Updating Diagnostics Firmware with RDM 4.30

A White Paper

May 11, 2006

Note:

Before using this information and the product it supports, read the general information in "Notices," on page 26.

Contents

1 Preface

This White Paper explains how to use IBM® Remote Deployment Manager (RDM) 4.20 (or a later RDM version) to update Diagnostics firmware.

There are other ways to flash Diagnostics firmware (e.g., with the BIOS and Diagnostics firmware diskettes, with the UpdateXpress CD, etc.). But using RDM to do this from a remote console on many systems concurrently, without having to visit the systems, is a powerful and easy way to accomplish this task.

You can use this White Paper to learn how to do the following:

- Updating Diagnostics firmware on systems that use the FLASH2.EXE program to update their BIOS and Diagnostics firmware.

- Updating Diagnostics firmware on systems that use some other program (i.e., not FLASH2.EXE) to update their BIOS and Diagnostics firmware.

In addition, this White Paper will help you learn some of the typical techniques that you can use to extend and customize RDM:

- Modifying RDM *System Firmware Flash* tasks.

- Creating RDM *Custom* tasks.

- Creating RDM custom images and using them in an RDM task.

- Using the RDM Command List Wizard to add an image to an RDM task.

- Use RDAGENT.EXE to display messages in the task log.

The tasks described in this paper accomplish their desired functions in a variety of ways. There are alternate techniques available for doing all of these functions. The intent is to illustrate various methods, as well as to describe a way to implement these particular functions.

This document contains embedded files. Just right click on the paperclip icon in order to extract the embedded files.

One good use of the custom task described below is in an end-to-end deployment procedure (i.e., an RDM Script task that does all steps in deploying a system). For example, such a Script task might contain the following subtasks:

1. Customized System Firmware Flash task – updates System BIOS, Diagnostics, and Integrated System Management Processor firmware.

2. Custom task to update the firmware and BIOS on a ServeRAID adapter (i.e., the task described below).

3. Custom task to update disk-drive firmware.

4. Custom task to update Diagnostics.

5. Custom task to update network adapter firmware.

6. RAID Custom Configuration task.

7. Task to deploy the operating system and applications – one of these:

   - Windows Native Install task.

   - Windows Clone Install task.

   - Linux Native Install task.

8. Power Restore task.

9. CMOS Update task – modifies the CMOS/BIOS settings.

1.1 Who should read this White Paper

This White Paper is intended to help skilled RDM administrators to create deployment procedures and to understand the concepts involved. To effectively use this White Paper, you should already have an extensive knowledge of your Network environment, your RDM environment, and DOS batch files.

1.2 Further reference

In addition to this paper, there are various other sources of information that you can consult for RDM and for RDM Custom tasks.

1.2.1 Guides

The following product documentation is available for RDM:

- *Remote Deployment Manager 4.30 User's Reference* – The main reference manual for RDM

- *Remote Deployment Manager 4.30 Installation and Configuration Guide* – Describes the complete installation process of RDM

- *Remote Deployment Manager 4.30 Compatibility Guide* – Lists RDM-supported hardware and software

Check the IBM Web site at http://www-307.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-50575 to get the current versions of the above documents.

1.2.2 White papers

The various RDM white papers are available on the IBM Web site at http://www-307.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-53487.

1.2.3 Online help

In general, most RDM windows have online help available (except for some message windows or other windows where no help is applicable), either using a **Help** menu or a **Help** button.

1.2.4 Links

The following links are available for further information:

- Support is available for supported systems (IBM and non-IBM) through e-mail or fee-based telephone support. Telephone support is not available in all countries. For more information about the fee-based telephone support, go to http://www.ibm.com/support or http://service.software.ibm.com/supportline.html. For more information about e-mail support, refer to the RDM home page.

Important: Before using RDM 4.30, check the compatibility test results and browse the rest of the RDM Web site for additional information and tips concerning the installation and use of RDM.

1.3 Change history

- May 11, 2006 – Updated for RDM 4.30.

1.4 Embedded files

For your convenience, we have included the files referenced in this document in an embedded file.

1. Extract the attached self-extracting ZIP file, *DiagnosticsFiles.EXE*, by right clicking on the paperclip icon and saving the file to disk.

   Note: You may need Adobe Acrobat Reader 6.0.1 or later to be able to extract the file. If you are using Adobe Acrobat Reader 7.0 or later, you may need to modify your Windows Registry to be able to extract the file. See http://www.adobe.com/support/techdocs/328671.html and http://www.adobe.com/support/techdocs/328671.html for configuration instructions.

