Restore partition on disk 1** reserves unformatted space for a Power Restore partition on the primary (boot) partition. Use the Power Restore task to create the actual Power Restore backup.

Click the individual grid cell to change the individual fields for **File System**, **Unit of Size**, and **Size** directly for a particular disk/partition.

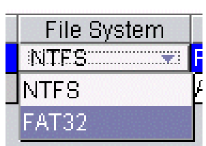


Figure 97. List of File System options

Click **Create** to open the “Create Partition” window.

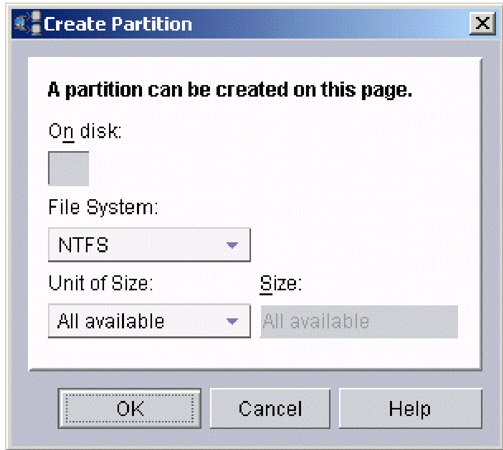


Figure 98. "Create Partition" window

On Disk
Type a disk number. Letters are not valid. Disk 0 is reserved for Power Restore partitions, even if you are not using Power Restore. Partition numbers are incremented automatically as partitions are added to a disk.

File System
Select *NTFS* or *FAT32* for the partition file format.

Unit of Size
If you want a single partition, leave this field set to *All available*. If you want multiple smaller partitions, set this field to *Fixed size in MB*, and type the size in the **Size** field.

Size
Type the number of MB for the partition in this field if **Unit of size** is *Fixed size in MB*.

Select a partition and click **Delete** to delete it.

Operating System

Select **Operating System** on the **Setup** tab.

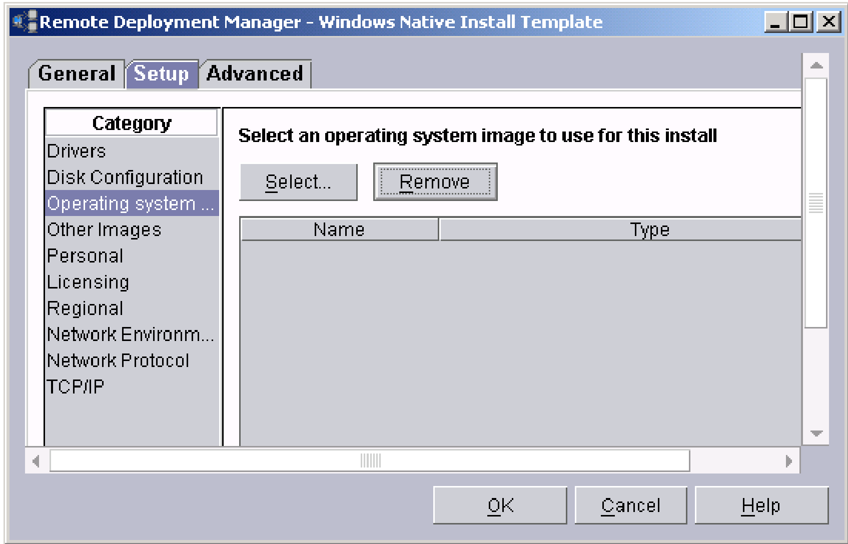


Figure 99. Windows Native Install Operating system category

The list box contains all installation images previously selected for this template.

Select an image from the list box, or click **Select** to add an image from the RDM repository to the list.

Select and image and click **Remove** to remove it from the list. It does not remove it from the Master Repository.

Creating a new image

Complete the following steps to create a new image:

1. Click **Select** from the Operating System category on the Setup tab. This opens the “Image Selection” window.

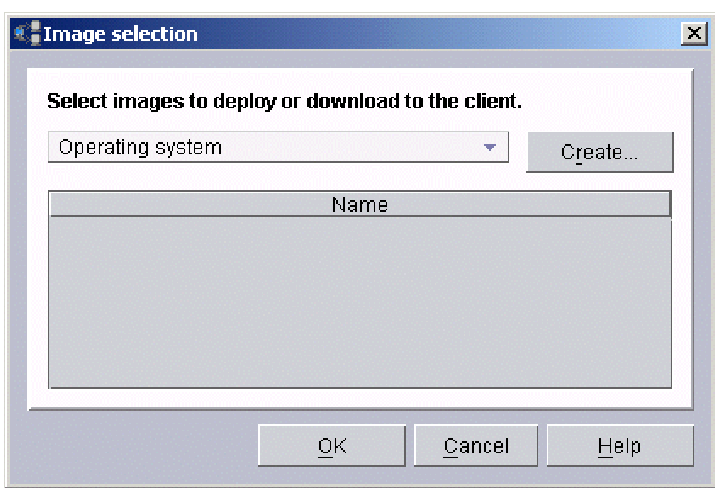


Figure 100. “Image selection” window

2. Click **Create** to open the “Image Management” window.

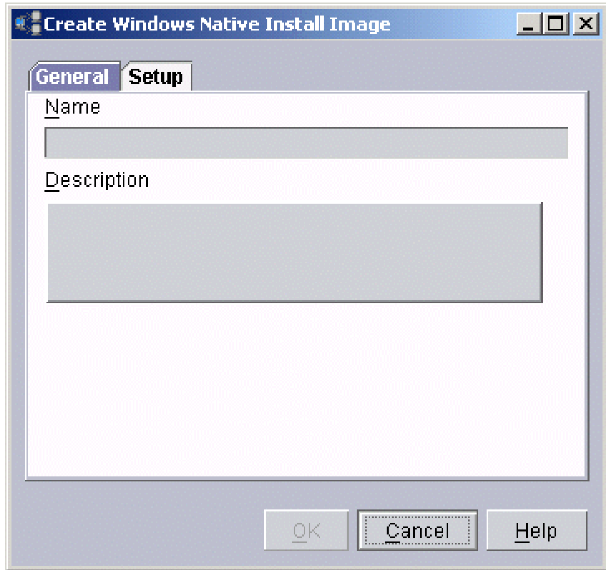


Figure 101. General page of the “Create Windows Native Install Image” window

3. On the General page, type a name and description for the new image.

   Click the **Setup** tab and select the image type and operating system type. The associated parameters change to reflect the type of image selected. Type the path to the source files or click **Browse** to locate the image source.

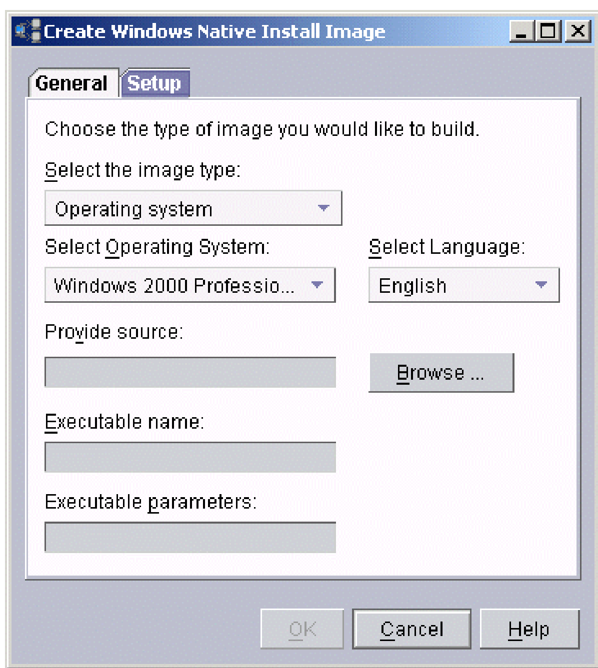


Figure 102. Setup page of the “Create Windows Native Install Image” window

   If you click **Browse**, the file you are looking for is called out in the title of the browse box. When you select the file, the remaining Entry fields are automatically filled in.

4. Click **OK**.

Other Images

Select **Other Images** from the **Setup** tab.

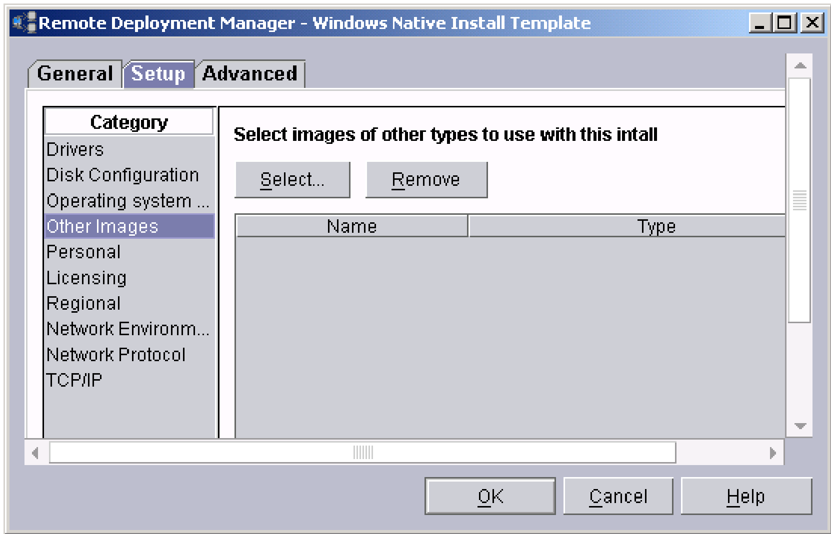


Figure 103. WIndows Native Install Other images category

From this window, you select images, other than operating system images, to install. Initially, the list box is empty. As you select images, an accumulative list is displayed. When the list is complete, select an image and click **OK**.

To create an installation image:

1. Click **Select** to choose from different types of installation images collected in the Master Repository, such as service packs, applications, and custom files.

   Click **Select** to open the "Image Selection" window from which you can select from images stored in the Master Repository, or click **Create** to create a new image.

   To remove an image from the list, select the image (within the list), and then click **Remove**.
2. Select the type of image to deploy. The selection determines which images from the Master Repository to display in the list box. Application images are listed by name alphabetically and installed in that order. Select an image and click **OK**. To create a new image instead, click **Create**.

   To create a new image, follow the steps outlined in the category "Operating System" on page 119.

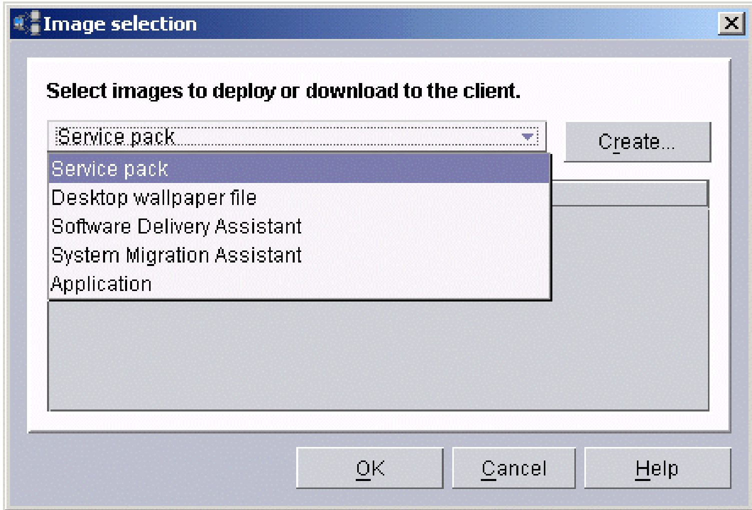


Figure 104. “Image selection” window

Desktop wallpaper file. Wallpaper can only deployed to the local administrator of the system. If you login as administrator of the domain (a separate account from the local administrator), you will not see the wallpaper.

Software Delivery Assistant (SDA) images. SDA is a stand-alone application that creates an image file to install applications on systems. It bundles up the setup.exe and install files from an application installation CD-ROM and creates an image and supporting batch files with the instructions for installation of the program. To create an SDA image that RDM can use, complete the following steps:

a. Install SDA on your system.

b. Follow SDA instructions to pack the software to distribute.

c. Change the working directory to the SDA Installer directory.

d. Create a self-extracting executable zip file from the previously packed software.

   For example, install SDA software in the c:\SDA Installer directory and pack the application to the c:\SDA Installer\MySoftware directory. With the pkzip program installed, type the following commands:

```
cd "SDA Installer"
pkzip -sfx -add -dir=current MySoftware.exe MySoftware\*
```

   The Image Manager uses MySoftware.exe to create the SDA image.

To install IBM Director Agent as part of a Windows Native Install task:

a. Copy the IBM Director Agent installation files from the IBM Director CD to folder on your hard drive.

b. Open the copy of the diragent.rsp file in an ASCII text editor.

c. Modify the diragent.rsp file. The file follows the Windows INI file format and is fully commented.

   Note: The diragent.rsp file must contain the following line:

   ```
   RebootIfRequired = N
   ```

   If the RebootIfRequired flag is set to Y, the Windows Native Install task will fail.

   Save the diragent.rsp file.

d. Create a Windows Native Install Application image.

e. Navigate to the IBM Director Agent installation files directory on the hard drive.

f. Select ibmsetup.exe.

g. Enter "silent waitforme" as the parameter.

Installing Applications

Applications can be installed in two different ways using the Create Windows Native Install window:

- By filling in the executable name and parameters
- By specifying and supplying a batch file

To create a Windows Native Install application image:

1. Click **Tasks** → **Remote Deployment Manager** → **Image Management** → **Create** → **Windows Native Install** → **OK**
2. Type an image name and description.
3. Click the **Setup** tab.
4. Select **Application** for image type.
5. Type, or browse to, the source of the application directory that will be part of the image
6. Type the executable name and parameters of the application.

   Executable name: *sample.bat*
   Executable parameters: %path%

   Note: RDM replaces %path% with the full name of the image directory

   Contents of *sample.bat*:

   ```
   example.exe /r %1\responsefile.txt
   rem keep a copy of the install directory
   xcopy %1\*.* c:\install\sample\ /h /e /i /r /s
   exit
   ```

   Note: A batch file must have an "exit" as the last command.

Personal

Select **Personal** from the **Setup** tab.

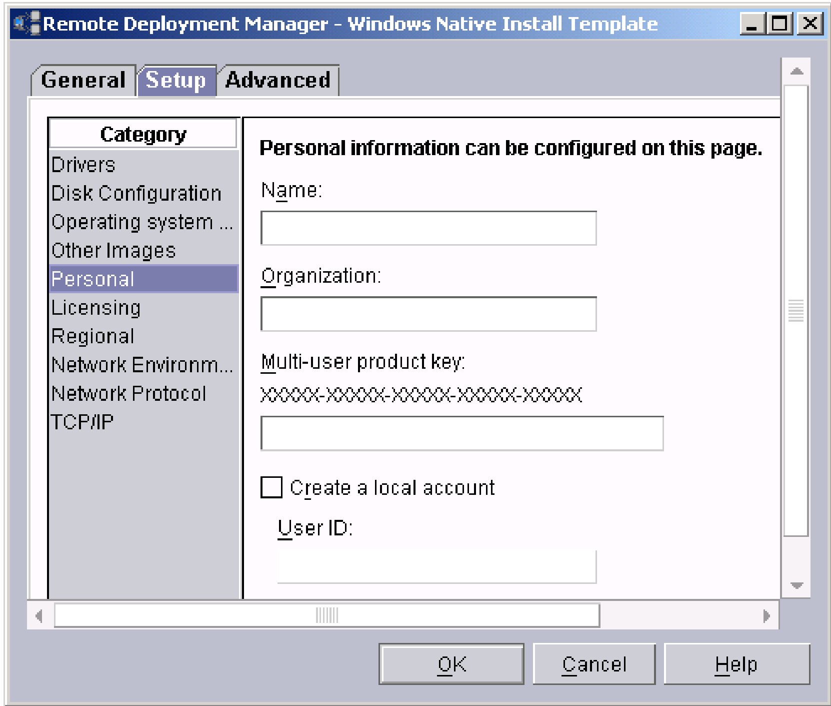


Figure 105. Windows Native Install Personal category

Name
: The name of the registered user of the system, for example, John Doe.

Organization
: The company name for the system being deployed, for example, IBM Corporation.

Multi-user product key
: This is the Certificate of Authorization for the Windows operating system being deployed. The CD Key format has a length of 29 characters, formatted in five 5-character alphanumeric tokens separated by hyphens.

Create a local account
: Select this check box if you want to create a local user on the system being deployed.

User ID
: The name of the local userid that is created if you select the **Create a local account** box.

Licensing

Select **Licensing** from the **Setup** tab.

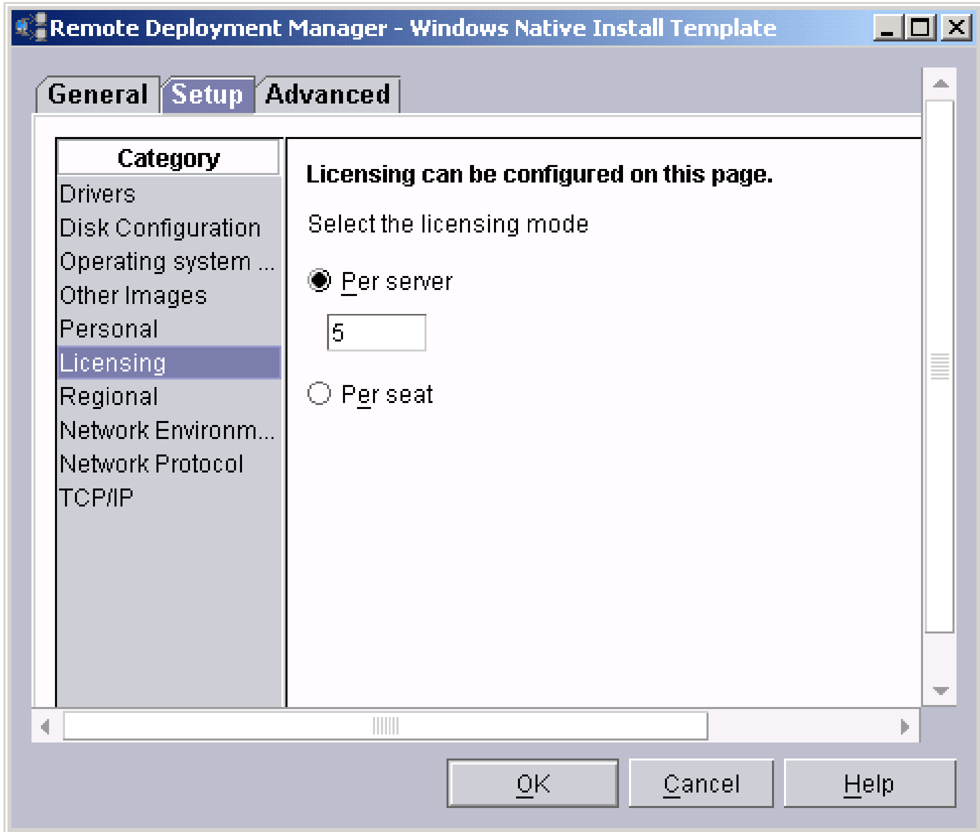


Figure 106. Windows Clone Install Licensing category

Licensing modes
A choice of Per server or Per seat. If you select Per server, you must also type the number of system licenses you have purchased for this server.

Server licensing count
Minimum count is 5.

Regional

Select **Regional** from the **Setup** tab.

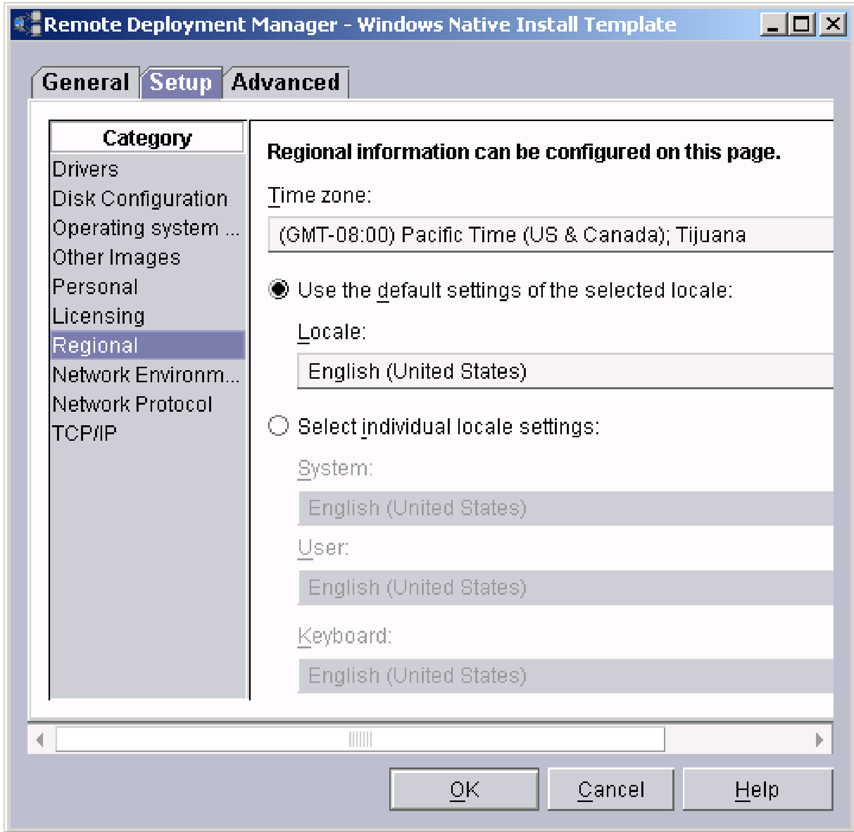


Figure 107. Windows Native Install Regional category

Use the Regional category to select values for time zone and locale system-level task parameters:

Time zone
: Select the entry from the list. The list is loaded from the database or master.ini file.

System language
: Select the system language from a dropdown list.

User locale
: Language to display.

Keyboard
: Select the keyboard language from a dropdown list.

Network Environment

Select **Network Environment** from the **Setup** tab.

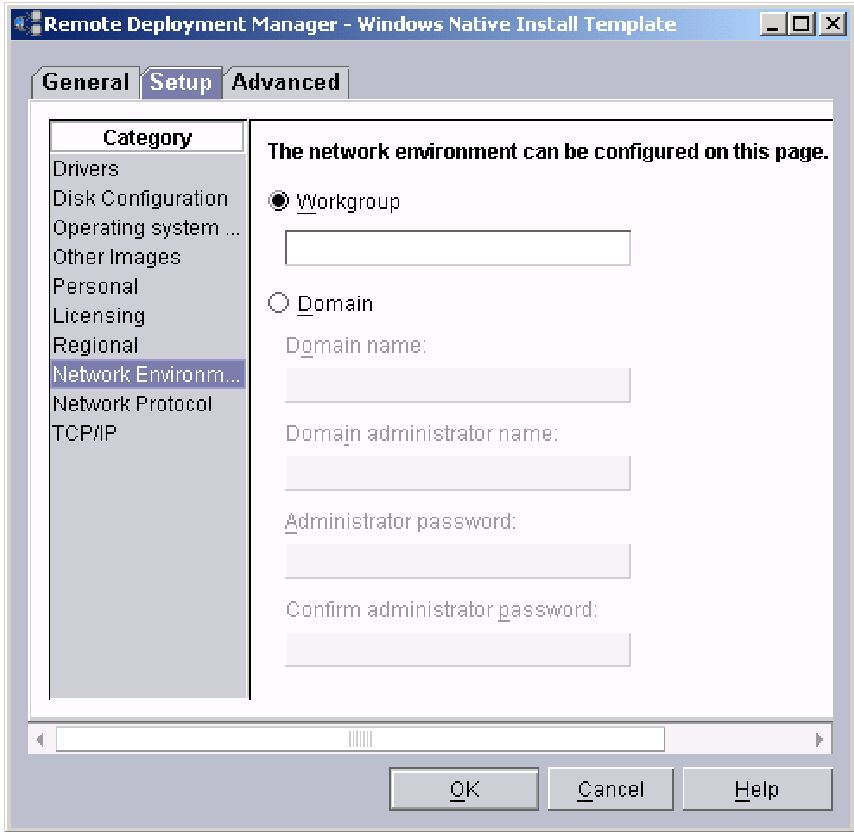


Figure 108. Windows Native Install Network Environment category

Type the name of the workgroup or domain to which your system belongs. To join a workgroup, select **Workgroup** and type the workgroup name. To join a domain, select **Domain** and type the domain name. For Windows 2000 Professional and Windows XP Professional, you must also type the Administrator name and password.

Network Protocols

Select **Network Protocols** from the **Setup** tab.

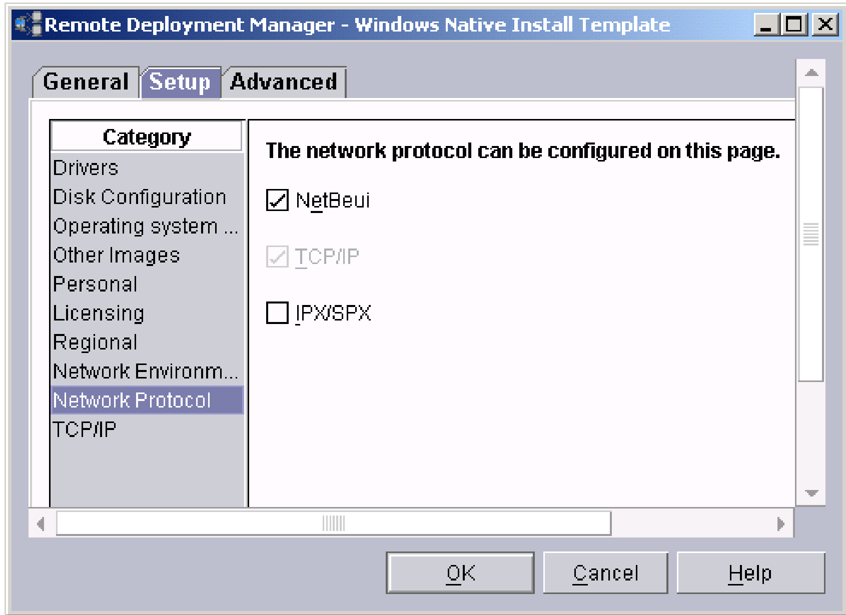


Figure 109. Windows Native Install Network Protocol category

NetBEUI
A non-routable protocol for use within peer-to-peer networks.

TCP/IP
A routable protocol for use across networks. The TCP/IP protocol is always checked.

IPX/SPX
A connection service similar to TCP/IP used by Novell Netware operating systems.

TCP/IP

Select **TCP/IP** from the **Setup** tab.

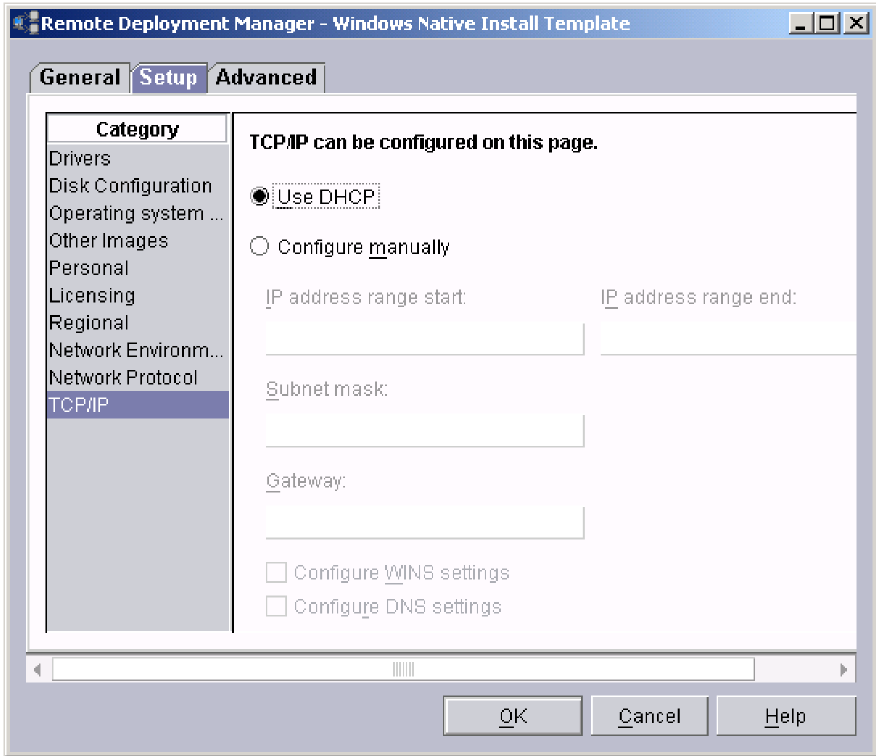


Figure 110. Windows Native Install TCP/IP category

Select **Use DHCP** to automatically configure TCP/IP settings or select **Configure manually**.

Note: If **Use DHCP** is selected, no other values are needed. A DHCP server must be present on the network. If **Configure manually** is selected, the other Entry fields are enabled, and their set up notebook is available in the category list and through the wizard.

Manual configuration

You have two choices for implementing manual configuration:

1. You can leave the IP address range blank. You then manually assign an IP address to each system during System Task Configuration (STC). This option is the best choice if either of the following conditions apply:
   - You have multiple subnets. RDM does not check for unique IP addresses on multiple subnets.
   - You use multiple installation tasks of a single type, or multiple types of installation tasks (such as, Windows Clone, Windows Native and Linux Native). RDM validates unique IP addresses within a single task, not across multiple tasks. If there is any overlap of address ranges within tasks, duplicate IP addresses are possible.
2. You can specify an IP address range. RDM then assigns an IP address to each system during system qualification. This option can be used for deploying tasks on a single subnet. An example is a classroom lab where you redeploy the same image on all systems before every class. You could set up a classroom installation task with the reserved range of addresses for the classroom.

Field descriptions

For manual configuration, the following Entry fields are enabled:

Starting IP address
Type the starting IP address for the range of available addresses to be assigned to target systems. RDM uses the IP address range to select a unique IP address for each target system when the system is qualified. The range of values can be obtained from your network administrator. You can leave this field blank. If you specify a Starting IP address, you must also specify an Ending IP address.

Note: If you specify a range of IP addresses, you must make sure there is no overlap of the range with any other installation task. RDM validates unique IP addresses within the individual task, not across multiple tasks.

Ending IP address
Type the ending IP address for the range of available addresses to be assigned to target systems. This parameter is required if you specify a Starting IP address.

Subnet mask
The default value is set in the template property sheet. It is a required system parameter whose value is required before an unattended installation is to begin. The value can be entered now in the task creation phase or in the System Assignment and Configuration phase.

Gateway IP
The default value is set in the template property sheet. It is an optional system parameter whose value is not required.

If you select to configure either WINS or DNS settings, WINS and DNS categories are added to the category list.

WINS

Select **WINS** from the **Setup** tab. WINS is only available if you selected WINS Configuration on the TCP/IP page.

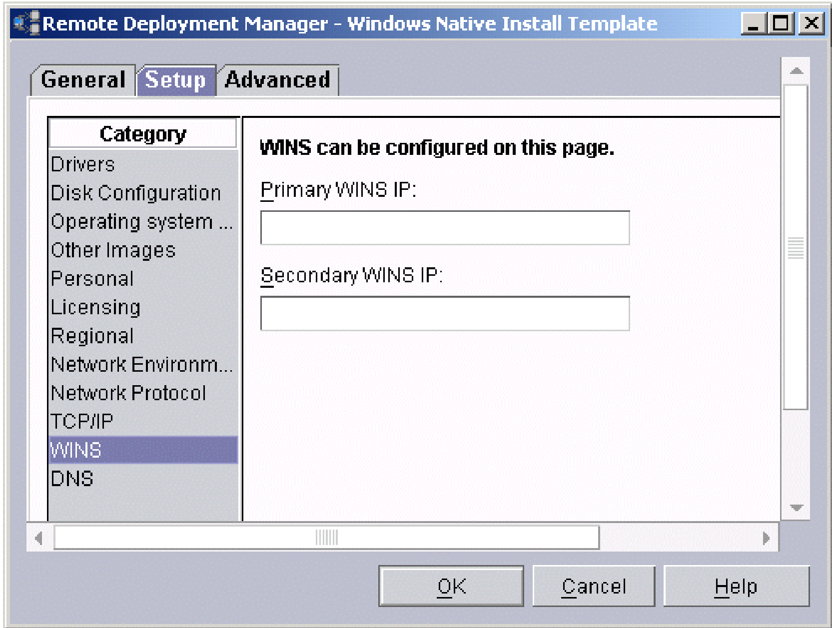


Figure 111. Windows Native Install WINS

Primary WINS IP
The default value is set in the template property sheet. When the task is customized to configure the WINS settings, the primary WINS Server IP address becomes a required system parameter that the user must provide a value. The value can be entered in the task phase or in the System Assignment and Configuration phase.

Secondary WINS IP
The default value is set in the template property sheet. It is an optional system parameter whose value is not required.

DNS

Select **DNS** from the **Setup** tab. DNS is only available if you selected WINS Configuration on the TCP/IP page.

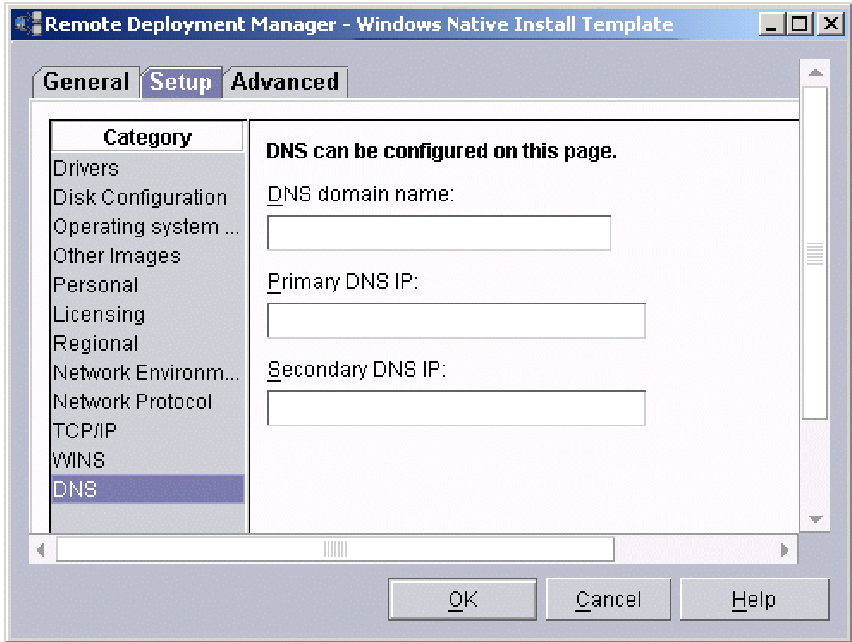


Figure 112. Windows Native Install DNS category

DNS domain name
The default value is set in the template property sheet. When the task is customized to configure the DNS settings, the DNS domain name and the primary DNS Server IP address become required system parameters for which you must provide values. The secondary DNS Server IP address is optional. Those values can be entered in the create task phase or in the System Assignment and Configuration phase.

Primary DNS IP
The default value is set in the template property sheet. You must enter a value for this option. The value can be entered in the create task phase or in the System Task Configuration phase.

Secondary DNS IP
The default value is set in the template property sheet. It is an optional system parameter whose value is not required.

Set password for local administrator

You can set the password for the local administrator by modifying the file answer2.txt. By default, the password is blank. By modifying the GuiUnattended section of the answer2.txt file.

1. Create a Windows Native Install task.
2. Find the Task folder location from the Advanced tab.
3. Locate the answer2.txt file in the task folder.
4. Modify the AdminPassword setting in the GuiUnattended section of the answer2.txt file. This will reset the password.

Miscellaneous

Select **Miscellaneous** from the **Advanced** tab.

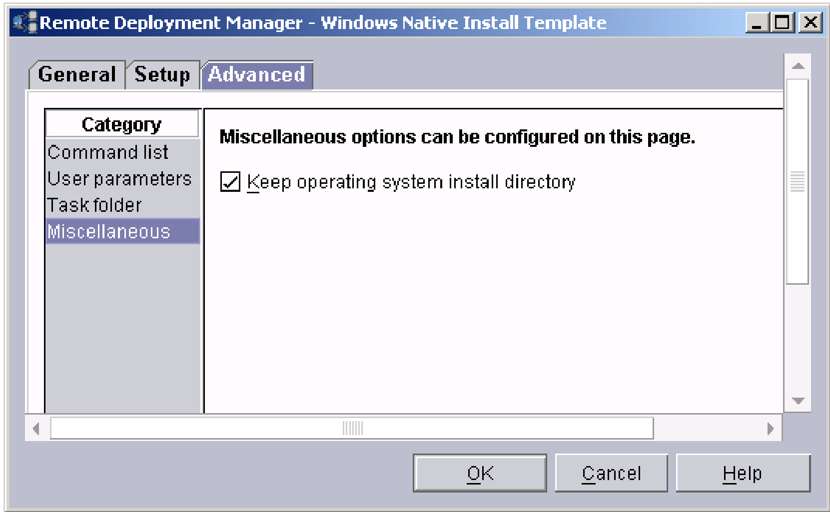


Figure 113. WIndows Native Install Miscellaneous category

Select **Keep operating system install directory** to preserve the i386 directory after Windows deployment.

Chapter 4. Examples

These examples are intended to help you decide what tasks to create with RDM. They are not intended to be followed exactly. The following examples are included:

Creating a Custom task to update network adapter firmware

The purpose of this scenario is to create a Custom task to update the IBM Token Ring network adapter firmware.

1. Prepare the files you need for a Custom image:
   a. Obtain the firmware update diskette from the IBM web site.
   b. Copy all files except the 3 DOS operating system files to your RDM server, say into an empty C:\TRFLASH directory.
   c. Create a file C:\TRFLASH\TRFLASH.BAT containing the following lines:
   ```
   %RAMDSK%
   SET FLASHUP=OK
   CD TRFLASH
   IBMFLASH.EXE
   TREBOOT.EXE
   ```
2. Create the custom image:
   a. Click **Tasks → Remote Deployment Manager → Image Management** on the Director console.
   b. Click **Create**, **Custom**, and **OK** to display the "Image Management" window.
   c. On the General page, enter a name, for example "Token Ring cs118r files", and (optionally) a description.
   d. On the Setup page, click **File** (for the output image to be a zip file). Then click **Directory...** and then navigate to the C:\TRFLASH directory.
   e. Click **OK** on both dialogs and on the "Image successfully created" message window. Your custom image that contains all the files that are needed on the target system is now created. Note the numeric Internal Name of the image, for use below.
3. Create the custom task:
   a. Right-click **Custom** and click **Create new task**.
   b. Type a name, say "Token Ring cs118r Firmware Flash", and (optional) a description on the General page.

c. Click the **Advanced** tab, and type the following lines in the command list editor. Use the image-file numeric name that you recorded above.

```
; Flash Token Ring adapter firmware
BOOTTYPE !LOADDOS /ENVIRONMENT/DOS71F
WAKE
!!SETENV
!mtftp get %%SERVER_IP%% image\0391131642556 %%RAMDSK%%\FILES.ZIP
!mtftprc.bat
!mtftp get %%SERVER_IP%% environment\dos\unzip.exe %%RAMDSK%%\unzip.exe
!mtftprc.bat
!%%RAMDSK%%
!UNZIP FILES.ZIP
!TRFLASH\TRFLASH.BAT
!!SHUTDOWN
END
```

d. Click **OK** to complete the task creation. Your new task will appear under Custom in the Tasks pane of the Director console.

4. Debug the task logic. The best way to do this is to run the task on a single system. After the “Starting PC DOS” message appears, quickly press the F8 key. This allows you to step through all the batch files one statement at a time. You can easily find your errors, this way.

This example illustrates several important custom-task concepts.

- There is no single correct way to design a custom task. In this example, the task of downloading files was put in the command list, but those steps could also have been included in the batch file.
- In this case, the batch file was required because flashing the network adapter firmware breaks the network connection. In order to complete the processing, you had to reboot the system in the batch file, since the RDAGENT program could no longer contact the RDM server.
- There are several useful environment variables. RAMDSK (which translates to “D:”) is the drive on which you store the images. SERVER_IP is the IP address of the RDM D-Server. Notice that you surround these variables with “%%” in the command list and with “%” in the batch file.
- The task uses the MTFTPRC program to do error handling for each MTFTP command. This program will cause the task to fail whenever the preceding MTFTP command returns an error.
- The task contains no other error handling. For a production-level custom task, you would want to add error handling for each command that might fail (for example, IBMFLASH.EXE and UNZIP.EXE) by setting the RDSTATUS environment variable to an appropriate string. Your objective is to have the task go to “failed” (rather than “complete”) state whenever the task does not work properly.
- As long as you use a 10-character variable For RDSTATUS ending in E, RDM will fail the task. For example:

  SET RDSTATUS=RDCUST001E Bad return code from Remote Supervisor

  Adapter’s FLASH2.EXE program.