2. Run *DiagnosticsFiles.EXE*.

3. Change the target folder name appropriately (e.g., to C:\), and then click the *Unzip* button.
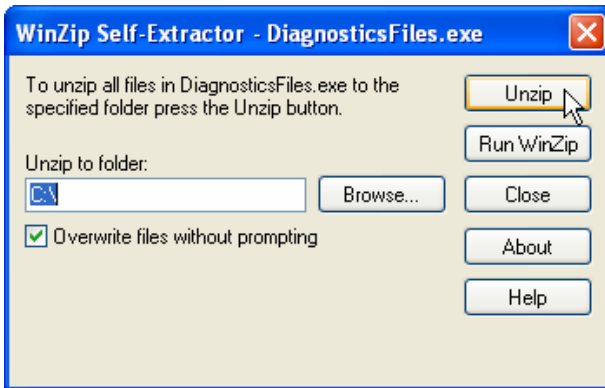
4. Click the *OK* button when the unzip is complete.
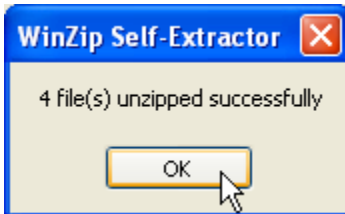
5. Click the *Close* button to exit WinZip.
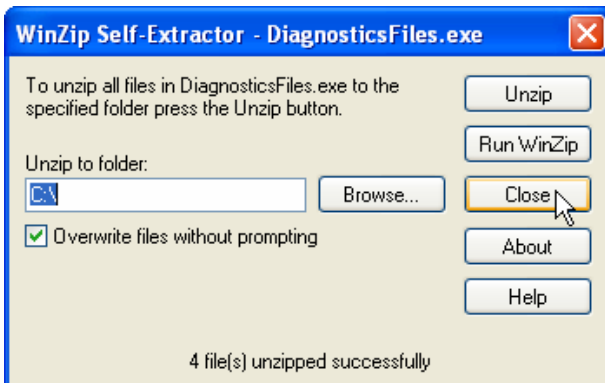
6. Then you can find the files in the C:\DiagnosticsFiles directory:

C:\DiagnosticsFiles\8839\CommandList

C:\DiagnosticsFiles\8839\DIAGFW.BAT

C:\DiagnosticsFiles\FLASH2\CommandList

C:\DiagnosticsFiles\FLASH2\LCREFLSH.BAT

Use the files in C:\DiagnosticsFiles\FLASH2 in chapter 2 below and the files in C:\DiagnosticsFiles\8839 in chapter 3 below.

2 Procedure for updating BIOS and Diagnostics

On some systems, the BIOS and Diagnostics firmware are updated with the same program (e.g., FLASH2.EXE). It is possible to create a custom task to update Diagnostics firmware (see section 3 below). However, it might be easier just to add the Diagnostics update to the same task that does the BIOS update (i.e., a System Firmware Flash task).

Like most RDM tasks, this customized System Firmware Flash task contains the following:

- o   A CommandList file containing the commands that the task executes.
- o   Executable programs and batch files that the task executes.
- o   Parameters (read-only) that can personalize each system.
- o   RDM System Environments (usually IBM DOS 7.1) that boot via the network.
- o   An RDM image that is input data for the task.

The steps shown below describe how to create or modify these task parts.

2.1 Acquire Diagnostics and BIOS firmware files

RDM uses diskettes as the source for its BIOS images. This procedure also uses diskettes as the source for its Diagnostics image.

1.   Download the appropriate files (for your particular target system machine type) from the IBM web site.

2.   Use those files to create the Diagnostics and BIOS diskettes. There will be 1 or 2 diskettes for Diagnostics firmware and 1 or 2 diskettes for BIOS firmware (depending on the system model).

2.2 Create a System Firmware Flash image of the BIOS

3.   Use RDM's *Image Management* window in the normal way to create the BIOS image from the BIOS diskettes. It will also be prudent to describe the image, in detail, for future reference:

- •   Make the image name reflect that it will contain both BIOS and Diagnostics firmware (e.g., *8832 HS20 BIOS 1.04 and Diagnostics 1.02*).

- •   You should also add an optional image description.

2.3 Add Diagnostics and batch files to the BIOS image

You will add the Diagnostics firmware and a new batch file that does the flash to the BIOS image. When RDM flashes BIOS, it finds the program that does the flash by the following logic (pseudo code):

If LCREFLSH.BAT exists, then

      Run LCREFLSH.BAT to flash the BIOS

Else if FLASH2.EXE exists, then

      Run FLASH2.EXE to flash the BIOS

Else

> Fail the task with a message indicating that RDM found no flash program

> Endif

This task capitalizes on that logic and uses an LCREFLSH.BAT file to do the flash of both BIOS and Diagnostics firmware.

4. If you created the BIOS image with RDM 4.11 or RDM 4.1, rename the BIOS image file by adding an extension of ZIP (e.g., 1728374697.ZIP). If you created the BIOS image with RDM 4.20, its file will already contain the ZIP extension, so do not change the file name.

5. Using any program that can modify ZIP files (e.g., WINZIP.EXE), add the 2 large files (the actual file names depend on the machine type of the target system) from the Diagnostics diskettes to the ZIP file. Make sure that you do not save path information when you add the files to the ZIP file.