  RDSTATUS uses a 6/3/1 format for the syntax: six-character identifier, three-digit id, and E for error, I for Information or W for Warning.

Flashing Remote Supervisor Adapter firmware with a Custom task

This example creates a Custom flash task for a Remote Supervisor Adapter:

1. Obtain the appropriate flash diskette images from the IBM Web site. Remote Supervisor Adapter flash diskettes are usually system-dependent. The same adapter model may need a different set of flash diskettes for each system model.
2. Create the flash diskettes.
3. Copy all the files (except DOS files like IBMBIO.COM, IBMDOS.COM, CONFIG.SYS and perhaps documentation files like README.TXT) from the flash diskettes to a folder named C:\RSAFLASH.
4. Create a C:\RSAFLASH\RSA1.BAT file containing these statements:
   ```
   %RAMDSK%
   FLASH2.EXE /u /c /m /b /d
   ```
5. Run your favorite zip program to zip up the C:\RSAFLASH directory into a RSA1.ZIP file. Do not allow it to keep the path name.
6. Create a Custom task named RSAFWFlash.
7. Go to the **Advanced** tab, and add the following script to the command list:
   ```
   ; This is a command list for custom task
   ; Flashes Remote Supervisor Adapter firmware for model 8671 server.
   BOOTTYPE !LOADDOS /ENVIRONMENT/DOS71F
   WAKE
   !!SETENV
   !%%RAMDSK%%
   !mtftp get %%SERVER_IP%% template\%%TASKTEMPLATEID%%\RSA1.ZIP RSA1.ZIP
   !mtftprc.bat
   !mtftp get %%SERVER_IP%% environment\dos\unzip.exe unzip.exe
   !mtftprc.bat
   !UNZIP RSA1.ZIP
   !rsa1.bat
   !!SHUTDOWN
   END
   ```

   Note: You might need to change the DOS71 directory from the default X to F to get the flash operation to take place.
8. Edit the new task, click the **Advanced** tab, click Task folder, and note the directory name (for example, <RDMInstallPath>\repository\template\3\501). Click **OK**.
9. Copy RSA1.ZIP to the custom task's template folder (for example, <RDMInstallPath>\repository\template\3).

   Note: In this example, the zip file was created outside of RDM and put in the template directory. To store the file in the task directory, you would reference it as `template\%%TASKTEMPLATEID%%\%%TASKTOID%%\RSA1.ZIP` in the command list.

Updating systems with selected system firmware levels to latest system firmware level

In this scenario, after new System Firmware Flash levels are imported into RDM, a new group of systems is created, based on System Firmware version, and then the System Firmware levels of this new group is updated.

1. Import the new Flash levels by copying the files from the IBM ftp site and import them into the Master Repository using IM.
2. Click **New Dynamic** from the context menu of the Groups pane.

3. Expand the **Inventory (PC)- Firmware- Version** branch of the Available Criteria pane.
4. Select the System Firmware versions to be upgraded and click **Add**.
5. Click **File** and **Save As** and type a name for the new group.
6. Drag the new group from the Groups pane and drop it on the latest **System Firmware Flash** task in the Tasks pane.
7. Click **Now** when asked if you want to run the task now or schedule for later.

The Execution History window opens with status for each of the systems. From there, the System Log window can be opened to view task status for each target system.

Updating systems with selected system firmware levels

In this scenario, a new dynamic group of systems is created, based on System Firmware Flash levels.

1. Import the new Flash levels by copying the files from the IBM ftp site and import using the System Firmware import utility.
2. Create a new dynamic group in the Groups pane, based on the System Firmware versions or levels of the systems to be upgraded.
3. Drag this new group to the Tasks pane and drop it on the System Firmware Flash task.
4. Click **Schedule** when asked if you want to perform the task now or schedule for later. The Scheduler window opens.
5. Click **Save** and type a name for the job.
6. Fill in STC information, if applicable, and click **OK** to allow the job to kick off at the scheduled time.

Using a Script task to flash firmware and perform Windows Clone Installation tasks

The purpose of this scenario is to run a Script task, which has already been created, to perform System Firmware Flash and Windows Clone Installation on all newly discovered systems. The task will be set to run immediately, rather than scheduled.

1. Create a Script task for System Firmware Flash and Windows Clone Install tasks as described in the previous scenario.
2. Drag the newly discovered systems from the Group Contents pane in the main console, and drop them on the newly created Script task in the Tasks pane. Click **Run systems**.
3. Click **Now** when asked whether to run the task now or schedule for later.
4. The Execution History window appears with status for each of the systems. From there, the System Log window can be opened to view task status for each target system.

Creating a customized Windows Clone Install task

In this scenario, the task is to set up a generic unattended installation for Windows 2000 Professional with Service Pack 2. The target systems will have IP protocol support and use DHCP. A local backup image will be created for Power Restore.

1. Prepare a donor computer to be the basis of the clone by running sysprep.exe on the donor computer to remove the unique system information.

2. Create a clone image by running the built-in **Get Donor** task, which runs the Power Quest program **PQIDplyZ.exe** to create the image of the donor computer and store it in the Master Repository. The output of the **PQIDplyZ.exe** program is a *.pqi* file.
3. Right-click the **Windows Clone Install** task in the Tasks pane of the main console and click **Create new task**.
4. Type a name and description for the new task (for example, W2000 SP2 with DHCP), and then click **Next**.
5. Click **Select**. Select an image and click **OK** and then click **Next**. If there are no images listed from which to choose, create one.
6. Type your personal information for the task (name, organization, multi-user product key, and User ID if you want to create a local account). Click **Next**.
7. Select the regional information for time zone, system language, user locale, and keyboard. Click **Next** to continue.
8. Configure the network environment by typing either a Workgroup or Domain name. If you click **Domain**, you will need to type the Domain administrator name, Administrator password, and password confirmation. Click **Next** to continue.
9. Select the network protocols to use. (TCP/IP is always selected by default). Click **Next** to continue.
10. Configure TCP/IP by selecting DHCP.
11. Click **Finish** to complete the task creation. The new task will appear underneath the **Windows Clone Install** task in the Tasks pane.

Deploying Windows 2000 on a Windows NT 4.0 workstation

The purpose of this scenario is to deploy Windows 2000 on a customer Windows NT® 4.0 workstation, giving the option to regress the workstation back to Windows NT 4.0 if the user later determines that Windows 2000 is unsatisfactory. The workstation contains a single hard disk drive with the following partitions:

- Partition 1 is the C: drive, which contains Windows NT 4.0 Workstation plus all of the user application programs.
- Partition 2 is the D: drive, which contains all of the user data files.
- Partition 3 is a hidden RDM 3.x Power Restore partition that contains a backup of partition 1 (called *Image A*).

It is assumed that there is enough space on the hidden Power Restore partition to store two compressed RDM backups of partition 1.

Create and run a Script Task that has the following characteristics:

- Flashes the system BIOS code to the latest level using a built-in System Firmware Flash Task.
- Deploys Windows 2000 Professional using a Windows Native Install Task.
- Deploys the customer applications as part of the Windows Native Install Task.
- Keeps existing hard-disk partitioning (the user must modify the Windows Native Install Task).
- Creates an *Image B* Power Restore backup of partition 1 using a Power Restore Task.

The workstation hard disk drive now looks like this:

- Partition 1 is the C: drive, which contains Windows 2000 Professional plus all of the user application programs.
- Partition 2 is the D: drive, which contains all of the user data files. This partition was not changed in any way by this scenario.
- Partition 3 is a hidden Power Restore partition that contains 2 backups of partition 1:
  – *Image A* backup containing Windows NT 4.0 Workstation.
  – *Image B* backup containing Windows 2000 Professional.

Refreshing hardware inventory data

Drag and drop a group from the Groups pane, or a system from the Group Contents pane, onto a **Scan** task in the Tasks pane. The **Scan** task will refresh the system database with the latest hardware, Asset ID, and optionally end user input. If the default **Scan** task for new system discovery includes user prompts, you might wish to create a separate task for hardware inventory refresh.

Viewing and editing system properties with System/Task Configuration

The purpose of this scenario is to import a file containing system property information into the Master Repository, and then view the information using the System/Task Configuration window. The file to be imported contains information needed for installing the operating systems and applications on the systems (for example, IP addresses, computer names, or time zones of the systems.) The file follows these rules:

- The file contains comma-delimited field names. These names are the same names that RDM uses for the same fields.
- The rest of the rows contain values for the fields, in the same order as the first row.
- The file contains a UUID for each computer.
- The file type is .txt.

1. Select a System (or Systems) from the Groups Contents pane in the main console. To select more than one system, press Ctrl while making your selections.
2. Right-click the blank area of the Group Contents pane, and then click **Open system configurations...**
3. The System/Task Configuration screen asks if you have a file of system information to import. To import a file, click **Yes**, import system information from a file and type the path to the file and the filename in the space provided or click **Browse** to find your file. Click **OK** to continue.
4. The system information is imported and then displayed in a grid so that you can view and modify the information for all of the systems at the same time. The information displayed is based on the file that was imported. To type or modify system parameters:
   a. Highlight the computer or computers for which you want to modify the parameters.
   b. Right-click the cell of the parameter you want to modify and select from the commands. The commands vary depending on whether you have selected one or multiple computers, and which parameter you are modifying. Some parameters (for example, Time zone) will have a scrollable list to choose a value from.

c. Click **OK** to save any changes you have made and close the System/Task Configuration, or click **Cancel** to close without saving changes.

Task configuration

1. Right-click a task. A context menu is displayed.
2. Click **Configure systems**. The System Task/Configuration (STC) panel is displayed with all the configured systems filled in.
3. Make changes as needed.
   - Update parameters.
   - Delete rows if needed.
4. Click **Save**. The STC closes.

Resetting IBM Director with twgreset command

The twgreset command resets the IBM Director persistent storage and resets the database tables, if the installation is a management server. Run this command only if you want to go back to a pristine installation without having to reinstall IBM Director, or if there has been corruption of persistent data.

Note: This command cannot be undone. All IBM Director data is removed.

To run the twgreset command, complete the following steps on the management server and each remote deployment server:

On the management server

1. Type the following commands:
   ```
   net stop twgipc
   twgreset
   ```
2. Uninstall RDM 4.1
3. Install RDM 4.1
4. Wait for IBM Director to start (green circle appears)

On each remote deployment server

1. Type the following commands:
   ```
   net stop dserver
   net start dserver
   ```
2. Enable the D-Server with the user interface

Chapter 5. RDM extensions

RDM can be customized to your environment. For example, you can create DOS image files to more efficiently deploy custom applications. Another example is automating sysprep for your environment, streamlining the time it takes to create a clone file.

Modifying RDM files

You can modify RDM files, such as a task's .bat files and .txt files. For example, if you create a Windows Native Install task, you can modify the files INSTALL.BAT, STARTUP.BAT, and ANSWER2.TXT; however, there is a caveat involved. If you make changes in a file that RDM creates dynamically, you lose your modifications when you click **OK** on the “Task properties” window. RDM recreates all the dynamically created files when you click the OK button. In this case, modifications to INSTALL.BAT modifications are retained but changes to STARTUP.BAT and ANSWER2.TXT are lost.

Note: As a precaution against losing your changes, change permissions on the file with your modifications to be read-only. That way, if you accidently edit the task and click OK, you'll receive an error message but not lose your changes.

Creating RDM DOS boot images

The following procedure outlines the steps to create RDM DOS boot images:

Note: When loading a DOS environment, the RDM bootstrap will return an error if there is less than 16 MB of system memory. The bootstrap by itself requires 2.88 MB of RAM to save the DOS image before transferring control to it.

1. **Create a unique DOS folder**:
   a. Navigate to the \rdm\local\env directory where x is the drive RDM is installed.
   b. Create a folder called myDos.dir.

      You can name this folder whatever you want.
   c. Copy your custom Autoexec.bat, Config.sys, DOS drivers, and any other supporting files to the myDos.dir directory.
2. **Edit mkimages.bat file**:
   a. Navigate to the \rdm\local\env directory.
   b. Right-click the mkimages.bat file and click **Edit**.
   c. Add the following lines of code to the mkimages.bat file:

```
Copy baseimg myDos
Bpdisk -d myDos -i myDos.dir
Move myDos ..\...\repository\environment\myDos
```
3. **Build DOS image**:
   a. Navigate to the \rdm\local\env directory.
   b. Run the mkimages.bat file.
   c. Make sure there is a file named myDos in the \rdm\repository\environment directory.
4. **Use DOS image**:
   a. Create a new Custom task or edit an existing task.

b. Right-click the task and click **Edit**.

c. Click the **Advanced** tab and add the following line to the beginning of the Command list:

```
BOOTTYPE !LOADDOS /ENVIRONMENT/MYDOS
```

This tells the RDM server to load your DOS image to the client assigned to this task on the next client boot.

Notes:

1) You will likely want to replace the existing BOOTTYPE command that is already in the Command list with this one.
2) When booting the client multiple times in the same Command List, you must set the BOOTTYPE before you call the !!REBOOT command. If you do not, the client will load the previous BOOTTYPE command.

Advanced mkimages.bat usage

If you want to use the RDM DOS RDAGENT in your Command List or Autoexec.exe file, add the following code to your section of the mkimages.bat file.

Example:

```
Copy baseimg myDos
Bpdisk -d myDos -i base.dir
Bpdisk -d myDos -i myDos.dir
Move myDos ..\...\repository\environment\myDos
```

To use the RDM Extended Memory Manager in your DOS image, add the following code to your section of the mkimages.bat file:

```
Bpdisk -d myDos -i others.dir\emm386
```

To use the RDM RAM Drive in your DOS image, add the following code to your section of the mkimages.bat file:

```
Bpdisk -d myDos -i others.dir\ramdrive
```

To use the RDM High Memory support in your DOS image, add the following code to your section of the mkimages.bat file:

```
Bpdisk -d myDos -i others.dir\himem
```

To use the RDM Disk Formatting support in your DOS image, add the following code to your section of the mkimages.bat file:

```
Bpdisk -d myDos -i others.dir\frmtutils
```

To use the RDM Windows Install Utilities in your DOS image, add the following code to your section of the mkimages.bat file:

```
Bpdisk -d myDos -i others.dir\instutils
```

Note: Make sure that you re-run the mkimages.bat file after every change you make.

Automating Sysprep

You prepare a donor computer to be the basis of the clone by running the Microsoft System Preparation tool, Sysprep (sysprep.exe), to remove the unique system information, such as its Security Identifier (SID). The following example automates the process of running Sysprep with the Windows Native Install task:

1. Copy necessary Sysprep files:

   Extract sysprep.exe and setupcl.exe from the \support\tools\deploy.cab file located on the Windows XP/2K CD into the x:\rdm\repository directory on the Master D-Server.

2. Create a batch file called SysCopy.bat as follows:

   ```
   Echo on
   REM Start SysCopy.bat
   mkdir c:\sysprep
   mtftp get %SERVER_IP% sysprep.exe c:\sysprep\sysprep.exe
   mtftp get %SERVER_IP% setupcl.exe c:\sysprepsetupcl.exe
   REM Finished SysCopy.bat
   ```

   Copy the SysCopy.bat file to the \rdm\repository directory on the Master D-Server.

3. Create a new Windows Native Install task:
   a. Type valid name and click Next.
   b. Click **Select**, select an operating system image, and then click **Next**.
   c. Make sure the operating system is compatible with the version of Sysprep in the folder.
   d. Click **Next** and continue with the wizard.
4. Click **Finish** to complete the wizard.
5. Edit the Windows Native Install task:
   a. Right-click the Windows Native Install task you just created and click the **Advanced** tab.
   b. Modify the Command List as follows:

      ```
       BOOTTYPE !LOADDOS ENVIRONMENT/DOS71X
      WAKE
      !!SETENV
      !PRE_INST.BAT
      !!REBOOT
      !!SETENV
      !INSTALL.BAT
      !!REBOOT
      !mtftp get %%SERVER_IP%% SysCopy.bat A:\SysCopy.bat
      !SysCopy.bat
      BOOTTYPE !BOOTLOCAL
      !!REBOOT
      BOOTTYPE !LOADDOS ENVIRONMENT/DOS71X
      !C:\sysprep\sysprep.exe -quiet -reboot
      !!SHUTDOWN
      END
      ```

You can drag a client (with a Windows 2000 or Windows XP operating system) onto this new Windows Native Install task. The task runs Sysprep after a complete Windows installation. After running Sysprep, the system reboots and then shuts down. You can now run a Get Donor task on the client.

Note: The *-reboot* parameter was used with Sysprep because Sysprep was not shutting down systems properly (while using Sysprep version 1.0 in the test). Sysprep version 1.1 for Windows 2000 and Sysprep for XP has a forceshutdown parameter that might solve this issue. The command list might change to look like this:

```
BOOTTYPE !BOOTLOCAL
!!REBOOT
!C:\sysprep\sysprep.exe -quiet -forceshutdown
END
```

Note: In order to complete a Windows Clone Install task on an image that has a Windows XP operating system, you must run Sysprep and add in the “-mini” tag to the sysprep command line in the RDM commandlist, for example:

```
sysprep -mini -quiet -reboot
```

This is not necessary with Windows 2000 Professional, Windows 2000 Server, or Windows 2003 Server.

Chapter 6. Utilities

This chapter describes the DOS, PowerQuest, RDM and Miscellaneous utilities. The utilities are listed alphabetically within each category. These utilities can be run on the command line, or added to the command list as part of a task.

The following conventions are used in this section:

- The utility name and any keywords or switches are shown in a normal font, and must be typed on the command line (unless they are optional). For example: `fat32 /s` or `format /autotest`
- Variables are represented with an italic font. This means the variable is replaced with your specific information. In the syntax example: `format` *`drive`* the variable *drive* represents the drive to be formatted. To format drive c:, the command would be: `format` *`c:`*
- Switches and variables can be combined. In the example: `format` *`drive`* `/V:`*`label`* the switch /V: is typed as is, with your information substituted for the variables *drive* and *label*. For example, to format drive c: with the label develop123, the command is: `format c: /V:develop123`
- Optional components are enclosed in square brackets [ ]. In the example:`fat32 [/s]` the /s switch is optional. Square brackets can be nested. In the example: `format` *`drive`* `[/V[:label]]`, the /V switch is optional, and can be used with or without the :label. Both these examples are valid: `format c: /V` and `format c: /V:develop123`
- Choices between components are indicated with the pipe (|) symbol. In the example: `FORMAT` *`drive`* `[/B | /S]` either the /B or the /S switch can be used. Both of these examples are valid:`format c: /B` and `format c: /S`
- A required choice is enclosed in braces { } and uses the pipe (|) symbol. In the example: `MTFTP {GET | PUT}` either the keyword get or put must be used. Both of these examples are valid:`mtftp get` and `mtftp put`

DOS utilities

RDM uses the following DOS 7.1 utilities:

- COMMAND.COM - refer to your DOS documentation
- DYNALOAD.COM
- EMM386.EXE - refer to your DOS documentation
- FAT32.EXE
- FDISK.COM
- FDISK32.EXE
- FORMAT.COM
- FORMAT32.COM
- IBMBIO.COM - refer to your DOS documentation
- IBMDOS.COM - refer to your DOS documentation
- MEM.EXE
- SMARTDRV.EXE

DYNALOAD.COM

This program uses the DYNALOAD utility to load a device driver dynamically after the boot process has completed.

DYNALOAD is part of PC-DOS 7 and is used in batch files to load a device driver dynamically after the boot process has completed. RDM automatically uses DYNALOAD to load ServeRAID drivers (when needed) to download the RAID configuration to your ServeRAID adapter. To use DYNALOAD to load another device driver within your batch files, refer your PC-DOS 7 documentation.

FAT32.EXE

This program accesses FAT32 disk partitions from PC-DOS. This is a “terminate and stay resident” (TSR) program.

The syntax of the command is:

```
FAT32 [/S]
```

`/S` Display the current status of FAT32 support.