6. If the BIOS image uses FLASH2.EXE, you should create an LCREFLSH.BAT file containing the following statements and add it to the ZIP file. You can extract a copy of this file from the embedded file in section 1.4 above.

```
REM **********************************************************************
REM * Remote Deployment Manager
REM * (C) Copyright IBM Corp. 2004 All rights reserved.
REM **********************************************************************
REM * User-generated file that causes the RDM System Firmware Flash task
REM * to update both Diagnostics and BIOS firmware using FLASH2.EXE.
REM **********************************************************************

RDAGENT /L "Flashing DIAGNOSTICS firmware."
FLASH2.EXE /u /d
IF ERRORLEVEL 1 GOTO DIAGERR

RDAGENT /L "Flashing BIOS firmware."
FLASH2 /U
IF ERRORLEVEL 1 GOTO BIOSERR

GOTO END

REM Error handling for DIAGNOSTICS flash
:DIAGERR
SET RDRASLEVEL=1
SET RDSTATUS="RDDIAG901E - DIAGNOSTICS firmware update failed - see %BOOTMAC%.SFF.DIAGFW.LOG
        file in RDM temp directory"
ECHO RDBIOS901E - DIAGNOSTICS firmware update failed. >> DIAG.LOG
MTFTP PUT %SERVER_IP% DIAG.LOG %BOOTMAC%.SFF.DIAGFW.LOG
GOTO SETERR

REM Error handling for BIOS flash
:BIOSERR
SET RDRASLEVEL=1
SET RDSTATUS="RDBIOS902E - BIOS firmware update failed - see %BOOTMAC%.SFF.BIOSFW.LOG file in
        RDM temp directory"
ECHO RDBIOS902E - BIOS firmware update failed. >> BIOS.LOG
MTFTP PUT %SERVER_IP% BIOS.LOG %BOOTMAC%.SFF.BIOSFW.LOG
GOTO SETERR

REM The invalid-syntax MTFTP > NUL statement causes a nonzero
REM ERRORLEVEL (needed because BFLSH.BAT needs it) in case of
REM failure:
:SETERR
MTFTP > NUL

:END
```

7. Close the ZIP program.

2.4 Create a new System Firmware Flash task

This step is optional, but highly recommended.

8. Create a new System Firmware Flash task in the normal way. It will also be prudent to describe the task, in detail, for future reference:

  - Make the task name reflect that it will contain both BIOS and Diagnostics firmware (e.g., *8832 HS20 BIOS 1.04 and Diagnostics 1.02*).

  - You should also add an optional task description.

9. Select the image that you modified in section 2.3.

10. Save the new task by selecting the **OK** button.

2.5 Test the BIOS/Diagnostics image

11. Run a System Firmware Flash task, such as the task you created in section 2.4 or the built-in *Deploy latest system firmware task*, to validate that the BIOS and Diagnostics updates work.

12. Immediately after the **Starting PC DOS...** message appears on the target system's monitor, press the F8 key. This allows you to step through all of the batch files, statement-by-statement.

13. Press the "y" key to execute each statement, in-turn. Observe each statement, and watch for any errors that may occur.

   Note: If an error occurs, debug it, fix it as appropriate (usually in one of the files you created or modified above), and then rerun the test.

   To rerun a failed test, you may need to do the following:

   a. Power off the target system with the power switch.

   b. Right-click on the target system in the middle pane.

   c. Click the **Remote Deployment Manager** and the **Cancel Tasks** menu items.

   d. Go back to step 11 above.

3 Procedure for updating Diagnostics only

The Custom task template is a general-purpose template that you use to create your own processes to run on a target system. This example contains 4 of the 5 basic parts of an RDM task:

- o   A CommandList file containing the commands that the task executes.
- o   Executable programs and batch files that the task executes.
- o   RDM System Environments (usually IBM DOS 7.1) that boot via the network.
- o   An RDM image that is input data for the task.

Note that this example does not have the following:

- o   Parameters that can personalize each system.

This example creates a Custom flash task for updating Diagnostics firmware on model 8839 BladeCenter HS20 blades. The task will deploy a specific firmware level on a target system of a specific machine type. You must create a Custom task like this one for each firmware level and machine type.

## 3.1 Acquire Diagnostics firmware files

This procedure also uses diskettes as the source for its Diagnostics image.

1.   Download the appropriate files from the IBM web site, and create the 1 or 2 Diagnostics diskettes.

3.2 Create a Custom image of the Diagnostics firmware

Use RDM's *Image Management* function to create the custom image. This stores the firmware in the RDM master repository and adds metadata about the image into the RDM database.