If a hard disk has been partitioned using FDISK32.EXE (so that partitions greater than 2047 MB can be supported) it is necessary to load the FAT32 TSR so that these partitions can be accessed. However, the FORMAT32.COM command can use FAT32 partitions without the FAT32 TSR. See FORMAT32.COM and FAT32.EXE for an example of the use of FORMAT32.COM and FAT32.EXE.

FDISK.COM

The FDISK command is used to partition a hard disk and prepare it for a format operation. When using FDISK, start from a known disk configuration by deleting all partitions. The utility LCBTRDEL.EXE resets the hard disk to a known state by deleting the master boot record.

Note: RDM is currently restricted to managing systems with a maximum of two DOS drives. You can create more partitions, but no more than two can be primary or logical DOS drives.

The version of FDISK that is provided with RDM can be used with command-line arguments or a response file. Using command-line arguments provides more flexibility and can provide standardized partition sizes regardless of the hard disk capacity.

Typically, within RDM the required keyboard input to the FDISK.COM command is provided by a redirected file:

```
%LCCMPATH%\FDISK < %TMPPATH%\LCFDISK.DAT
```

The LCFDISK.DAT file is prepared using the LCFDISK2.EXE utility.

FDISK command-line arguments

You can use DOS FDISK command-line arguments in RDM batch files as an alternative to creating binary response files.

The syntax for the DOS FDISK command is:

[*d*:][*path*]FDISK *d* [/PRI:*m*] | [/EXT:*n*] | [/LOG:o]

d: The drive on which the FDISK program is located.

path	The *path* to the directory of specified drive where the FDISK program is located.
d	The drive (1 or 2) on which the FDISK operation is to be performed.
/PRI:*m*	The size of the primary DOS partition to create (in MB).
/EXT:*n*	The size of the extended DOS partition to create (in MB).
/LOG:*o*	The size of the logical drive to create (in MB) in the extended partition.

PC DOS can handle a maximum of two partitions: one primary and one extended. The maximum primary partition size recognized by PC DOS is 2048 MB. The maximum extended partition size is 8064 MB. The largest logical drive that can be contained within the extended partition is 2048 MB, but you can have multiple logical drives. If you specify a partition size that is larger than the amount of available disk space, the FDISK command will create a smaller partition to use whatever amount of disk space is available. Therefore, you can create a single preload image batch file specifying the /EXT:8064 parameter and use it on any system regardless of the hard disk capacity.

Note: Be aware that the LCBTRDEL utility program provided with the RDM program numbers the first physical hard disk drive as 0 and the second physical drive as 1. The DOS FDISK command numbers the first physical hard disk as 1 and the second physical drive as 2.

Example 1: You have a single 5 GB hard disk and you want to partition it as follows:

2 GB primary partition
2 GB extended partition
1 GB unused

Your preload image batch file (.LCP file) would look like the following:

```
%LCCMPATH%\LCBTRDEL 0 /S
%LCCMPATH%\FDISK 1 /PRI:2048 /EXT:2048 /LOG:2048
```

If you use this same preload image batch file on a system with a 3 GB hard disk, the result would be a 2 GB primary partition and a 1 GB Extended partition.

Example 2: You have a single 5 GB hard disk and want to partition it to have a 2 GB primary partition and a 3 GB extended partition containing two logical drives (2 GB and 1 GB, respectively).

Your preload image batch file (.LCP file) would look like the following:

```
%LCCMPATH%\LCBTRDEL 0 /S
%LCCMPATH%\FDISK 1 /PRI:2048 /EXT:3076 /LOG:2048
%LCCMPATH%\FDISK 1 /LOG:1024
```

Response Files for the FDISK Command

Two response files are provided by RDM to run the FDISK command unattended.

LC5050FD.DAT contains the responses for FDISK to process a disk with no partitions defined and to create one primary and one secondary partition, each taking 50% of the disk space.

Note: If the size of the system hard disk is 4 GB or greater, you cannot use LC5050FD.DAT. LC5050FD.DAT creates a primary DOS partition that is 50% of the hard disk space, and this partition cannot exceed 2 GB.

LCFDISK.DAT contains the responses for FDISK to process a disk with no partitions defined and to create a single partition, 100% of available disk space.

The following shows the sequence of responses found in the LC5050FD.DAT file:

`ENTER`	Create DOS partition.
`ENTER`	Create primary DOS partition.
`N ENTER`	Do not use all disk space.
`50% ENTER`	Use 50% of disk space.
`ESC`	Return to FDISK Options.
`ENTER`	Create DOS partition.
`2 ENTER`	Create extended DOS partition.
`ENTER`	Use maximum available space.
`ESC`	Go to create logical DOS drives.
`ENTER`	Use all available space.
`ESC`	Return to FDISK options.
`2 ENTER`	Set active partition.
`1 ENTER`	Partition 1.
`ESC`	Return to FDISK options.
`ENTER`	Reboot.

The most likely variation would be to create one or more partitions of fixed size. To do this, change the text 50% to the size of the partition required.

You can easily modify one of the existing response files as follows:

1. Copy the LC5050FD.DAT file provided with RDM under a new name. Make sure you keep the .DAT extension.
2. Open the newly created response file using WordPad or NotePad. Not all of the characters will be readable.
3. Locate the 50%.
4. Change the 50 to any value from 1 to 100. Do not change any other characters. The value you choose will determine the percentage of the hard disk that will be used for the primary partition.
5. Save and close the file.

If you want to create your own response file you must first go through the FDISK procedure to partition the hard disk and write down every keystroke you use. Be sure to include the final keystroke to restart the computer. Next, use an editor to prepare a binary file with the ASCII codes for the keystroke characters. (ENTER is 13 decimal, 0D hex. ESC is 27 decimal, 1B hex.)

A preload image batch file (.LCP file) using the LC5050FD.DAT response file looks similar to the following:

```
ctty con
%LCCMPATH%\LCBTRDEL 0 /S
%LCCMPATH%\INTER.EXE FDISK < %LCCMPATH%\LC5050FD.DAT
```

FDISK32.EXE

This program allows you to create hard disk drive partitions larger than 2047 MB.

The syntax of this command is exactly the same as FDISK.COM.

Example: The following command line will create a primary partition of size 4096Mb.

```
FDISK32 1 /PRI:4096
```

As with FDISK.EXE, the system must be re-booted after changes have been made to the partition table before it can be used. After a re-boot, the following command line can be used to prepare the partition for use:

```
FORMAT32 C:
```

Finally, before using any other PC-DOS commands the FAT32 TSR must be loaded thus:

```
FAT32
```

Typically, within RDM the required keyboard input to the FDISK32.EXE command is provided by a redirected file:

```
%LCCMPATH%\FDISK32 < %TMPPATH%\LCFDISK.DAT
```

The LCFDISK.DAT file is prepared using the LCFDISK2.EXE utility.

FORMAT.COM

This program prepares a disk partition for use with PC-DOS.

The syntax for this command is:

```
FORMAT drive: [/V[:label]] [/Q] [/U] [/F:size] [/B | /S] [/C]
FORMAT drive: [/V[:label]] [/Q] [/U] [/T:tracks /N:sectors] [/B | /S] [/C]
FORMAT drive: [/V[:label]] [/Q] [/U] [/1] [/4] [/B | /S] [/C]
FORMAT drive: [/Q] [/U] [/1] [/4] [/8] [/B | /S] [/C]
```

drive	Specifies the drive to format.
/V[:*label*]	Specifies the volume *label*.
/Q	Performs a quick format.
/U	Performs an unconditional format.
/F:*size*	Specifies the *size* of the diskette to format (such as 160, 180, 320, 360, 720, 1.2, 1.44, 2.88).
/B	Allocates space on the formatted disk for system files.
/S	Copies system files to the formatted disk.
/T:*tracks*	Specifies the number of *tracks* per disk side.
/N:*sectors*	Specifies the number of *sectors* per track.
/1	Formats a single side of a diskette.
/4	Formats a 5.25-inch 360K diskette in a high-density drive.
/8	Formats eight sectors per track.
/C	Revert to less conservative handling of bad blocks.

Example: The following command line prepares the primary partition on a drive:

```
FORMAT C:
```

Note: This is the standard PC-DOS FORMAT.COM command.

Typically, within RDM the required keyboard input to the FORMAT.COM command is provided by a redirected file:

```
%LCCMPATH%\FORMAT %TARGET% < %LCCMPATH%\FORMAT.DAT
```

FORMAT32.COM

This program prepares a FAT32 disk partition for use with PC-DOS.

The syntax for this command is:

FORMAT32 *drive*: [/V[:*label*]] [/Q] [/AUTOTEST]

drive	Specifies the drive to format.
/V[:label]	Specifies the volume label.
/Q	Performs a quick format.
/AUTOTEST	Run FORMAT without prompts.

Example: The following command line prepares the primary partition on a drive:

```
FORMAT32 C:
```

Note: FORMAT32.COM should only be used to format FAT32 partitions, that is, partitions that were created by FDISK32.EXE.

Typically, within RDM the required keyboard input to the FORMAT32.COM command is provided by a redirected file:

```
%LCCMPATH%\FORMAT32 %TARGET% < %LCCMPATH%\FORMAT.DAT
```

Response file for the FORMAT command

The FORMAT command can be used to define areas of the hard disk that can receive and store data. A response file is provided with RDM to run the FORMAT command unattended.

FORMAT.DAT contains the responses for FORMAT to create DOS FAT16-based tracks and sectors within the specified partition.

IMPORTANT: The FORMAT command prompts the user to define a volume label as a part of its process. RDM will not create a startable partition if a volume label is named.

Example: The following sequence of responses is found in the FORMAT.DAT file:

y ENTER	Format existing partition
ENTER	No volume label assigned

Do not create variations of this response file.

MEM.EXE

Lists the amount of used and free memory in your system.

PowerQuest utilities

The PowerQuest utilities are:
- PQACCD.EXE
- PQIDPLYZ.EXE

For details on the PowerQuest utilities, refer to the PowerQuest web site:

http://www.powerquest.com

PQACCD.EXE

This is a PowerQuest utility that does basic file operations (such as DIR and COPY) with drives and partitions that are not normally visible to DOS. RDM uses the utility to copy a modified SETUP.INF file to a folder on a machine that has received a cloned Windows image. That file directs the “mini-install” process that customizes the Windows installation for the individual user.

PQIDPLYZ.EXE

This is a PowerQuest utility that creates image files, or backups of entire partitions, used in both Windows cloning and in Power Restore tasks.

RDM utilities

RDM utilities are described here. They are several categories of RDM utilities:
- General
- Asset ID
- D-Server Configuration
- Power Restore

General

The general RDM utilities are:
- APPSINST.EXE
- BOOTINI.COM
- BSTRAP.0 and LCCM.1
- CLEANUP.EXE
- DEDITD.EXE
- GETVOL.EXE
- LCBTRDEL.EXE
- LCCUSTOM.EXE
- LCCM.1 AND BSTRAP.0
- LCIPS.DOS
- LCREBOOT.EXE
- MAKEPQS.COM
- MERGEINI.EXE
- MTFTP.EXE and MTFTPRC.BAT
- POWEROFF.COM

- PREPDSKS.EXE
- RAIDCFG.EXE
- RAMDSK2.EXE
- RAVE.EXE
- REDIRECT.EXE
- RDAGENT.EXE
- SCAN.EXE
- SCRUB3.EXE
- SLEEP.EXE
- TREBOOT.EXE
- TSHUDWN.EXE
- UNZIP.EXE

APPSINST.EXE

This program installs applications.

The syntax of the command is:

```
APPSINST
```

BOOTINI.COM

BootINI.COM modifies the BOOT.INI file to ensure that it is pointing to the first partition on the drive.

A donor System may possibly have the boot partition be other than the first partition on the drive, and the BOOT.INI value will point to that partition. If an image is captured from such a donor System and deployed down to a target machine, the image will be placed on the first partition. This may cause the target System to fail to boot as the BOOT.INI would be pointing to the wrong partition.

The syntax for BootINI.COM is:

BOOTINI

CLEANUP.EXE

This program cleans up the installing file.

The syntax of the command is:

```
CLEANUP
```

DEDITD.EXE

Use the DEDITD.EXE utility to replace, insert, or append strings within text files.

The syntax of the command is:

DEDITD [/I[L]A | /I[L]B | /R | /AE | /AS] [/N*number*] *target* [*search*] *replace*

`/IA, /IB`	Insert After, Before search.
`/ILA, /ILB`	Insert in the line After, Before search.

/R	Replace search with target throughout the file.
/AE, /AS	Append or replace to a line at the End or Start of the file.
/N*number*	Perform an action the indicated *number* of times. The default is to do it once, as in /N1
target[*search*]	Full path and name of the text file to edit, with an optional *search* string.
replace	String to substitute/append on search string.

For example, the following line replaces the first 5 occurrences of the string *LOADHIGH* in the file: C:\AUTOEXEC.BAT with the string *LOAD*.

```
DEDITD /R /N5 C:\AUTOEXEC.BAT LOAADHIGH LOAD
```

GETVOL.EXE

Run this utility in Windows, with no command-line arguments.

The GETVOL.EXE command creates a file named deleteme.txt in the TEMP directory. This file contains a single record that is the volume label of whatever diskette is in the user's diskette drive A. If there is no diskette in the drive, it does not create the deleteme.txt file. If the deleteme.txt file already exists, it overwrites it.

LCBTRDEL.EXE

Use the LCBTRDEL.EXE utility to delete the master boot record of a physical disk drive. This action destroys all partitions on the disk and, for normal purposes; all data saved on it. Use this utility only if you want to partition the disk using FDISK or FDISK32.

The syntax of the command is:

LCBTRDEL *n* /S

where *n* is the disk drive number (0 is the first hard disk drive, 1 is the second hard disk drive, and so on) and /S is a safety flag to prevent accidental use.

After using LCBTRDEL.EXE, you would normally call FDISK or FDISK32.

LCCUSTOM.EXE

The LCCUSTOM.EXE utility substitutes DOS environment variables with values within batch files. In most cases, the LCCUSTOM utility can be used to replace the older DEDITD.EXE utility. LCCUSTOM is more powerful than DEDITD, in that it cannot only substitute the environment variables of a batch file based on parameters supplied from RDM System and Profile parameter pages, but it can also substitute environment variables from parameters stored in a text file (which DEDITD cannot do).

Variables within files must be enclosed within % characters (as they are in RDM batch files). If a string enclosed within % characters is the name of an environment variable, the string, including the % characters, will be replaced by the actual value of the environment variable.

The syntax for the command is:

```
LCCUSTOM infile [=outfile] [variable_file] [/v]
```

infile	The name of the file to be modified.
outfile	Optional. The name of the modified copy of the file. If omitted or set to "=", the *infile* is modified.
variable_file	Optional. A file containing variables to be modified. If used, *outfile* must be specified as "=".
/v	Optional. Verbose output for debugging.

When using LCCUSTOM.EXE, note the following:

- A value set in *variable_file* takes precedence over a value for the same variable set in the DOS command line environment.
- Environment variables within the output file can be given a blank value.
- LCCUSTOM can replace DEDITD for the most common purposes, replacing all occurrences of a parameter with its value throughout a file. DEDITD might still be required for more specialized file modifications.
- LCCUSTOM does not use the current directory for work files, so it can be run from a read-only directory.
- LCCUSTOM modifies one line at a time. The maximum line length is 8 KB. Lines that are longer than 8 KB might not be fully converted.

LCCM.1 and BSTRAP.0

LCCM.1 and BSTRAP.0 are the bootstrap programs that are loaded and run on each system being deployed by RDM. They communicate with the RDM server to download and run the proper RDM system environment (pre-boot operating system).

1. The following informational messages can be displayed on the system monitor:

   IBM Bootstrap Loader 2.1
   (C) Copyright IBM Corp. 1999,2002 All Rights Reserved.
   Copyright (C) 1997,1999 Intel Corporation.
   This version of RDM is licensed to run only on IBM computers.
   Please contact your IBM representative to purchase the RDM
   version that is licensed to run on non-IBM computers.
   Contacting RDM D-Server"
   Booting RDM System Environment"
   from RAM disk ..."
   Performing local boot ..."
   Loading second bootstrap"
   Receive Reboot command ..."
   Receive Shutdown command ..."
   Reboot in 3 seconds ..."

2. The following error or warning messages can be displayed on the system monitor:

   ```
   RDBOOT000I Bootstrap starts up successfully"
   RDBOOT001W No D server IP found. Default to DHCP server."
   RDBOOT002W No udp ports defined. Default to "
   RDBOOT003E !PXE structure is invalid "
   RDBOOT004E PXENV+ structure is invalid "
   RDBOOT005E Get cached packet failed"
   RDBOOT006E Could not get pointer to original packet storage"
   RDBOOT007E No response from server."
   RDBOOT008E Received invalid message type (Sig/Dtype/Opcode)"
   RDBOOT009E Message XID not match"
   RDBOOT010E Unknown work type received"
   ```

```
RDBOOT011E Unknown work option received"
RDBOOT012E Not support floppy image larger than 2880KB"
RDBOOT013E Not enough extended memory"
RDBOOT014E Could not download boot image"
RDBOOT015E ENV RAMdisk image corrupted"
RDBOOT016E Cannot update 40:13"
RDBOOT017E Cannot remove undi code"
RDBOOT018E Could not open UDP connection"
RDBOOT019E UDP write failed."
RDBOOT020E PXE-E79: NBP is too big to fit in free base memory."
RDBOOT021E Failed to send DHCP Release"
RDBOOT022E PXE-E81: Invalid DHCP option format."
RDBOOT023E Transferring control to RAMdisk image failed."
RDBOOT024E Restart to new bootstrap failed."
RDBOOT025E Failed to read hard disk boot sector"
```

3. The following messages are displayed by BSTRAP.0 only:

```
Invalid DHCP option format"
Bad or missing discovery server list. #1"
Bad or missing multicast discover address #1"
Bad or missing discovery server list #2"
Bad or missing multicast discover address #2"
Bad or missing PXE menu and/or prompt information. #1"
Bad or missing PXE menu and/or prompt information. #2"
No MAN_INFO or OS_INFO options found"
Press <Space> for Configuration Services or <Esc> or <Ctrl-C> to cancel"
Press <Esc> to cancel network boot"
No services selected"
Network boot canceled by keystroke"
Network Boot Menu"
Key Description"
 Esc   Cancel network boot"
Press key to select desired network boot (1"
, 2"
, Space"
, ESC) "
Network boot canceled by keystroke"
```

LCIPS.DOS

This is the DOS IP stack used on the to-be-deployed systems.

```
RDIPST001E The protocol manager could not be opened."
RDIPST002E The protocol manager would not accept a request."
RDIPST003E The protocol manager would not supply a configuration image."
RDIPST004E The protocol manager would not accept module registration."
RDIPST005E No MAC driver bindings were specified in PROTOCOL.INI"
RDIPST006E System Resources are nto available to hold the current parameter
configuration in PROTOCOL.INI.
RDIPST007I Driver will not fit in UMB, loading low."
RDIPST008I Chaining multiple LAN drivers."
RDIPST009E Address error correcting 386 processor."
RDIPST010E Too many MAC driver binds specified in PROTOCOL.INI"
RDIPST011E An unrecognized keyword was found in PROTOCOL.INI:"
RDIPST012E A value is required for keyword in PROTOCOL.INI."
RDIPST013E The value specified for a keyword is not valid."
RDIPST014E The value specified for a keyword is not within the allowed range."
RDIPST015E A duplicate keyword was found in PROTOCOL.INI."
RDIPST016E Section for this Driver missing in PROTOCOL.INI."
RDIPST017E Error loading - Press F1 to continue."
```

LCREBOOT.EXE

This program performs a reboot from within Windows.

The syntax of the command is:

`LCREBOOT`

MAKEPQS.COM

This command makes a PowerQuest ImageCenter script tool. The tool is used to ensure the correct partition is captured from a donor system. MakePQS checks the donor System to determine the actual boot partition number and generates a PowerQuest ImageCenter script to capture that partition, instead of always capturing the first partition.

The syntax is:

`MAKEPQS`

MERGEINI.EXE

This program merges two (.INI) or (.INF) files together.

The syntax of the command is:

MERGEINI *file1 file2*

The contents of *file1* are merged with the contents of *file2* and the results written to *file2*.

MTFTP.EXE and MTFTPRC.BAT

This program is the MTFTP client. The Linux version and the DOS version are the same except that the DOS version omits the -I option.