2.   In the IBM Director console, click the **Tasks…Remote Deployment Manager…Image Management…Create and Modify Images** menus to open the *Image Management* window.
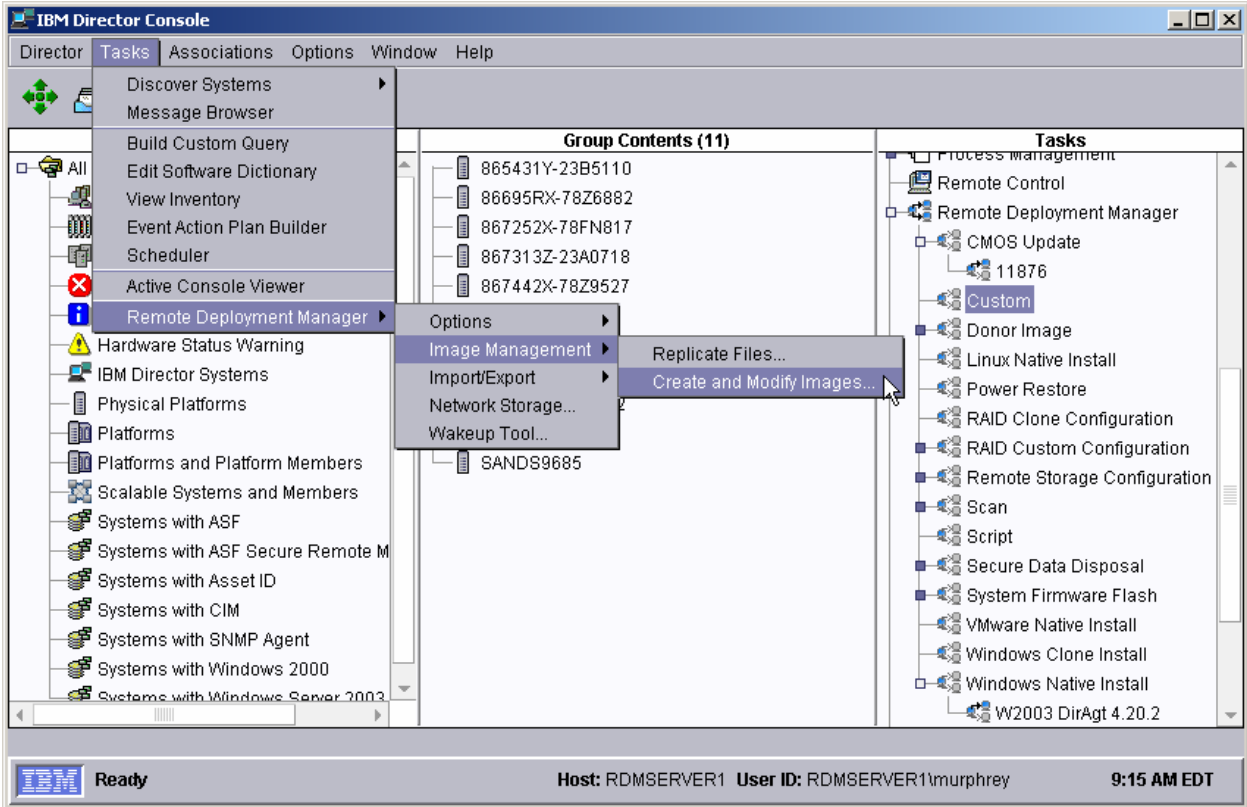
3. Click the **Create…** button to open the *Create Image* window.
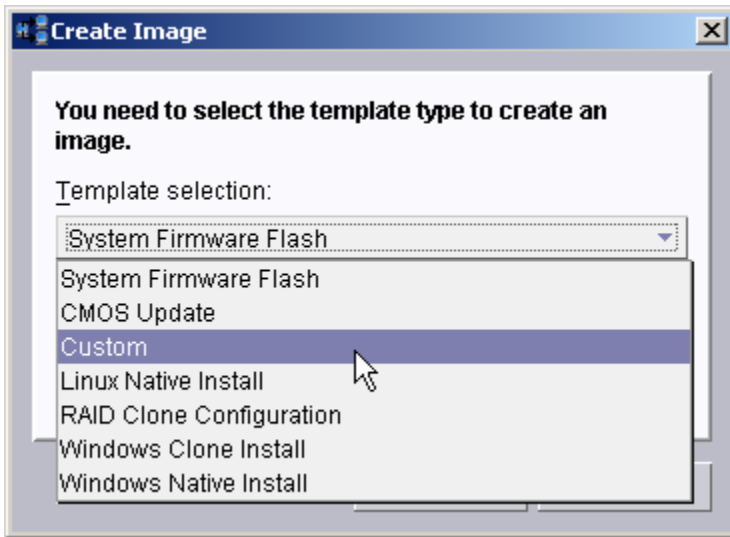
4. From the drop-down list, select **Custom**; then select the **OK** button to open the *Create Custom Image* window. There are 2 pages:

   - **General**: Contains basic information about the image.

   - **Setup**: Contains the definition of the input data that you use to create the image file and the configuration of the output image.

5. On the General page, enter a name for the image and (optionally) a description.
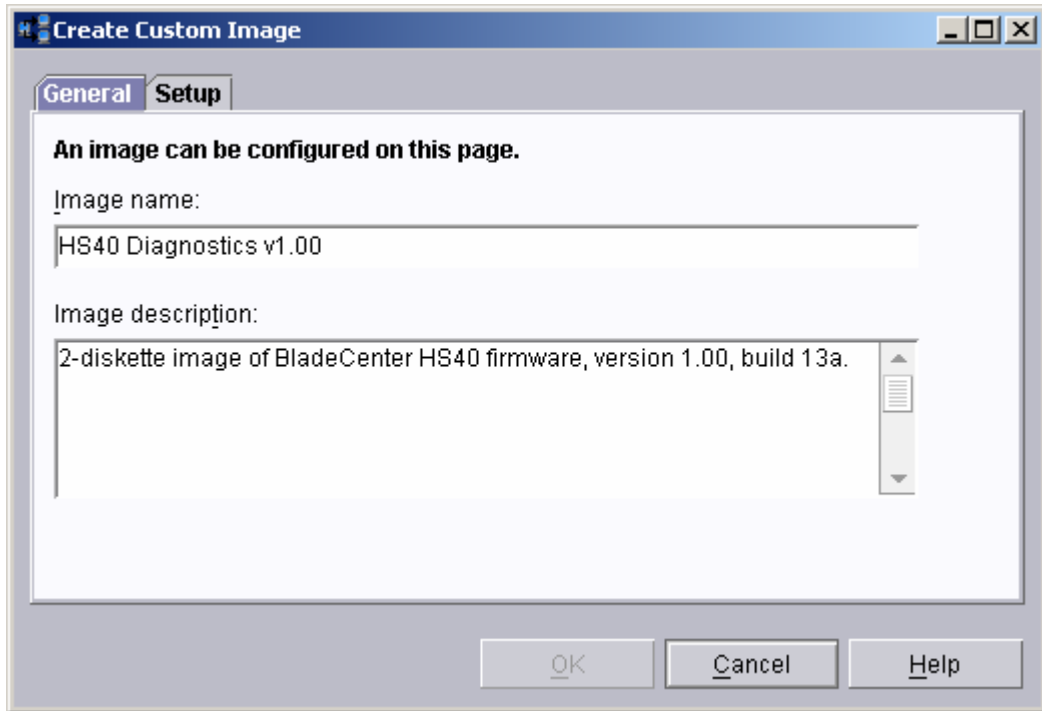
6. On the Setup page, in the *Input* area, select **Multi-volume, removable media**. In the *Output* area, select the **File** radio button.
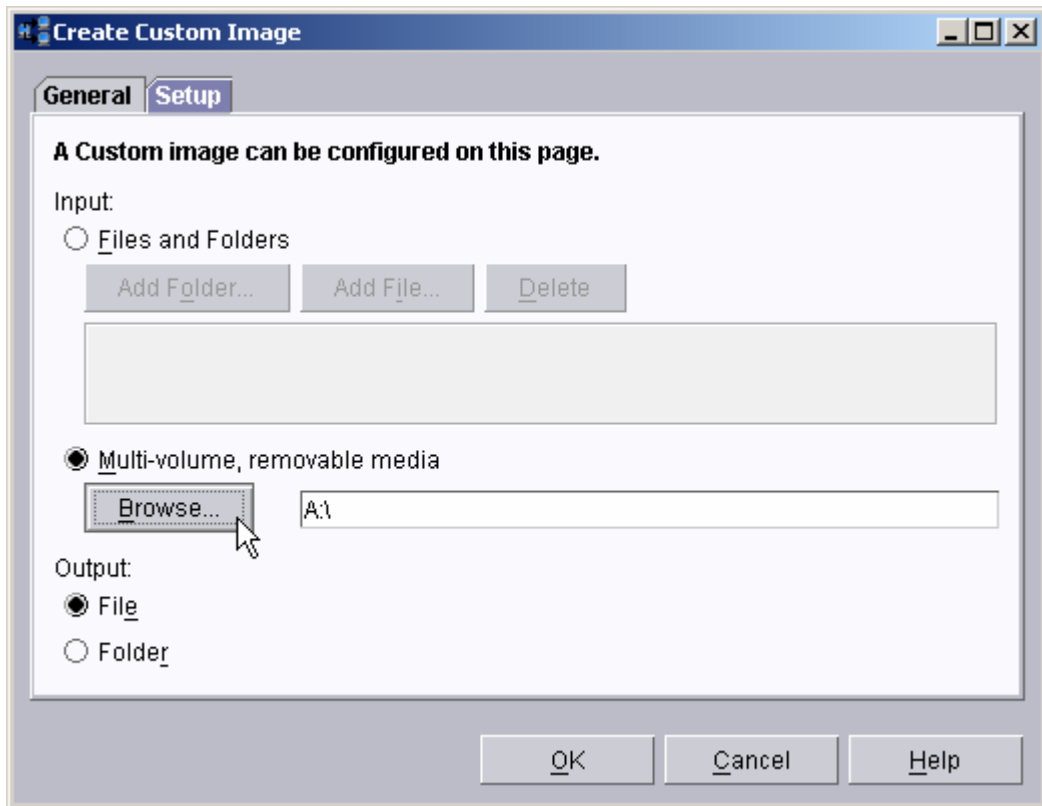
7. Select the **Browse** button, navigate to A:\, and select the **OK** button.
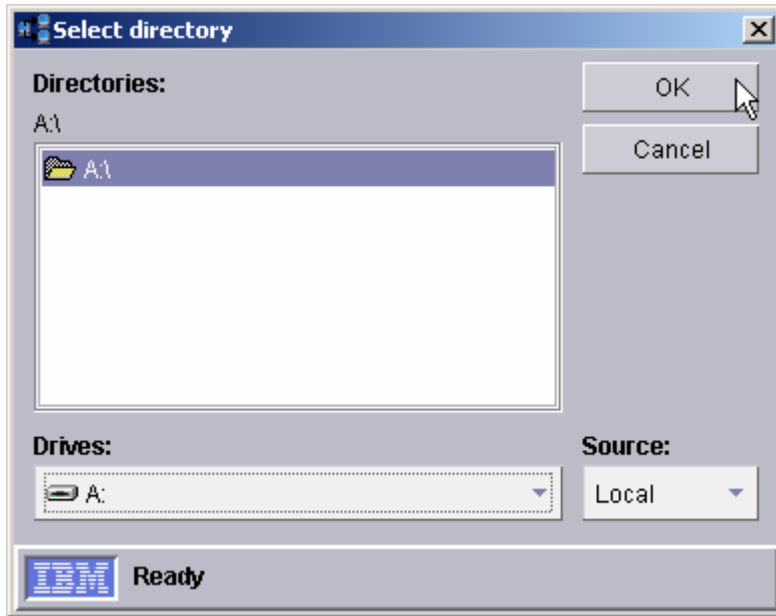
8. Put diskette 1 in your A: drive.