Note: The MTFTPRC.BAT file is created by the MTFTP.EXE program. The batch file is used for error checking after an MTFTP command is run. If MTFTP completes successfully, the MTFTPRC.BAT file is empty. If MTFTP fails, the MTFTPRC.BAT file contains statements to set the RDSTATUS and RDRASLEVEL environment variables to the appropriate failure codes An additional statement transfers the mtftp error log to the /temp directory. on the RDM Server.

MTFTP {GET | PUT} *ipaddr*[,*port*] *sourcefile destfile* [-A*ackfrequency*] [-B*blocksize*] [-M] [-L*listen_to*] [-T*transmission_to*] [-V] [-D] [-R] -I*interface*

GET|PUT	GET to read file from server. PUT to write file to server. PUT is only supported for unicast.
ipaddr	IP address of MTFTP service in format w.x.y.z
port	Listen port of MTFTP service. Default port is1759 for multicast, 69 for unicast.
sourcefile	Name of file to read from. For GET, the source file resides on the server. For PUT, the source file resides on the client.
destfile	Name of file to write to. For GET, the destination file resides on the client. For PUT, the destination file resides on the server.
-A*ackfrequency*	Acknowledge every nth packet, where n=ackfrequency. Should be a power of 2. Default is 1.
-B*blocksize*	Blocksize of data packet - should be multiple of 512. Default is 512. Maximum value is 8192.
-M	Use multicast TFTP, listening on mip:mport assigned by server. No input required for mip or mport. Default mport mip is 1758.

-L*listen_to*	Time, in seconds, a client listens before deciding to open the multicast session himself. Must be >= 0. Defaults to 2 seconds.
-T*transmission_to*	Baseline time, in seconds, a non-acking client waits before deciding to reopen the multicast session himself. The actual time waited is adjusted based on the data already received. Must be >= 0. Defaults to 2 seconds.
-V	Display progress of transfer.
-D	Display extensive details of transfer appropriate for program debugging. Debug information displayed will include verbose output regardless of specification of -V option.
-R	Replicate file from master dserver to remote dserver without actually transferring file to client.
-I*interface*	IP address of client network interface to communicate on in format w.x.y.z

- The following are messages displayed when invalid parameter values are entered:

```
RDMMC002E Invalid option: %s\n

RDMMC003E Invalid server IP address %s\n
Server IP address must be in format w.x.y.z where w, x, y, and z are all
numeric and <= 255\n

RDMMC004E Invalid server port - %s. Port number must be numeric and less
than 65535.\n

RDMMC005E Invalid ackfrequency -A%s\n
Ackfrequency must be numeric and in decimal\n

RDMMC006E Invalid ackfrequency -A%s\n
Ackfrequency must be greater than 0\n
RDMMC007E Invalid blocksize -B%s\n
Blocksize must be numeric and in decimal\n
RDMMC008E Invalid blocksize -B%s\n
Blocksize must be between 512 and 8192.\n
RDMMC009E Invalid multicast IP address -M%s\n
Multicast IP address must be in format w.x.y.z where w, x, y, and z
are all numeric and <= 255\n
#define RDMMC010InvalMcastPort RDMMC010E Invalid multicast port - %s.
Port number must be numeric and less than 65535.\n
RDMMC011E Invalid listen timeout value -L%s\n
Listen timeout must be numeric and in decimal\n
RDMMC012E Error opening destination file %s\n
RDMMC013E Invalid transmission timeout value -T%s\n
Transmission timeout must be numeric and in decimal\n
RDMMC014E Error getting UNDI information\n
RDMMC015E Server returned a zero ack frequency in OACK response\n
RDMMC016E The ack frequency returned by the server, %d, was not the
same as the ack frequency, %d, requested.\n
RDMMC017E Multicast put not supported. Remove -M option.\n
RDMMC019E Error opening source file %s\n
RDMMC020E Error getting cached packet of type %d - retval = %d\n
RDMMC021E Error getting cached packet of type %d - gbi.Status = %d\n
RDMMC022E Failed to bind with the IP stack, RC=%04xh\n
RDMMC023E Error setting unicast filter, RC: %04x\n
RDMMC024E Error joining multicast group, RC: %04x\n
RDMMC025E Error setting multicast filter, RC: %04x\n
RDMMC026E Error removing filter, RC: %04x\n
RDMMC027E Error leaving multicast group, RC: %04x\n
RDMMC028E Error unbinding service RC: %04x\n
RDMMC029E Error seeking to location %ld in destination file -
RDMMC030E Error writing %d bytes to location %ld in destination file -
RDMMC031E Error seeking to location %ld in source file -
RDMMC032E Error reading %d bytes from location %ld in source file -
RDMMC033E Max seek location exceeded for blocksize %d\n
```

```
RDMMC034E Invalid multicast IP address -M%s\n
Multicast IP address must be between 224.0.0.0 and 255.255.255.0\n
RDMMC035E Invalid ackfrequency -A%s\n
Ackfrequency should be less than 5 characters\n
RDMMC036E -A option specified without a value\n
RDMMC037E Invalid blocksize -B%s\n
Blocksize should be less than 5 characters\n
RDMMC038E -B option specified without a value\n
RDMMC039E Invalid listen timeout -L%s\n
Listen timeout must be > 0\n
RDMMC040E Invalid transmission timeout -T%s\n
Transmission timeout must be > 0\n
RDMMC041E Error seeking to end of source file -
RDMMC042E Error seeking to start of source file -
RDMMC043E Error getting file position using ftell -
RDMMC044E Invalid option: %s - no leading hyphen\n
RDMMC045E -L option specified without a value\n
RDMMC046E Invalid listen timeout -L%s\n
Listen timeout should be less than 4 characters\n
RDMMC047E -T option specified without a value\n
RDMMC048E Invalid transmission timeout -T%s\n
Transmission timeout should be less than 4 characters\n
RDMMC049E Invalid client network interface address -M%s\n
Client network interface must be an IP address in format w.x.y.z where w, x, y,
and z are all numeric and <= 255\n
RDMMC050E No client network interface specified with -I\n
```

- The following are messages displayed when there is a problem with the MTFTP transfer:

```
RDMMC100E ProxyDHCP service did not reply to request on port 4011\n
RDMMC101E Client could not locate a secure server\n
RDMMC102E Missing MTFTP server IP address\n
RDMMC103E BIS bad entry structure checksum\n
RDMMC104E BIS get signature information failed\n
RDMMC105E BIS free memory failed\n
RDMMC106E BIS get boot object authorization check flag failed\n
RDMMC107E BIS shutdown failed\n
RDMMC108E BIS initialization failed\n
RDMMC109E BIS image/credential validation failed\n
RDMMC110E BIS integrity check failed\n
RDMMC111E Transfer canceled by keystroke\n
RDMMC112E ARP timeout\n
RDMMC113E TFTP open timeout\n
RDMMC114E TFTP Error - File Not found\n
RDMMC115E TFTP Error - Access Violation\n
RDMMC116E Error received from TFTP server\n
RDMMC117E TFTP unknown opcode\n
RDMMC118E TFTP read timeout\n
RDMMC119E TFTP cannot open connection\n
RDMMC120E TFTP cannot read from connection\n
RDMMC121E No DHCP or proxyDHCP offers were received.\n
RDMMC122E proxyDHCP offers were received. No DHCP offers were received.\n
RDMMC123E No boot filename received\n
RDMMC124E Invalid UNDI API function number\n
RDMMC125E MTFTP cannot initialize NIC for multicast\n
RDMMC126E Error while initializing the NIC\n
RDMMC127E Error while initializing the PHY\n
RDMMC128E Error while reading the configuration Data\n
RDMMC129E Error while reading the initialization data\n
RDMMC130E Invalid MAC address\n
RDMMC131E Invalid EEPROM checksum\n
RDMMC132E Error while setting interrupt\n
RDMMC133E TFTP too many packages\n
RDMMC134E TFTP packet size is invalid\n
RDMMC135E Media test failure, check cable\n
RDMMC136E NBP is too big to fit in free base memory\n
RDMMC137E Bad or missing discovery server list\n
```

```
RDMMC138E Bad or missing multicast discovery address\n
RDMMC139E Bad or missing PXE menu and/or prompt information\n
RDMMC140E Could not locate boot server\n
RDMMC141E Invalid state returned from UNDI\n
RDMMC142E Mtftp Unexpected Error\n
RDMMC143E Tftp error %d received from server: %s\n
RDMMC144E Blocksize %d returned from server is too large. Max size is %d\n
RDMMC145E A TFTP_DAT message was received when operating in large block
num mode\n
RDMMC146E A TFTP_LDAT message was received when operating in standard block
num mode\n
RDMMC147E A TFTP_ACK message was received when operating in large block
num mode\n
RDMMC148E A TFTP_LACK message was received when operating in standard block
num mode\n
RDMMC149E Invalid blknumsize\n
RDMMC150E Blocksize %d returned is not a multiple of sector size 512\n
RDMMC151E File too large for transfer to server with 2-byte packet number.\n
RDMMC152E Unexpected NACK received - not supported by server.\n
RDMMC153E Unexpected error in receive buffer management.\n
```

- The following are messages displayed when there is a problem locating or initializing the PXE interface:

```
RDMMC201E INT 1A could not find PXE structure.\n
RDMMC202E PXE-E81 PXENV+ structure is invalid. (#%1d)\n
RDMMC203E PXE-E81 !PXE structure is invalid. (#%1d)\n
RDMMC204E Error calling PXENV_UNDI_GET_INFORMATION - status = %d\n
RDMMC205E Hardware MTU is 0\n
```

- The following are messages displayed in the linux version when performing socket operations:

```
RDMMC301E Error creating unicast socket -
RDMMC302E Error setting unicast socket options -
RDMMC303E Error binding to unicast socket -
RDMMC304E Error creating multicast socket -
RDMMC305E Error setting multicast socket options -
RDMMC306E Error binding to multicast socket -
RDMMC307E Error setting owner via fcntl on unicast socket -
RDMMC308E Error setting owner via fcntl on multicast socket -
RDMMC309E Error joining multicast group -
RDMMC310E Error leaving multicast group -
```

POWEROFF.COM

This utility powers off the system.

The syntax is:

```
POWEROFF
```

PREPDSKS.EXE

This utility generates batch files that partition and format the hard drives.

RAIDCFG.EXE

This is an add-on utility to Scan. It scans a system for RAID (LSI) controllers and calls IPSSENDL.EXE or CFG1030.EXE to retrieve their configuration information, then logs the output to the raid.cfg file.

RAVE.EXE

This program, the older Rapid Restore program from LCCM 3.0 and earlier versions, comes with RDM (unchanged from LCCM 3.0). It is used only as part of Power Restore, when it converts the hidden partition from the older format to the new format.

REDIRECT.EXE

This utility redirects stderr output to stdout. The syntax is:

```
redirect <DOS command or executable>
```

Example:

```
redirect raidcustom.bat >raidcstm.log
```

In this example, all stderr and stdout output will go to the file raidcstm.log.

RAMDSK2

Use this utility to determine the drive letter of the RAM drive.

The syntax is:

```
RAMDSK2
```

RDAGENT.EXE

This program is used on the to-be-deployed system for communication with the D-Server. It is not intended to be run by the customer.

rdagent [/r] [/d] rdagent /s=<*filename*> [/d] rdagent /g=<*filename*> [/d]

- The following informational messages can be displayed on the system monitor:

```
RDAGENT Contacting server ... (%d)
RDAGENT Notifying server ... (%d)
RDAGENT Received shutdown command.
RDAGENT Received reboot command.
RDAGENT Received command file.
RDAGENT Received set env command.
RDAGENT Received ack
RDAGENT Received nack
```

- The following error or warning messages can be displayed on the system monitor:

```
RDAGEN001E Error parsing arguments
RDAGEN002E File not found: %s
RDAGEN003E Sending invalid opcode (%04xh)
RDAGEN004E Failed to open file to write: %s
RDAGEN005E PXE interrupt 1A failed or bad PXE struct
RDAGEN006E Failed to get communication info
RDAGEN007E Failed to get DHCP packet\n
RDAGEN008E Failed to bind with IP stack, RC=%04xh
RDAGEN009E Error setting filter, RC: %04xh
RDAGEN010E Transmit Error, RC=%04xh
RDAGEN011E No buffers available
RDAGEN012E Failed to unbind from IP stack, RC=%04xh
RDAGEN013E Receive invalid message type
RDAGEN014E Receive invalid work type
RDAGEN015W Receive invalid work option
RDAGEN016E No response from server.
RDAGEN017E SETENV data has wrong format
RDAGEN020E Socket open error
RDAGEN021E Socket bind error
RDAGEN022E Socket connect error
RDAGEN023E Socket select error
RDAGEN024E Socket send error
RDAGEN025E Socket recv error
RDAGEN026E Socket setsockopt error
```

SCAN.EXE

This program collects hardware information about the to-be-deployed system. It runs in DOS.

Text output

```
This version of RDM is licensed to run only on IBM computers. Please
contact your IBM representative to purchase the RDM version that is
licensed to run on non-IBM computers. Thank you.
```

Messages

```
RDSCAN000I Scan succeeded.
RDSCAN001E Failed to set locale.
RDSCAN002E Memory allocation failed
RDSCAN003E Failed to open file for output
RDSCAN004E Non-IBM system detected
RDSCAN005I Default scan running
RDSCAN006E Invalid input data file format
RDSCAN007E Failed to retrieve system info
RDSCAN008E Failed to retrieve Bios info
```

```
RDSCAN009E Failed to retrieve ECU info
RDSCAN010E Failed to retrieve processor info
RDSCAN011E Failed to retrieve memory info
RDSCAN012E Failed to retrieve hard disk info
RDSCAN013E Failed to retrieve PCI info
RDSCAN014E Failed to retrieve nic info
RDSCAN015E Failed to retrieve Raid info
RDSCAN020E Failed to update AID (input might be too large).
RDSCAN021E General scan error
RDSCAN022I Detected same BIOS version
RDSCAN023I Detected different BIOS version
```

SCRUB3.EXE

The SCRUB3 utility is part of the RDM Secure Data Disposal tool. This program runs as a system command under the DOS operating system. It permanently erases all data on one or more hard disk drives that are installed on the system. Therefore, it is a potentially dangerous utility. It is strongly recommend that you do not use this utility manually. Instead, use the built-in profiles to run this program. The syntax of this command is:

SCRUB3 [/?]|[[/Q=NO][/S=NO]{/D=*drive*|/D=ALL}{/L=*level*|/W=*writes*}]

/Q=NO
: This parameter causes the program to display a maximal number of messages on STDOUT. It is intended for "in the field" debugging only, and a customer should normally not use this parameter. If present, this parameter should be the first (that is, left-most) parameter.

/S=NO
: This parameter causes the program not to write the scrub signature to the disk(s) that will be erased.

/D=*drive*
: Use this form of the /D parameter if you want to erase only one hard disk drive that is installed on the system computer. The value *drive* is the hard disk drive number of the drive that you want to erase. 1 is the first hard disk drive, 2 is the second hard disk drive, and so on. There is no default value for this parameter. The /D parameter is required.

/D=ALL
: Use this form of the /D parameter if you want to erase all hard disk drives that are installed on the system computer. There is no default value for this parameter. The /D parameter is required.

/L=*level*	The value level is the security *level* of the disposal operation. It must be one of the following values: **/L=1** Limited security. The first 63 sectors on the drive (includes Master Boot Record) the last 2 sectors on the drive, and the first 100 sectors on each partition are overwritten with a 0x0000 pattern (that is, each pair of bytes on the sector is overwritten with this pattern). This operation is very fast. The hard disk drive will not be usable through standard I/O methods. However, this is not a secure operation in an absolute sense. It leaves most of the partitions on the hard disk drive unchanged. **/L=2** Medium security. All sectors on the drive are overwritten 1 time with a 0x0000 pattern (that is, each pair of bytes on the sector is overwritten with this pattern). This operation is relatively slow and involves many write operations. Actual speed depends on the size and speed of the target hard disk drives. **/L=3** High security. All sectors on the drive are overwritten 4 times with the following patterns (in this order): a random pattern, the bit-wise complement of that random pattern, a different random pattern, and a 0x0000 pattern (that is, each pair of bytes on the sector is overwritten with these patterns). This operation is quite slow, and it takes 4 times as long as a /L=2 operation. **/L=4** DOD-compliant security. All sectors on the drive are overwritten 7 times with the following patterns (in this order): a random pattern, the bit-wise complement of that random pattern (3 times, each with a different random pattern), and a 0x0000 pattern (that is, each pair of bytes on the sector is overwritten with these patterns). This operation is quite slow, and it takes 7 times as long as a /L=2 operation. There is no default value for this parameter. The /L parameter is required.
/W=*writes*	The value *writes* is the number of times each sector is overwritten (done *writes* - 1 times with a random pattern, before a final write with a 0x0000 pattern). *writes* is an integer greater than 1 and less than 100. There is no default value for this parameter. Exactly one of the /L parameter or the /W parameter is required.
/?	This parameter causes the program to display a concise description of its execution syntax on STDOUT and then to terminate execution. If you run SCRUB3.EXE with no parameters, it will display this same output. The /? parameter causes all other parameters to be ignored.

Examples:

```
SCRUB3 /L=1 /D=ALL
```

Overwrites the Master Boot Record, the first 100 sectors of each partition, and the last 2 sectors on every hard disk drive installed on the system. The pattern used for the write operation is 0x0000. None of the data on any of the drives can be accessed with standard methods. However, most of the data on these drives can be read successfully by a program that uses low-level BIOS read functions.

```
SCRUB3 /Q=NO /D=2 /L=2
```

Overwrites every sector on hard disk drive number 2 with a pattern of 0x0000. None of the other hard disk drives installed on the system is changed. Debug messages are displayed in the command window (that is, on STDOUT), along with all the standard messages that this program produces.

```
SCRUB3 /D=ALL /L=3
```

Overwrites every byte on every sector of every hard disk drive installed on the system 4 times. None of the data on any of the drives is recoverable. This is not the normal way to run SCRUB3.EXE. It takes an extremely long time to run. However, overwriting 4 times provides good protection from attempts to recover data with specialized sensitive electronic equipment.

```
SCRUB3 /D=ALL /L=2
```

Overwrites every byte on every sector of every hard disk drive installed on the system with 0x00. None of the data on any of the drives is recoverable. This is the normal way to run SCRUB3.EXE.

During execution of the last example, the following output is displayed:

```
IBM Secure Data Disposal Utility v2.0 (RDM v4.x)
      Licensed Materials - Property of IBM
      (C) Copyright IBM Corp. 1999, 2003  All Rights Reserved.
      Number of hard drives found: 1
      Processing drive 1:
      Writing sectors for Secure Data Disposal
      Writing signature on scrubbed drives.
      Processing drive 1:
      Total program execution time (minutes): 17.85
      IBM Secure Data Disposal Utility
      Return code ..... 0
      Execution Complete.
```

The hard disk drives are modified based on what parameters the user specified on the command line. A record of the SCRUB3 processing is written on the master boot record of each scrubbed hard disk drive. If the computer is then booted to its hard disk drive, that signature is displayed on the computer monitor. The following is an example of the SCRUB3 signature:

```
IBM Secure Data Disposal Utility 2.0
IBM Remote Deployment Manager
Date and time of execution ... 08/16/02 17:49:39
Command executed ............. A:\SCRUB3.EXE /d=all /l=2
Return code .................. 0
```

SLEEP.EXE

This utility halts processing for a specified number of seconds.

The syntax is:

SLEEP *seconds*

where *seconds* is the number of seconds to halt processing.

TREBOOT.EXE

This utility reboots the system.

TSHUDWN.EXE

This utility shuts down the system.

UNZIP.EXE

This utility unzips a zipped file.

The syntax is:

UNZIP *file*

where *file* is the name of the file to be unzipped.

Asset ID

If your computers contain Radio Frequency Identification (RFID) chips and are Asset Information Area (AIA) enabled, you can use AIA data fields with RDM. Data can be read from or written to an on-board Electronically Erasable Programmable Read Only Memory by RDM during the scanning and assigning of systems. Additionally, you can use these fields in RDM batch files.

You can use Asset ID data fields to process RDM profiles when the scan process first detects a system. The scan program will read the required data from the AIA. This data must be available on the system. Make sure that you specify no user prompts during the scan process.

For information on implementing Asset ID, refer to:
http://www.redbooks.ibm.com/redbooks/SG246165.html
http://www.redbooks.ibm.com/redbooks/pdfs/sg246165.pdf

The Asset ID fields are:

- PRELOADPROFILE. This information is part of the requested name and date fields for the system. The image name must be 20 characters or less. Here are examples with sample data:
  IMAGE=OS Clone Profile - 1
  IMAGEDATE=00000000
- OWNERDATA. The Name, Department, Phone and Position field values from the OWNERDATA group on the system are joined to make a single RDM field. Here are examples with sample data:
  OWNERNAME=John_Smith
  DEPARTMENT=Accounts
  PHONE_NUMBER=555 555 5555
  OWNERPOSITION=Manager
- OWNERDATA, LOCATION. The location field value of the OWNERDATA group is added to the Location field. Here are examples with sample data:
  LOCATION=Room12, Floor 3
- USERDEVICE. The five user-definable fields from the USERDEVICE group are joined to make a single RDM field. Here are examples with sample data:
  ADDRESS = 3039 Cornwallis Rd
  CITY = RTP
  STATE = NC
  ZIPCODE = 27709
  AREA = West
- NETWORKCONNECTION. The network connection information for the system. Here are examples:
  IPADDRESS
  SUBNETMASK
  GATEWAY
  SYSTEMNAME (computer name)

The Asset ID utilities are:

- AIAREAD.EXE - Asset ID
- AIAWRITE.EXE - Asset ID

AIAREAD.EXE

Use the AIAREAD.EXE utility to read the contents of the Asset Information Area (AIA) of the Radio Frequency Identification (RFID) chip. This chip is battery-maintained and contains asset data specific to each system. This program runs under DOS only.

The syntax of the command is:

AIAREAD *group* [*field*] [/f=*file*] [/a] [/s]] [/x] [/p=*prefix*]

group	The name of the device group.
field	The name of the field to read (default is all fields).
/f=*file*	The name of the file to sent output results to (default is stdout).
/a	Append the file (default is overwrite file).
/s	Format output as SET statements. For example, "SET name=value" (default is "name=value").
/x	Exclude fields that are null strings or zero values.
/p	Prepend "prefix" to the name of each field.

Example 1: You want to display one of the AIA fields at the system.

At the system, run the following command line:

```
AIAREAD ownerdata
```

The following is displayed:

```
OWNERNAME=jim smith
DEPARTMENT=219
LOCATION=Room 315
PHONE_NUMBER=3765
OWNERPOSITION=Manager
```

Example 2: You want to create a .BAT file that will SET variables in RAM on a system.

At the system, run the following command line:

```
AIAREAD /s ownerdata > OWNER.BAT
```

The created OWNER.BAT file would contain these lines:

```
SET OWNERNAME=jim smith
SET DEPARTMENT=219
SET LOCATION=Room 315
SET PHONE_NUMBER=3765
SET OWNERPOSITION=Manager
```

AIAWRITE.EXE

Use this program to input contents to the Asset Information Area (AIA) of the Radio Frequency Identification (RFID) chip. This chip is battery maintained and contains asset data specific to each system. This program runs under DOS only.

The syntax of the command is:

```
AIAWRITE group {field1=[value1]...[fieldn=[valuen]]|/f=file}
```

group	The name of the device group.
fieldn	The name of the field to write.
valuen	The value to assign to *fieldn*. For the USERDEVICE group, a blank value means delete this field, if the field already exists, or create a field with a NULL value if the field does not exist. For all others it means assign a zero or null value.
/f=*file*	The name of the file from which to get field/value pairs. Each line in this file contains one field/value pair, separated by "=".

Example:

```
AIAWRITE USERDEVICE AREA=SOUTH
```

D-Server configuration

The D-Server configuration program, DSCONFIG.EXE, runs under Windows on a D-Server to start the RDM D-Server Service and to configure the D-Server parameters.

The program runs automatically at the end of a D-Server installation, whether it is part of a RDM Server installation (which includes both Console and D-Server components) or the D-Server component by itself. The program can be run at any time in a command window using the Windows **Start** → **Run** command.

The syntax of this command is:

```
DSCONFIG [/Q]
```

/Q This parameter causes the program to run without displaying the dialog.

DSCONFIG is used on both the Master D-Server and the Remote D-Servers.

Master D-Server

If you run DSCONFIG.EXE with no command-line options the following window is displayed. This window is also displayed when installing RDM Server.

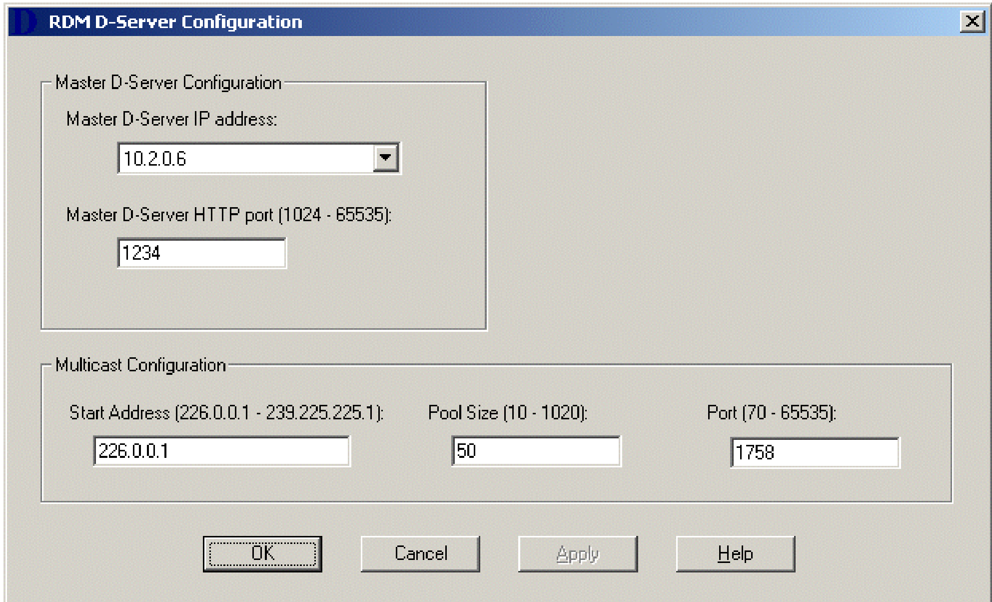


Figure 114. Master D-Server Configuration window

The fields on this window are defined as follows:

Master D-Server IP address - This is the IP address by which the Master D-Server is known to RDM. If the Server contains multiple network adapters (with multiple IP addresses), you must select one of them in this field.

Master D-Server HTTP port - This is the port number for communication between the Master D-Server and Remote D-Servers; it is the port on which the Master D-Server receives HTTP messages. The default is 1234. The minimum of 1024 is an IBM Director requirement. The port must not already be in use by any application.

Start Address - This is the first class-D (multicast) IP address in a range of addresses that is assigned to this D-Server. The default value, 226.0.1.1, is the smallest class-D address that RDM allows. Class-D addresses in the range 224.0.0.0 through 226.0.0.0 are often used for other specific non-RDM purposes.

Pool Size - This is the number of contiguous class-D addresses reserved by RDM for use by this D-Server.

Port - This is the port number used by the IBM RDM MTFTP Service that is installed on this D-Server. The default is 1758.

Remote D-Server

If you run DSCONFIG.EXE with no command-line options, on a system with only the RDM D-Server component (that is, no Server component) installed, the following window is displayed. This window is also displayed when installing just the RDM D-Server component.

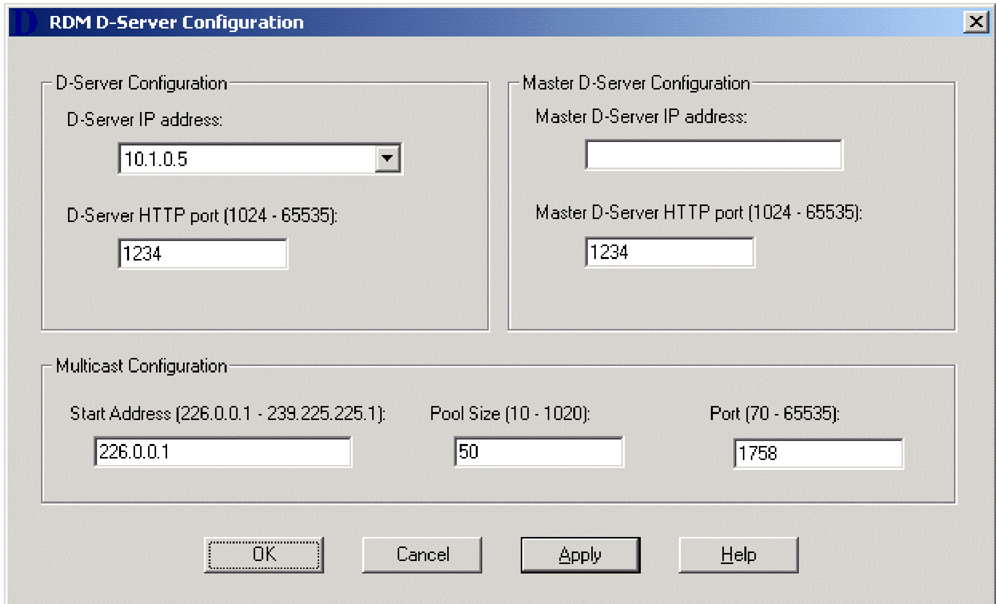


Figure 115. Remote D-Server Configuration window

The fields on this window are defined as follows:

D-Server IP address - This is the IP address by which is D-Server is known to RDM. If the Server contains multiple network adapters (with multiple IP addresses), you must select one of them in this field.

D-Server HTTP port - This is the port number for communication between this D-Server and the master D-Servers. The default is 1234. The port must not already be in use by any application.

Master D-Server IP address - This is the IP address by which the Master D-Server is known to RDM. It must be the same address that you used when installing the RDM Server.

Master D-Server HTTP port - This is the port number for communication between the Master D-Server and the Remote D-Server; it is the port on which the Master D-Server receives HTTP messages (and therefore, to which this D-Server sends HTTP messages). It must be the same port that you used when installing the RDM Server.

Start Address - This is the first class-D (multicast) IP address in a range of addresses that is assigned to this D-Server. The default value, 226.0.1.1, is the smallest class-D address that RDM allows. Class-D addresses in the range 224.0.0.0 through 226.0.0.0 are often used for other specific non-RDM purposes. Ensure that a D-Server range of addresses does not overlap with another D-Server range (or with addresses used by another application).

Pool Size - This is the number of contiguous class-D addresses reserved by RDM for use by this D-Server.

Port - This is the port number used by the IBM RDM MTFTP Service that is installed on this D-Server. The default is 1758.

Power restore

The RDM utilities for Power Restore are:

- ChkPart.com
- GetBSize.com
- GetRamD.com
- HidePart.com
- PR.exe
- PR2.com
- PRLast.com
- PRSOURCE.EXE
- SetError.com
- REBOOT.COM

There are several custom programs used in the installation and running of Power Restore and IBM Boot Manager. Brief descriptions of them are provided next.

ChkPart.com

This utility can, based on the command-line parameter given, perform various tests on the primary drive and return error codes to indicate if the tested-for condition has been found. The syntax is:

```
CHKPART { /R | | /A | /3 | /H | /F | /I | /Pxxxx | /B } { /V }
```

/R ChkPart tests if a Rapid Restore/Rave-style partition is defined

/A ChkPart tests if an active (or “startable”) partition is defined

/3 ChkPart tests if partition number 3 is defined

/H ChkPart tests if partition number 3 is a hidden FAT32 partition

/F ChkPart tests if partition number 3 is a FAT32 partition

/I ChkPart tests if there is a drive defined with the volume name IBM_SERVICE

/P ChkPart tests if a version of IBM Power Restore equal to or higher than the specified version has already been installed, with the specified version being in the format:

```
(Major Version * 1000) + (Minor Version * 100) + (Sub Minor Version)
```

where /P2100 would indicate a test for version 2.1.00 or greater

/B ChkPart tests if IBM Boot Manager for Power Restore has been installed

/V ChkPart runs in verbose (debug) mode

ChkPart returns an error level of 1 if the test passes or 0 if it fails (except for /I tests). For the /I test, it returns 1 through 24 (drives C: through drive Z:) if the test passes or 0 if it fails.

GetBSize.com

This program checks the size of the boot partition on the primary drive and creates a batch file (FDISK.BAT) to run the IBM FDISK32.COM utility to create a Power Restore partition of the same size. If there is not enough space left on the primary drive to create the Power Restore partition, the FDISK.BAT file will contain a line to call SETERROR.COM to return an error level of 1. The syntax is:

```
GETBSIZE
```

GetRamD.com

This utility searches the available drives and returns a number indicating which, if any, is the RAM drive. It returns 1 through 24 if a RAM drive is found, with 1 corresponding to the “C:” drive, 2 corresponding to the “D:” drive, and so on. If no RAM drive is identified, it returns 0. The utility has the following syntax:

```
GETRAMD
```

HidePart.com

This utility marks the specified partition(s) as hidden or un-hidden. The syntax is:

```
HIDEPART {/F | /L | /A | /n1} {/H | /U} [/n2] [/V]
```

/F HidePart acts on the first defined partition on the primary drive

/L HidePart acts on the last defined partition on the primary drive

/A HidePart acts on all partitions on the primary drive

/n*1* With n*1* being 0 through 3, HidePart acts only on the specific partition table entry on the primary drive

/H HidePart marks the specified partition(s) as hidden

/U HidePart marks the specified partition(s) as un-hidden

/n*2* With n*2* being 0 through 9, HidePart acts on a specific drive (if not specified, drive 0 [the “boot” drive] is assumed)

/V HidePart runs in verbose (debug) mode

PR.exe

The Power Restore program (PR) is a front-end for the PowerQuest ImageCenter program which is run by a combination of command-line arguments and a script file. When run as part of an RDM task, PR runs with no visible user interface and translates commands defined in the RDM interface to a batch file and an ImageCenter script file that are used to run ImageCenter to perform tasks. When run as a “local” task, PR runs with an interactive user interface, and then creates the batch file and an ImageCenter script file that run ImageCenter to perform the desired tasks. Whether run as part of an RDM task or as a local task, PR also performs the backing up or restoring of the Master Boot Record. When run as a local task, PR can also be used to display information about the Partition Table. The syntax is:

```
PR {/I | /P | /V | {/S | /R}{/Y | /N}{/Y | /N}{/A | /B | /O | /N}}
```

/I PR runs in interactive mode, displaying a user interface (no additional parameters needed)

/P PR runs in interactive mode, displaying a user interface, but preventing the user from being able to save to the “A” image file (no additional parameters needed)

/V PR shows the partition table information (no additional parameters needed)

/S PR runs in noninteractive mode with a Save operation specified

/R PR runs in noninteractive mode with a Restore operation specified

/Y As the second parameter, PR acts on (save or restore) the Master Boot Record

/N As the second parameter, PR does not act on (save or restore) the Master Boot Record

/Y As the third parameter, PR acts on (save or restore) the Boot Partition

/N As the third parameter, PR does not act on (save or restore) the Boot Partition (if this option is chosen, the fourth parameter is ignored)

/A As the fourth parameter, PR saves to or restores from the "A" image file (only if the third parameter has been set to /Y)

/B As the fourth parameter, PR saves to or restores from the "B" image file (only if the third parameter has been set to /Y)

/O As the fourth parameter, PR saves to or restores from the older of the "A" or "B" image files (only if the third parameter has been set to /Y)

/N As the fourth parameter, PR saves to or restores from the newer of the "A" or "B" image files (only if the third parameter has been set to /Y)

PR2.com

This utility is run from the batch file generated by PR.exe and is used to update the information sector on the first track of the boot drive. The information sector holds the Power Restore version number, a flag indicating whether or not IBM Boot Manager for Power Restore has been installed, flags indicating the existence (or lack thereof) of the "A" and "B" Power Restore image files, the creation dates of the image files and comments associated with the image files. The syntax is:

```
PR2 { /1 | /2 | /B | /D | /F | /U} { "comments" }
```

/1 PR2 sets the "A image file exists" flag to True, to store the date of the "A" image file and to store the optional comments for the "A" image file

/2 PR2 sets the "B image file exists" flag to True, to store the date of the "B" image file and to store the optional comments for the "B" image file

/B PR2 sets the "IBM Boot Manager for Power Restore Installed" flag to True

/U PR2 sets the "IBM Boot Manager for Power Restore Installed" flag to False

/D PR2 lists the information stored in the Information Sector

/F "Flushes" (zeros out) the information sector

comments
Optional comments, which must be enclosed in double quotation marks, are stored if the first parameter has been set to /1 or /2

PRLast.com

This program copies details of the partition table to a sector on the drive. It can also restore the details of the partition table from the copy plus search the partition table of the primary drive in last-to-first order for a hidden FAT32 partition. If it finds one and it is not the last partition table entry, the entry is swapped with the last partition table entry. The syntax is:

```
PRLAST { /S | /R | /U} { /V }
```

/S PRLast saves details of the partition table to a sector on the drive

/R PRLast restores details of the partition table from the copy

/U PRLast restores details of the partition table from the copy plus moves the Power Restore partition to be the last entry in the table

/V PRLast runs in verbose (debug) mode

PRSOURCE.EXE

This is a self-extracting Zip file that contains several other utility programs. For faster performance, MTFTP only needs to copy one file rather than repeatedly call MTFTP to copy several files to a system on which a Power Restore partition is being installed or on which a Power Restore operation is running.

REBOOT.COM

This program causes a system to reboot. The syntax for this command is:

```
REBOOT
```

There are no command line parameters.

This command will cause a system running the DOS environment to reboot immediately.

SetError.com

This program sets the error level to the value set in the numeric command-line parameter. The syntax is:

```
SETERROR /n
```

The /n parameter must be a positive integer value from 0 to 32767.

Miscellaneous Utilities

There are several miscellaneous utilities:

- BMGR.EXE (IBM Boot Manager)
- BPDISK.EXE
- CFG1030.EXE (LSI SCSI RAID)
- FSID.COM
- IDEWC.EXE
- IPSSENDL.EXE (ServeRAID)
- NDIS.DOS
- NETBIND.COM
- PROTMAN.EXE
- SDAINST.EXE (Software Delivery Assistant)
- SMABAT.EXE (System Migration Assistant)

BMGR.EXE

This utility modifies the boot code on a hard drive to display a prompt before the OS boots that allows you to press a key (usually F11) to force booting from the IBM_SERVICE partition on the drive.

The syntax of the command is:

```
BMGR [/R]
```

`/R` Removes the boot manager code.

BPDISK.EXE

This is a boot image creation and modification program. It is located in the <drive>:\IBMTCPIP\images directory. It can be used to create, restore, and modify boot images without the need for a diskette drive. Using BPDISK, you can do the following:

- Insert or extract single files or complete subdirectories from a boot image.
- Create optimized boot images which only allocate the actual storage space occupied by the included files.
- Create boot images of all common DOS diskette formats, including 1.2-, 1.44-, and 2.88-megabyte images.
- Write DOS batch files which create or update multiple boot images.

The syntax of the command is:

```
BPDISK -d file [-v] [-D | -T file | -F dsize,bsec | -E | -I dst[,[@]src] |
-i dir | -O src[,[@]dst] | -o dir | -R file | -M dir | [-P dsize]
```

`-d` *file*	The filename of the boot image. It can be an existing image or an image that should be created.
`-D`	Show a recursive directory listing of all files in the boot image identified by the –d option.
`-T` *file*	Display the contents of *file* in the boot image defined by the –d option.
`-F` *dsize*,*bsec*	This option formats a new boot image. The name of the boot image is defined with the –d option or by the environment variable BPDISK. If the boot image already exists, it will not be overwritten. The first argument, *dsize*, specifies the format of the boot image. It is one of the following: 320, 360, 640, 720, 1200, 1440, or 2880. Initially, BPDISK will not allocate the space needed for the complete boot image; it will do this later, when files are copied into the boot image. The second argument, *bsec*, points to a file or drive which holds the boot sector and the system files for the boot image. The 2 arguments must be separated by a comma.
`-P` *dsize*	Enlarge (pad) an existing image by *dsize* kilobytes. It is useful for creating space into which a program may write files into the boot image, which is a RAM drive at run time.
`-I` *dst*[,*src*]	This option copies a file into an existing boot image. The first argument, *dst*, is the name of the file in the boot image. The second argument, *src*, is the name of the file to be copied. If the second argument is omitted, then the name of the dst file, with the directory path removed, is used; in this case, the source file must be in the current directory.