9. Click the **OK** button on the *Create Custom Image* window to copy files from the first diskette. You will see a progress-indicator window, followed by a message window.
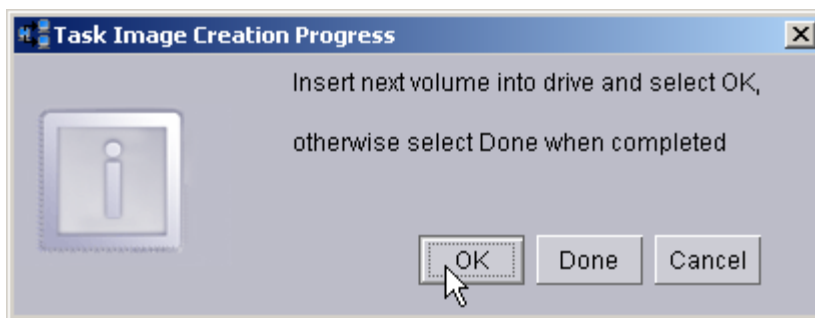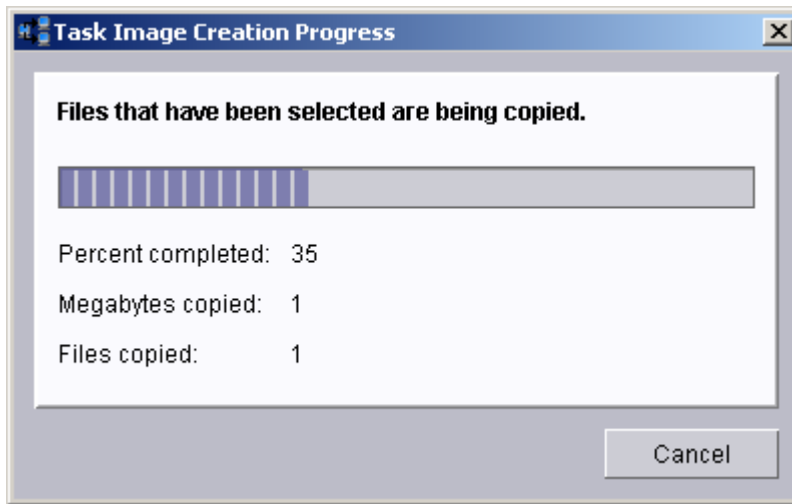
10. Put diskette 2 in your A: drive, and select the **OK** button on the message window. This will copy files from the second diskette. You will again see the progress-indicator window, followed by the message window.

11. Click the **Done** button. You will see an *Image Creation Messages* window describing duplicate files. These are not errors, so click the OK button.

The new custom image will appear in the *Image Management* window.
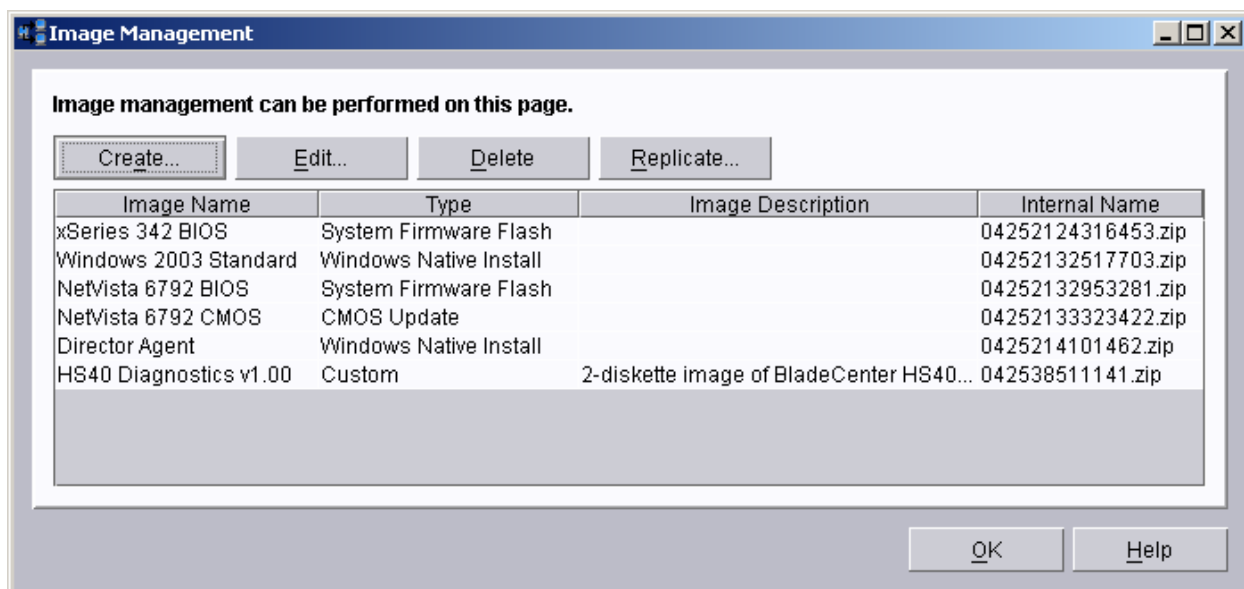
3.3 Create a batch file that will do the flash update

It is common to incorporate some of the task logic in a batch file that the task's command list will call. This facilitates error handling, so that you can make the task fail whenever some part of its logic fails.
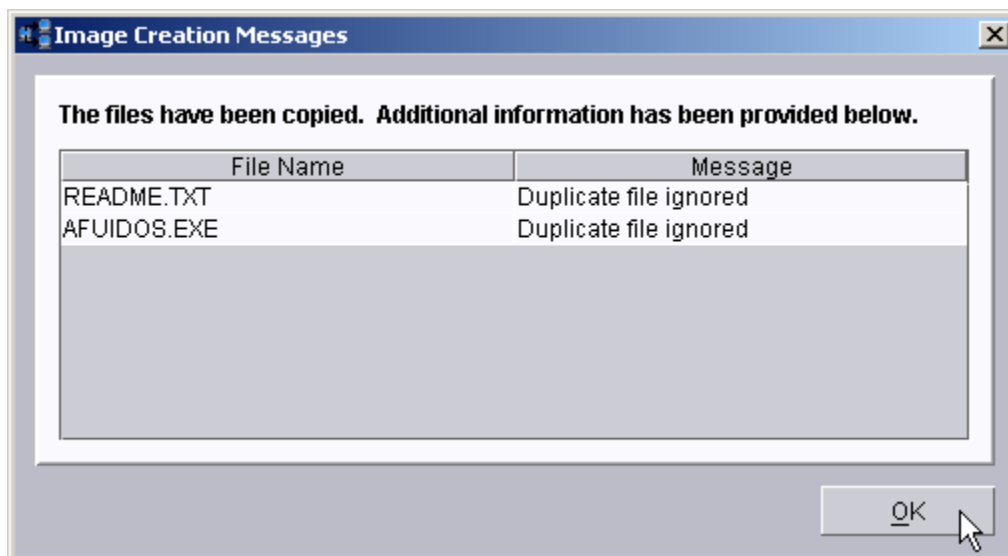
12. Using your favorite editor (e.g., Notepad), create a file named C:\DIAGFW.BAT that contains the following statements. You can extract a copy of this file from the embedded file in section 1.4 above.

```
ECHO Entering DIAGFW.BAT
SET RDSTATUS=RDMDFW000I
SET RDRASLEVEL=0

RDAGENT /L "Merging firmware files."
```

```
IF NOT EXIST $SBYDIAG.001 GOTO IMGERR
IF NOT EXIST $SBYDIAG.002 GOTO IMGERR
COPY /b $SBYDIAG.001+$SBYDIAG.002 $SBYDIAG
IF NOT EXIST $SBYDIAG GOTO IMGERR
RDAGENT /L "Flashing diagnostics firmware with AFUIDOS.EXE program."
AFUIDOS /D:$SBYDIAG
IF ERRORLEVEL 1 GOTO FLSHERR
GOTO END

:FLSHERR
SET RDRASLEVEL=1
SET RDSTATUS=RDMDFW001E Bad return code from AFUIDOS.EXE flashing diagnostics.

:IMGERR
SET RDRASLEVEL=1
SET RDSTATUS=RDMDFW002E Missing input file $SBYDIAG.001, $SBYDIAG.001, or $SBYDIAG.

:END
ECHO Exiting DIAGFW.BAT
RDAGENT /L "Exiting DIAGFW.BAT"
```

Notice that AFUIDOS is the program that updates the Diagnostics firmware. It is contained in the image that you created in section 3.2 above. This sample batch file is for the BladeCenter HS40 model 8839 blade computer. If you are creating a custom task to flash diagnostics of a different machine type, you will have to adjust C:\DIAGFW.BAT accordingly.

Also notice the error handling in this batch file. At the beginning of the file, it initializes 2 of RDM's reserved environment variables to values that indicate "success". If AFUIDOS fails *and if it sets a non-zero ERRORLEVEL*, the SET statements after label FLSHERR change the environment variables' values to indicate "failure". In particular, because the 10th character in RDSTATUS is "E", the RDM task that uses this batch file will fail and display that error message in its task execution history.

3.4 Create the Custom task that will deploy the firmware

Because RDM does not have any built-in logic to flash Diagnostics firmware, this procedure uses a Custom task.