`-i` *dir*	Copy all files (recursively) from directory *dir* into the boot image. If you want to copy all files from the current directory, use a "." (dot) as the argument.
`-O` *src*[,*dst*]	This is similar to the –I option, but it copies out of the boot image. It copies file *src* from the boot image to file *dst*.
`-o dir`	This is similar to the –i option, but it copies out of the boot image. It copies all files (recursively) from the boot image to directory *dir*.
`-E file`	Delete *file* from the boot image.
`-C`	Erase all files from the boot image.
`-M dir`	Create a new subdirectory, *dir*, in the boot image.
`-v`	Give more technical information about BPDISK operations. It can be used together with other options or alone.

CFG1030.EXE

This DOS command line utility configures the RAID LSI53C1020 and LSI53C1030 SCSI controllers.

The syntax of the command is:

`cfg1030 <command> <parameters>`

BACKUP command

`cfg1030 backup controller # path/filename [noprompt]`

This command saves the configuration settings for the controller in a file.

Parameters:

adapter #
: Number of controller targeted by this command.

path/filename
: Path and filename of file to store configuration data in; path is optional.

noprompt
: Option ignored.

CREATE command

`cfg1030 create controller# logicaldrive newarray size RAIDlevel {channel# SCSI:ID} [qsync]`

This command creates logical drives or RAID volumes on the LSI53C1020/1030 controllers.

Parameters:

controller#
: Number of SCSI bus targeted by this command.

logicaldrive
: Required keyword.

size
: Size of the RAID volume in MB or "MAX" for the maximum size available.

RAIDlevel
: RAID level for the volume to be created. Valid values are 1 and 1E.

channel#
: This parameter must be one (1).

SCSI ID
: *SCSI ID* of a hard disk drive to be included in the RAID volume.

[qsync]
: An optional parameter, if specified means that the volume created will be quick synchronized as opposed to long synchronized, and applies for 2 drive volumes. The first 32K of the drives in the volume will be cleared to 0.

GETCONFIG command

```
cfg1030 getconfig controller# [options]
```

The getconfig command lists information about LSI53C1020/1030 controller configurations. The information displayed includes controller type, firmware version, BIOS version, logical drive/RAID volume information, and physical drive information.

Parameters:

controller#
: Number of SCSI bus targeted by this command.

options
: The following options indicate what information is to be returned.
- AD - Controller information only
- LD - Logical drive (RAID volume) information only
- PD - Physical drive information only
- AL - All information (default)

RESTORE command

```
cfg1030 restore controller# path/filename [noprompt]
```

The restore command configures a controller using configuration data and settings stored in a file.

controller#
: Number of controller chip targeted by this command.

path/filename
: Path and filename of file to store configuration data in; path is optional.

noprompt
: Option ignored.

SETCONFIG command

```
cfg1030 setconfig controller# default [noprompt]
```

This command will delete any logical drives and hot spare drives created by the create and setstate commands.

Parameters:

controller#
: Number of SCSI bus targeted by this command.

default
: Set the factory default settings.

noprompt
: Do not alert user to potential risk of using this command.

SETSTATE command

`cfg1030 setstate controller# channel# SCSI ID newstate`

This command will set the drive state to the *newstate* parameter value. The hot spare option will be the only supported state. The hot spare drive will be added to hot spare pool 0.

Parameters:

controller#
: Number of SCSI bus targeted by this command.

channel
: Must be set to one (1).

SCSI ID
: SCSI target ID of drive targeted by this command.

newstate
: State to which the target device is to transition:

  HSP - Hot spare

FSID.COM

This is the File System ID tool. When run, it returns an error code that identifies the file system or partition type for the specified drive or partition.

The syntax is:

`FSID /D=x /P=y`

/D*x*	Returns information on drive number *x*, where *x* is in the range of 0 and the number of drives present.
/P*y*	Returns information on partition number *y*, where *y* is in the range of 0 and 3.

The possible return values are:

0 Unidentified partition type

1 FAT12

4 FAT16

5 Extended Partition

6 BIGDOS FAT16

7 NTFS

11 FAT32

12 FAT32 (Int 13 Ext)

14 BIGDOS FAT16 (Int 13 Ext)

15 Extended Partition (Int 13 Ext)

17 Hidden FAT12

18 EISA Partition

20 HiddenFAT16

21 Hidden Extended Partition

22 Hidden BIGDOS FAT16

23 Hidden NTFS

27 Hidden FAT32

28 Hidden FAT32 (Int 13 Ext)

30 Hidden BIGDOS FAT16 (Int 13 Ext)

31 Hidden Extended Partition (Int 13 Ext)

66 Dynamic Disk Volume

130 Linux Swap File

131 Linux Ext 2

134 Legacy FT FAT16

135 Legacy FT NTFS

139 Legacy FT FAT32

140 Legacy FT FAT32 (Int 13 Ext)

999 Unrecognized partition type

IDEWC.EXE

This utility enables write-caching on BladeCenter blades.

The syntax is:

```
IDEWC
```

IPSSENDL.EXE

The ipssendl command is a light version of the ServeRAID ipssend command-line configuration utility. As such, it supports a subset of the ipssend command set, restricted to the following options:

GETCONFIG
SETCONFIG
BACKUP
RESTORE
SETSTATE
CREATE LOGICALDRIVE
SET LDCACHE
STRIPESIZE

To configure an IBM ServeRAID Adapter directly at the client or remotely using the RAID clone task, use a DOS batch file comprised of appropriate ipssendl commands, comments, and error-handling for the tasks. These tasks include viewing the current configuration, rebuilding a dead drive, initializing and synchronizing logical drives, plus many more. This functionality is described in more detail here.

To create arrays and logical drives for ServeRaid Controllers, you use the CREATE option. You must type the channel and SCSI ID of the physical drives to define an array. You must type the logical drive size and the RAID level for the logical drive. When you type MAX as the size on the command line, the maximum size of the logical drive is calculated automatically. If there is free space in an existing array, you can create additional logical drives for that array.

The syntax of the command with the `CREATE` option is:

`IPSSENDL CREATE` *`Controller`* `LOGICALDRIVE` *`Options Size RAIDLevel Channel SCSI ID`* `[`*`Channel SCSI ID`*`] NOPROMPT`

Controller	Indicates the ServeRAID controller number (1 to 12).
LOGICALDRIVE	Indicates you are creating a logical drive.
Options	Enter one of the following: - The keyword NEWARRAY indicating that you are creating a new array and a new logical drive. - A valid array ID (A–H) of an existing array
Size	Enter one of the following: -The keyword `MAX` to create the maximum size for the array. -The size in megabytes (MB) of the logical drive.
RAIDLevel	The RAID level for the logical drive (0, 1, 1E, 5, 5E).
Channel	Enter the channel number for the device (1 to 4). You must provide *Channel* and *SCSI ID* at least once. However, you can repeat these parameters in a single command up to 16 times.
SCSI ID	Enter the *SCSI ID* of the device (0 to 15). You must provide *Channel* and *SCSI ID* at least once. However, you can repeat these parameters in a single command up to 16 times.
NOPROMPT	Overrides the user prompt. The parameter is optional.

Note: You cannot create RAID level-x0 logical drives with the `IPSSENDL CREATE` function.

After the logical drive is created, a quick initialization is done. The quick initialization process initializes (writes zeroes on) the first 1024 sectors (0.5 MB) of the logical drive. If you assign RAID level-5 or RAID level-5E to the logical the logical drive automatically synchronizes in the background.

Refer to the documentation on the ServeRAID CD for syntax and detailed explanations of these commands.

NDIS.DOS

This is the Universal network driver RDM uses.

NETBIND.COM

This utility is part of the DOS LAN Manager. Refer to your LAN Manager documentation for details.

PROTMAN.EXE

This utility is part of the DOS LAN Manager. Refer to your LAN Manager documentation for details.

SDAINST.EXE

The utility installs Software Delivery Assistant files.

SMABAT.EXE

This utility runs System Migration Assistant batch files.

Chapter 7. Solving RDM problems

This table lists some of the RDM problem symptoms and suggested actions.

Table 2.

<table>
<tr><th>Symptom</th><th>Suggested Action</th></tr>
<tr><td colspan="2">RDM server</td></tr>
<tr><td>Qualification error stating the data is not available</td><td>If an error in qualification says data is not available in a Native Managed Object (NMO), it may be because the database is not yet populated. This can occur in the following kind of scenario:
1. Do a Director discovery (this creates new NMOs).
2. Drag one of the NMOs to an RDM task, and click Run systems....

Because the Director database update is still in progress (in the background), the error occurs. You should generally wait short time (for example, 30 to 60 seconds) before using a new NMO for an RDM task.</td></tr>
<tr><td>Disk reading or writing errors</td><td>Sometimes hard-disk or RAID-adapter manufacturers provide firmware updates to correct reported problems. You should check the Web sites of your system, RAID adapter, and disk manufacturers to see if an update is available.

In some cases, you can create an RDM Custom task to deploy the firmware update, depending on the particular update program capabilities and memory-usage constraints.</td></tr>
<tr><td>Scanned systems do not wake up</td><td>Before or during the scan process, you must turn on the system manually and force a network boot (either by keystrokes or by setting the primary boot sequence to be network).

RDM wakes a system by sending a wake-up packet to the system media access control (MAC) address. At the time a scan process is initiated, RDM has no knowledge of the MAC address; RDM discovers the MAC address during the scan process. Therefore, the Wake on LAN feature is not part of the scan function.

RDM can wake up a system manually before scan if you type the computer MAC address into the Wake Systems window of RDM. This window is accessed through the Tools selection on the main menu bar. But it is usually easier just to turn on the system manually.</td></tr>
<tr><td colspan="2">System management</td></tr>
<tr><td>Cannot change RAID configuration.</td><td>If you try to change your RAID configuration with any RAID Clone or RAID Custom task and receive the message, “You cannot change the configuration. A rebuild, logical drive migration, RAID compression/decompression or RAID-5EE compaction/expansion is in progress.”, the following workarounds are available:
1. If you have physical access to the system, type Ctrl+I to restore the factory defaults.
2. If you have physical access to the system, pull another one of the drives in the array being compressed, rebuilt, or migrated.
3. Use ipssendl to set one of the drives in the array as dead, either by running ipssendl at the system or creating an RDM custom task and running it remotely.
4. Wait until the compression, migration, or rebuild has completed, and then rerun the Express task.</td></tr>
</table>

Table 2. (continued)

Symptom	Suggested Action
Changing from a network boot to a local boot	The only way to do what you want is to change the primary startup sequence in the CMOS to the way you want the system to act. You can do it as part of the system deployment (on most IBM computers) by using the CMOS update facility to change the CMOS as needed. (You could also do this as a separate Maintenance procedure). There is NO way to remotely do it without modifying the boot sequences. While it is possible to do this on many network adapters by changing a setting in the network adapter configuration, you have to be at the system to do so. Of course, if the adapter has a DOS-based configuration utility that is not too resource-hungry, you might be able to do this as an RDM Custom task. This is not possible on any of the currently officially supported network adapters.
Performing a system reboot instead of powering down.	Modify the command list instead to end with !REBOOT instead of !SHUTDOWN.
Installation of IBM Boot Manager was interrupted, and the system cannot restart.	If the installation of IBM Boot Manager on a local system is interrupted, it might leave the computer in a non-startable state. Follow these steps to repair the computer: 1. Start the PC with a DOS boot diskette. 2. Replace the DOS boot diskette with the IBM Boot Manager Installation diskette. 3. From the DOS prompt, run the following commands: `HIDEPART A U HIDEPART L H` 4. Remove the IBM Boot Manager Installation diskette and reboot the PC.
Installation of Power Restore was interrupted, and the system cannot restart.	If the installation of Power Restore on a local system is interrupted, it might leave the computer in a non-startable state. Follow these steps to repair the computer: 1. Start the PC with a DOS boot diskette. 2. Replace the DOS boot diskette with the Power Restore Installation diskette. 3. From the DOS prompt, run the following commands: `HIDEPART A U HIDEPART L H` 4. Remove the Power Restore Installation diskette and reboot the PC.
Using RDM with third-party products.	With RDM, a light version of PowerQuest DeployCenter is included in RDM. You can use this capability without installing any other imaging product. You can also upgrade this capability to use the full-function version of the PowerQuest tool.
RDM Databases	
Error exporting systems or profiles.	If you export a systems or profiles database, and use spaces in the filename or pathname, you will get an error message. RDM does not allow the use of spaces. Try again without spaces.
How to reset the database tables.	The twgreset command deletes all persistent data and resets the database tables. This is run if you want to go back to a pristine installation without actually having to reinstall everything, or if there has been corruption of persistent data. **Note:** Use the twgreset command only when instructed by the IBM Director program or documentation.

Appendix A. Command list commands

The commands found in Command Lists are described in this section.

Conventions

!! == RdAgent command
A command list entry that begins with two exclamation marks runs in the system environment and is only understood by the RDMAgent executable.

! == Client command
A command list entry that begins with a single exlamation mark runs in the system environment. It can be any DOS command.

Example to run a DOS directory command
!dir

Example to execute the myprog program
!myprog.exe

This command runs the myprog program previously copied to the system with an mtftp command.

== Server Side Command
A command list entry that does not begin with any exclamation marks runs on the RDM Server (not the D-Server). These commands include those listed in this following sections, and can also be commands specific to the Task Driver implemented when the Task Driver was created.

Parameter replacement

Double Percents - client DOS session parameter replacement - %%var1%%

These are for passing single ! commands to be run on the system where the replacement parameter exists in the system environment and has usually been set using the !SETENV command.

Example
!!SETENV

The !!SETENV command sends all variables for the given task to the RDMAgent, which sets them in the environment.

Example
!mybat.bat %%var1%%

The !mybat.bat command is passed by the RDMAgent to the command line as: `mybat %var1%`where *%var1%* is replaced by the environment setting.

Single Percents - RDM Server parameter replacement - %var1%

Used the same as the double percent replacements except on the RDM Server instead of in a client DOS session.

Server commands

BOOTTYPE: Specifies the type of DOS or Linux Profile Image to be loaded into a clients RAM. This will always be the first or second command in every command list.

Usage
BOOTTYPE [!LOADDOS | !LOADBOOTSTRAP] <boot image file>

Example to load DOS71C as the running environment
BOOTTYPE !LOADDOS /ENVIRONMENT/DOS71C

Example to load bstrap.0 as the bootstrap environment
BOOTTYPE !LOADBOOTSTRAP bstrap.0

Example to boot to the local hard disk
BOOTTYPE !BOOTLOCAL

END: Ends the command list, usually the last command in a given task. Available with all tasks.

Usage
END

Example
END

Note: This should be the last command in all command lists. Some tasks, such as Windows Native Install, will never complete a command list if End is not specified.

SUBTASK: Appends and runs the specified task for the current task. Available with all tasks.

Usage
SUBTASK .<name of the task>

Example
SUBTASK .Intellistation MPro Bios downloaded 2002/07/15.

SHUTDOWN_AND_WAKE: Shuts a system down and then sends a Wake on LAN command to wake it up again.

Usage
Used with the CMOS and BIOS tasks on systems that require being powered off after the flash and before a Scan is run.

Example
SHUTDOWN_AND_WAKE

TIMEOUT: Changes the timeout value that the server will wait for the client to send its next request for work. It is used in the command lists.

Usage
TIMEOUT <time in minutes>

Example
TIMEOUT 8

WAKE: Wakes client system. Tasks usually start with a wake.

Usage
Should be the first or second command in all command lists.

Example
WAKE

Client commands

!BOOTLOCAL

Usage
Used internally with Boottype command list command (Linux). It is not called directly.

Example
BOOTTYPE !BOOTLOCAL

!LOADBOOTSTRAP

Usage
Used internally with Boottype command list command (Linux). It is not called directly.

Example
!LOADBOOTSTRAP ENVIRONMENT\bstrap.0

!LOADDOS

Usage
Used internally with Boottype command list command (Scan). It is not called directly.

Example
!LOADDOS ENVIRONMENT\DOS71S

!MTFTP: performs MTFTP commands .

Usage
!MTFTP [get | put] %%server_ip%% <source path> <destination path>

!SLEEP: sleep for given time in seconds.

Usage
!SLEEP <time in seconds>

Example
!SLEEP 10

!UNZIP: unzips files to current directory.

Usage
!UNZIP <zip filename>

Example
!UNZIP filename.zip

!*.*: any IBM PC-DOS command available on client system can be used with the .!. as a client command will be stripped of .!. and run as normal DOS command.

Usage
Used with any locally present DOS command or executable.

Example
!myBatchFile.bat

RdAgent commands

!!REBOOT

Usage
Command list to reboot client.

Example
!!Reboot

!!SETENV: Sets all environment variables for client DOS session.

Usage
Used with operating system installs to pass Task parameters to the RDAGENT command called directly from the server task list.

Example
!!SETENV

!!Shutdown

Usage
Command list to shutdown client

Example
!!Shutdown

Appendix B. System environment overrides

All RDM tasks involve running a DOS or Linux system environment (for example, a Preboot Environment) on the system. Many tasks involve several system reboots and use a system environment for some of those reboots.

System environments

A system environment involves data that is related to the task or system. This data might typically include things such as:

- Task template id
- Task id
- Computer model
- Machine type
- Network-adapter model

If you need a system environment (for example, a DOS or Linux image) that is not included in RDM, you must create a new one or modify an existing system environment manually to override what is defined by a task. When the images are ready, insert them into the Master Repository with the Image Management (IM).

When you want to change the boot environment from the default, modify the file bootEnvir.sub. This file comes with the RDM product, located in the repository,...\rdm\local\env\bootEnvir.sub. An example of when you might need to change the boot environment is when the NIC in one or several of your systems require a special memory allocation during bootup that the RDM default boot image does not provide. In this case, create a new boot image that addresses the problem. Put that new image in an applicable location as defined in “Creating RDM DOS boot images” on page 143. To make the substitution, you must know which environment your special systems needs to boot up instead of the default boot image. You identify the condition (criteria) based on the system hardware configuration, such as boot the new image based on either the machine model or the PCI ID of the system, or both. With that information, modify and save the file bootEnvir.sub. The next time you initiate a task, the data from bootEnvir.sub is updated, and remains until you make another change and start a new task.

Note: The boot image is universally used, and if you define the condition, for example, of just the model type, then, every system with that model type and the specified boot environment will be run with the new image. The more you can refine the condition, the more you can target specific systems.

System environment substitution

Each line in the system environment file defines a rule for substituting a different system environment in place of the default system environment and has the following syntax:

```
model::PCIid=TaskBootEnvironment::SubstituteBootEnvironment
```

where `model` is the model number of the computer (0 means the line applies to all models). `PCIid` is the manufacturer identification for the PCI adapter (0 means the line applies to all adapters). `TaskBootEnvironment` is the default system environment used by a task. `SubstituteBootEnvironment` is the system environment to use instead of the task default

The double colons (::) and equal (=) are required punctuation.

Any line that begins with a number sign (#) is a comment line, and all text following the # will be ignored for that line.

All blank lines will be ignored.

Each condition (that is, the left side of the =) must be unique. For the case where the condition is the same, but the boot environment is different, put the second set of changes on the same line, separate by a semicolon.

Examples

The following example lines substitute one system environment for another:

```
0::80861229=DOS70::DOS71J
```

In this example, any model computer that has the PCI card which is device number 80861229 will use the boot environment DOS71J instead of the task default boot environment of DOS70.

```
4696::0=DOS71S::DOS71J
```

In this example, all model 4696 computers will substitute the task default boot environment of DOS71S with DOS71J.

```
4696::80861129=DOS71S::DOS71J
```

In this example, all model 4696 computers having the PCI card 80861129 installed will substitute the task default boot environment of DOS71S with DOS71J.

```
8550::0=DOS7S::DOS71S;DOS7S1test::DOS71S2test
```

In this example, all model 8550 computers will substitute the default boot environment of DOS7S with DOS71S, and will substitute the default boot environment of DOS7S1test with DOS71S2test.

The following is an example of a system environment file:

```
############################################
##
##        The data lines begin here
##
############################################
```

```
8550::0=DOS7S::DOS71S;DOS7S1test::DOS71S2test
8560::78934900093498=DOS7Ss::DOS71S
#data extrapolated from real machine.1st for testing purpose only
4694::0=dos71c.dir::dos71s.dir
4800::0=dos71c.dir::dos71s.dir
6881::80862449101401CE=dos71s.dir::dos71x.dir
8660::0=dos71s.dir::dos71x.dir
```

Appendix C. RDM 4.11 data

RDM 4.11 data is stored in various places on the LAN or WAN. The RDM 4.11 data is used for most of its operations, storing information about tasks, systems, and schedules. While conceptually, this data could be considered to be a single entity, the actual implementation consists of two different kinds of data stores.

In implementation, it is mechanized as a traditional database for data that fits a row/column model, and a repository (part of the host file system) used for general file storage. Entries in the database are used for all searching and filtering operations, and in turn reference files in the repository when required.

Directory structure

RDM 4.11 files are stored in two places:

- \Program Files\IBM\Director - The RDM 4.11 executables and database.
- \Program Files\IBM\RDM - The RDM 4.11 repository and miscellaneous other files. This is the root directory for RDM 4.1. It is the only name you can configure (while installing RDM 4.1).

Repository

The entire Repository (either the Master Repository or any of the Distributed Repositories) exists as a single directory tree, beneath the RDM 4.11 root directory. This single directory is referred to as the Repository Root. The name of the Repository Root is saved locally for each Repository. All accesses to the Repository are done using D-Server API calls or through services exposed by the D-Server itself (for example, TFTP, MTFTP, or PXE).

Note: It is defined as being illegitimate for any RDM 4.11 code or code outside RDM to access the Repository (that is, the files under the Repository Root directory) directly. Accesses to the Repository from outside RDM 4.11 may cause unpredictable operation.

The RDM 4.1-provided accesses to Repository files always expect file names to be relative to the Repository Root. No RDM 4.1-supplied Repository-access code will allow access to any other areas of the D-Server file system, as doing so would be a potential security exposure.

Beneath the Repository Root are a number of standard directories for use by RDM 4.11, where each one might have directories underneath in turn, managed by various portions of RDM 4.11 code. Any file within the Repository might be replicated automatically (also known as “reactively”), depending on the D-Server Preferences set by the user. The general structure is outlined next.

- \bin - This directory contains RDM 4.11 server-side executable modules that are not installed in \Program Files\IBM\Director directories. RDM also installs a separate Java® Runtime Environment here, which is only used for the Remote D-Server.
- \local - This is the directory for files used to build things that go into the RDM 4.11 Master Repository.
- \local\env - This is the directory for creating RDM 4.11 system environments. It contains programs (such as, BPDISK.EXE and MKIMAGES.BAT) that are used to build the DOS images.

- \local\http - This directory is used internally by RDM 4.11 for D-Server-to-Master D-Server communication using HTTP protocol.
- \local\w32drivers - This is the directory for Windows 2000, Windows XP, and Windows Server 2003 device drivers. Under this directory is an identical structure to what will be copied to the system during a Windows Native Install task.
- \local\wnihives - This directory contains files to modify the hivesft files furnished by Microsoft.
- \log - This is the directory for various RDM log files.
- \repository - This is the directory for the RDM 4.11 Master Repository (on the Server) or for the repository (on a D-Server). This is the controlled access path for the MTFTP Service.
- \repository\environment - This is the directory for RDM 4.11 system (preboot) environments used to implement the many tasks comprising RDM 4.1. They are generally created during the installation of RDM 4.11 itself, though subsequent installation of Templates could also add environments. The user can create and add environments, too. Each DOS image is a single file that is created by the MKIMAGES.BAT file during RDM 4.11 install. Each Linux image is a single file.
- \repository\image - This is the directory for the RDM 4.11 images that are managed by the Task Image Management. Most are supplied by the user, and added to the Master Repository using the IM GUI. Files are described using meta-data stored in the RDM 4.11 database, and names are not intended to be user-significant. In general these files are large compressed collections of other files, and change very infrequently. It is also legitimate for an "image" to actually be a subdirectory, which might contain any number of other files or directories. Only the first level (that is, files and directories immediately beneath the Images directory) is controlled; directories below this first level are preserved and replicated, but their content is unknown to the RDM 4.11 infrastructure code.
- \repository\template - This is the directory for the RDM 4.11 templates.
- \repository\template\<n> - This is the directory for a specific RDM 4.11 template. The subdirectory name is a number. Within this directory, there is a subdirectory for each task created. RDM 4.11 does not expose a user mechanism for preemptively replicating these files. They are, in practice, always replicated reactively (that is, as needed by the system). There might be other directories or files here, as well, for tasks that require it; for example, the Windows Native Install task will contain its zipped driver file.
- \repository\template\<n>\<m> - This is the directory for a specific RDM 4.11 task. It contains all the files that the particular task needs. The subdirectory name is a number.
- \temp - This directory is used internally by the RDM 4.11 Scan task. Each system stores its SCAN.OUT file here, and the RDM 4.11 System Engine uses this file to create or update the system Platform Managed Object. It might also be used for other items, particularly those that transmit data back to the RDM Server (the Get Donor task, for instance).

Appendix D. Linux directories

The following table contains the Linux directories to avoid using as mount points:

Table 3. Linux directories

/	/bin	/boot
/boot/grub	/boot/lost+found	/dev
/dev/ataraid	/dev/cciss	/dev/compaq
/dev/cpu	/dev/cpu/0	/dev/cpu/1
/dev/cpu/10	/dev/cpu/11	/dev/cpu/12
/dev/cpu/13	/dev/cpu/14	/dev/cpu/15
/dev/cpu/2	/dev/cpu/3	/dev/cpu/4
/dev/cpu/5	/dev/cpu/6	/dev/cpu/7
/dev/cpu/8	/dev/cpu/9	/dev/dri
/dev/i2o	/dev/ida	/dev/inet
/dev/input	/dev/logicalco	/dev/logicalco/bci
/dev/logicalco/dci1300	/dev/pts	/dev/raw
/dev/rd	/dev/shm	/dev/usb
/dev/video	/etc	/etc/CORBA
/etc/CORBA/servers	/etc/X11	/etc/X11/applnk
/etc/X11/fs	/etc/X11/fvwm2	/etc/X11/lbxproxy
/etc/X11/proxymngr	/etc/X11/rstart	/etc/X11/serverconfig
/etc/X11/starthere	/etc/X11/sysconfig	/etc/X11/twm
/etc/X11/xdm	/etc/X11/xinit	/etc/X11/xserver
/etc/X11/xsm	/etc/aep	/etc/alchemist
/etc/alchemist/namespace	/etc/alchemist/switchboard	/etc/alternatives
/etc/atalk	/etc/atalk/nls	/etc/cipe
/etc/cipe/pk	/etc/cron.d	/etc/cron.daily
/etc/cron.hourly	/etc/cron.monthly	/etc/cron.weekly
/etc/cups	/etc/default	/etc/dhcpc
/etc/gconf	/etc/gconf/1	/etc/gconf/gconf.xml.defaults
/etc/gconf/gconf.xml.mandatory	/etc/gconf/schemas	/etc/gnome
/etc/gnome/fonts	/etc/gnome/panel-config	/etc/gtk
/etc/gtk-2.0	/etc/hotplug	/etc/hotplug/pci
/etc/hotplug/usb	/etc/httpd	/etc/httpd/conf
/etc/iproute2	/etc/isdn	/etc/joe
/etc/locale	/etc/locale/cs	/etc/locale/da
/etc/locale/de	/etc/locale/es	/etc/locale/eu_ES
/etc/locale/fi	/etc/locale/fr	/etc/locale/gl
/etc/locale/hu	/etc/locale/id	/etc/locale/is
/etc/locale/it	/etc/locale/ja	/etc/locale/ko
/etc/locale/nn	/etc/locale/no	/etc/locale/pl

Table 3. Linux directories (continued)

/etc/locale/pt	/etc/locale/pt_BR	/etc/locale/ro
/etc/locale/ru	/etc/locale/sk	/etc/locale/sl
/etc/locale/sr	/etc/locale/sv	/etc/locale/tr
/etc/locale/uk	/etc/locale/wa	/etc/locale/zh
/etc/locale/zh_CN.GB2312	/etc/locale/zh_TW	/etc/locale/zh_TW.Big5
/etc/log.d	/etc/log.d/conf	/etc/log.d/scripts
/etc/logrotate.d	/etc/mail	/etc/mail/spamassassin
/etc/makedev.d	/etc/mgetty+sendfax	/etc/midi
/etc/network	/etc/nmh	/etc/ntp
/etc/oaf	/etc/openldap	/etc/opt
/etc/pam.d	/etc/pango	/etc/ppp
/etc/ppp/peers	/etc/profile.d	/etc/rc.d
/etc/rc.d/init.d	/etc/rc.d/rc0.d	/etc/rc.d/rc1.d
/etc/rc.d/rc2.d	/etc/rc.d/rc3.d	/etc/rc.d/rc4.d
/etc/rc.d/rc5.d	/etc/rc.d/rc6.d	/etc/redhat-lsb
/etc/rpm	/etc/samba	/etc/security
/etc/security/console.apps	/etc/sgml	/etc/skel
/etc/smrsh	/etc/sound	/etc/sound/events
/etc/ssh	/etc/sysconfig	/etc/sysconfig/apm-scripts
/etc/sysconfig/console	/etc/sysconfig/network-scripts	/etc/sysconfig/networking
/etc/sysconfig/rhn	/etc/tripwire	/etc/ups
/etc/vfs	/etc/vfs/modules	/etc/w3m
/etc/xinetd.d	/etc/xml	/home
/initrd	/lib	/lib/i686
/lib/iptables	/lib/kbd	/lib/kbd/consolefonts
/lib/kbd/consoletrans	/lib/kbd/keymaps	/lib/kbd/unidata
/lib/kbd/videomodes	/lib/lsb	/lib/modules
/lib/modules/2.4.18-10	/lib/modules/2.4.18-3	/lib/modules/2.4.18-4
/lib/modules/2.4.18-5	/lib/security	/lib/security/pam_filter
/lost+found	/misc	/mnt
/mnt/floppy	/opt	/proc
/root	/root/dhcpc	/root/dhcpcd.rpmsave
/sbin	/tmp	/usr
/usr/X11R6	/usr/X11R6/bin	/usr/X11R6/include
/usr/X11R6/lib	/usr/X11R6/man	/usr/X11R6/share
/usr/bin	/usr/bin/X11	/usr/dict
/usr/doc	/usr/doc/enlightenment-0.16.5	/usr/doc/fnlib-0.5
/usr/etc	/usr/games	/usr/i386-glibc21-linux
/usr/i386-glibc21-linux/bin	/usr/i386-glibc21-linux/include	/usr/i386-glibc21-linux/lib
/usr/include	/usr/include/GL	/usr/include/arpa
/usr/include/asm	/usr/include/atk-1.0	/usr/include/bits

Table 3. Linux directories (continued)

/usr/include/freetype1	/usr/include/freetype2	/usr/include/g++-2
/usr/include/g++-3	/usr/include/gimp-print	/usr/include/glib-1.2
/usr/include/glib-2.0	/usr/include/gnu	/usr/include/gtk-1.2
/usr/include/gtk-2.0	/usr/include/gtkgl	/usr/include/linux
/usr/include/mysql	/usr/include/net	/usr/include/netash
/usr/include/netatalk	/usr/include/netax25	/usr/include/neteconet
/usr/include/netinet	/usr/include/netipx	/usr/include/netpacket
/usr/include/netrom	/usr/include/netrose	/usr/include/nfs
/usr/include/openssl	/usr/include/pango-1.0	/usr/include/pcap
/usr/include/protocols	/usr/include/pwdb	/usr/include/rpc
/usr/include/rpcsvc	/usr/include/scsi	/usr/include/sigc++
/usr/include/sp	/usr/include/sys	/usr/kerberos
/usr/kerberos/lib	/usr/kerberos/share	/usr/lib
/usr/lib/GConf	/usr/lib/Omni	/usr/lib/X11
/usr/lib/alchemist	/usr/lib/ao	/usr/lib/apache
/usr/lib/aspell	/usr/lib/autofs	/usr/lib/bash
/usr/lib/bcc	/usr/lib/bonobo	/usr/lib/cups
/usr/lib/dateconfig	/usr/lib/desktop-links	/usr/lib/exmh-2.4
/usr/lib/games	/usr/lib/gcc-lib	/usr/lib/gconv
/usr/lib/gdk-pixbuf	/usr/lib/gedit	/usr/lib/glib
/usr/lib/glib-2.0	/usr/lib/gnome-pilot	/usr/lib/gnupg
/usr/lib/gtk-2.0	/usr/lib/guppi	/usr/lib/ical
/usr/lib/isdn	/usr/lib/kde2-compat	/usr/lib/kde3
/usr/lib/libuser	/usr/lib/licq	/usr/lib/locale
/usr/lib/lsb	/usr/lib/mc	/usr/lib/mcop
/usr/lib/metamail	/usr/lib/mgetty+sendfax	/usr/lib/mozilla
/usr/lib/mysql	/usr/lib/netscape	/usr/lib/nmh
/usr/lib/pango	/usr/lib/perl5	/usr/lib/pgsql
/usr/lib/pilot-link	/usr/lib/pkgconfig	/usr/lib/pppd
/usr/lib/python1.5	/usr/lib/python2.2	/usr/lib/qt-2.3.1
/usr/lib/qt-3.0.3	/usr/lib/rar	/usr/lib/rpm
/usr/lib/rpmdb	/usr/lib/sasl	/usr/lib/sigc++
/usr/lib/tcl8.3	/usr/lib/tix8.2	/usr/lib/tk8.3
/usr/lib/vfs	/usr/lib/w3m	/usr/lib/x3270
/usr/lib/xawtv	/usr/lib/xemacs	/usr/lib/xemacs-21.4.6
/usr/lib/xmms	/usr/lib/yp	/usr/lib/zsh
/usr/libexec	/usr/ibexec/awk	/usr/libexec/emacs
/usr/libexec/filters	/usr/libexec/openssh	/usr/libexec/rep
/usr/libexec/sawfish	/usr/libexec/xtraceroute	/usr/local
/usr/local/bin	/usr/local/doc	/usr/local/etc
/usr/local/games	/usr/local/include	/usr/local/lib

Table 3. Linux directories (continued)

/usr/local/libexec	/usr/local/sbin	/usr/local/share
/usr/local/src	/usr/man	/usr/man/man1
/usr/sbin	/usr/share	/usr/share/VFlib
/usr/share/aclocal	/usr/share/aclocal-1.4	/usr/share/applets
/usr/share/application-registry	/usr/share/apps	/usr/share/aspell
/usr/share/aumix	/usr/share/authconfig	/usr/share/autoconf
/usr/share/automake	/usr/share/autostart	/usr/share/awk
/usr/share/bonobo	/usr/share/cdrdao	/usr/share/config
/usr/share/control-center	/usr/hare/cups	/usr/share/cvs
/usr/share/dateconfig	/usr/share/dict	/usr/share/doc
/usr/share/emacs	/usr/share/empty	/usr/share/enlightenment
/usr/share/epic	/usr/share/etable	/usr/share/fnlib_fonts
/usr/share/fonts	/usr/share/foomatic	/usr/share/gal
/usr/share/games	/usr/share/gedit	/usr/share/ghostscript
/usr/share/gimp-print	/usr/share/glib-2.0	/usr/share/gnome
/usr/share/gnome-about	/usr/share/gnome-pilot	/usr/share/gnome-print
/usr/share/gnome-terminal	/usr/share/gnome-upgrade	/usr/share/gnupg
/usr/share/groff	/usr/share/grub	/usr/share/gtk-2.0
/usr/share/gtk-doc	/usr/share/gtkhtml	/usr/share/guile
/usr/share/guppi	/usr/share/hwbrowser	/usr/share/hwdata
/usr/share/i18n	/usr/share/icons	/usr/share/idl
/usr/share/info	/usr/share/intltool	/usr/share/jed
/usr/share/kontrol-panel	/usr/share/ksconfig	/usr/share/libtool
/usr/share/licq	/usr/share/locale	/usr/share/magicdev
/usr/share/man	/usr/share/mime-info	/usr/share/mimelnk
/usr/share/misc	/usr/share/mpage	/usr/share/mysql
/usr/share/nmap	/usr/share/oaf	/usr/share/omf
/usr/share/openldap	/usr/share/pgsql	/usr/share/pixmaps
/usr/share/printconf	/usr/share/pspell	/usr/share/redhat-config-network
/usr/share/redhat-config-users	/usr/share/rep	/usr/share/rhn
/usr/share/samba	/usr/share/sawfish	/usr/share/screen
/usr/share/scrollkeeper	/usr/share/sendmail-cf	/usr/share/serviceconf
/usr/share/services	/usr/share/servicetypes	/usr/share/sgml
/usr/share/sndconfig	/usr/share/snmp	/usr/share/sounds
/usr/share/spamassassin	/usr/share/ssl	/usr/share/tabset
/usr/share/terminfo	/usr/share/themes	/usr/share/type-convert
/usr/share/umb-scheme	/usr/share/usermode	/usr/share/vim
/usr/share/vnc	/usr/share/w3m	/usr/share/xemacs-21.4.6
/usr/share/xmms	/usr/share/xtraceroute	/usr/share/zoneinfo
/usr/share/zsh	/usr/src	/usr/src/redhat
/usr/tmp	/var	/var/cache

Table 3. Linux directories (continued)

/var/cache/alchemist	/var/cache/foomatic	/var/cache/httpd
/var/cache/man	/var/db	/var/ftp
/var/ftp/bin	/var/ftp/etc	/var/ftp/lib
/var/ftp/pub	/var/jabberd	/var/jabberd/dialback
/var/jabberd/dnsrv	/var/jabberd/jabberd	/var/jabberd/jsm
/var/jabberd/pthsock	/var/jabberd/spool	/var/jabberd/xdb_file
/var/lib	/var/lib/alternatives	/var/lib/games
/var/lib/misc	/var/lib/mysql	/var/lib/nfs
/var/lib/pgsql	/var/lib/rpm	/var/lib/scrollkeeper
/var/lib/slocate	/var/lib/tripwire	/var/lib/ups
/var/lib/xdm	/var/lib/xkb	/var/local
/var/lock	/var/lock/subsys	/var/lock/xemacs
/var/log	/var/log/httpd	/var/log/vbox
/var/mail	/var/named	/var/nis
/var/opt	/var/preserve	/var/run
/var/run/console	/var/run/mysqld	/var/run/named
/var/run/netreport	/var/run/radvd	/var/spool
/var/spool/anacron	/var/spool/at	/var/spool/cron
/var/spool/fax	/var/spool/lpd	/var/spool/mail
/var/spool/mqueue	/var/spool/rwho	/var/spool/up2date
/var/spool/vbox	/var/spool/voice	/var/tmp
/var/www	/var/www/cgi-bin	/var/www/html
/var/www/icons	/var/www/nut-cgi-bin	/var/yp
/var/yp/binding	/var/yp/masters	/var/yp/yp

Appendix E. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM® products, you will find a wide variety of sources available from IBM to assist you. This appendix contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your xSeries or IntelliStation® system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system is turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system.
- Go to the IBM Support Web site at http://www.ibm.com/pc/support/ to check for technical information, hints, tips, and new device drivers.
- Use an IBM discussion forum on the IBM Web site to ask questions.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the publications that are provided with your system and software. The information that comes with your system also describes the diagnostic tests that you can perform. Most xSeries and IntelliStation systems, operating systems, and programs come with information that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the information for the operating system or program.

Using the documentation

Information about your IBM xSeries or IntelliStation system and preinstalled software, if any, is available in the documentation that comes with your system. That documentation includes printed books, online books, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/pc/support/ and follow the instructions. Also, you can order publications through the IBM Publications Ordering System at http://www.elink.ibmlink.ibm.com/public/applications/publications/cgibin/pbi.cgi.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM xSeries and IntelliStation products, services, and support. The address for IBM xSeries information is http://www.ibm.com/eserver/xseries/. The address for IBM IntelliStation information is http://www.ibm.com/pc/intellistation/.

You can find service information for your IBM products, including supported options, at http://www.ibm.com/pc/support/.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with xSeries servers, IntelliStation workstations, and appliances. For information about which products are supported by Support Line in your country or region, go to http://www.ibm.com/services/sl/products/.

For more information about Support Line and other IBM services, go to http://www.ibm.com/services/, or go to http://www.ibm.com/planetwide/ for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

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