13. Expand **Remote Deployment Manger** in the *Tasks* pane of the IBM Director console, and right-click **Custom**. The menu is displayed.
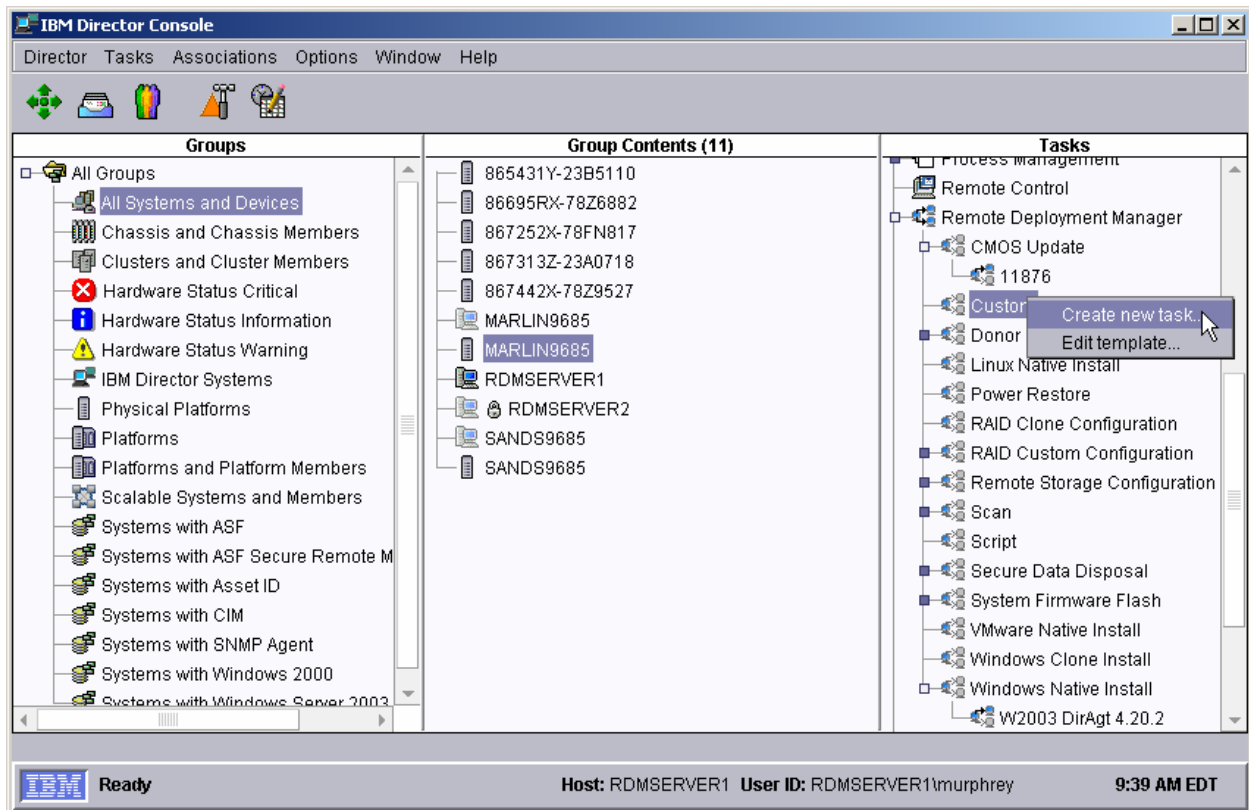
14. Click **Create new task…** on the menu to access the property pages. There are two pages:

- **General**: Contains basic information about the task.
- **Advanced**: Contains the command list, user parameters, and task folder name for the task.
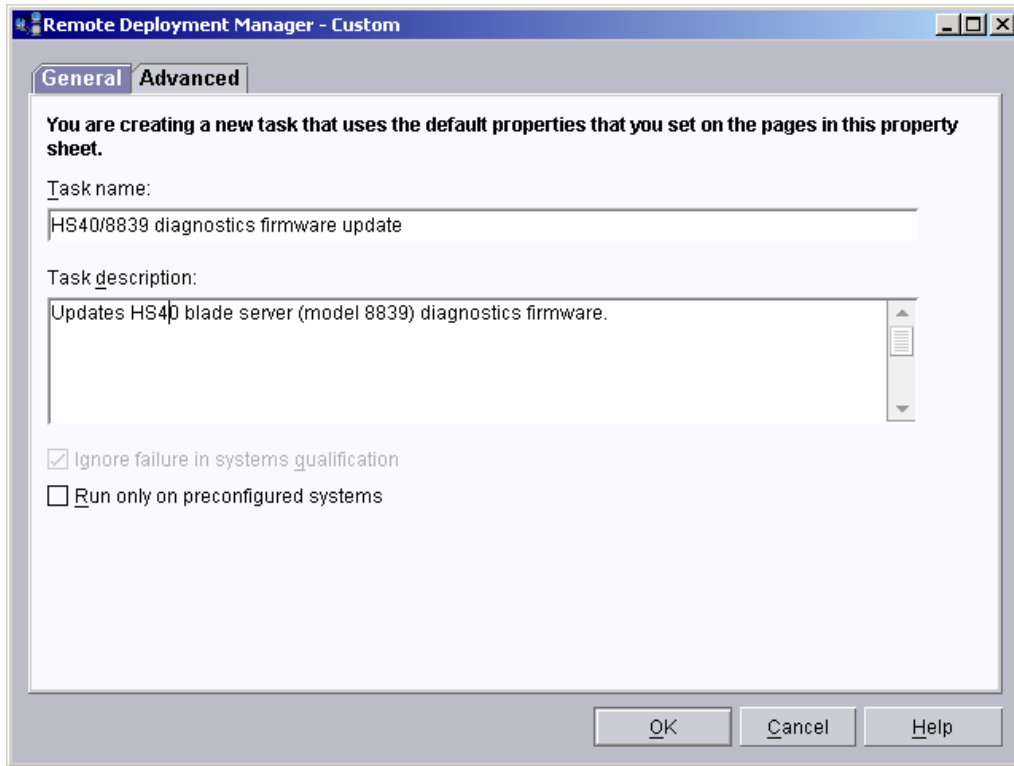
15. Enter the task information on the General page (e.g., name the task *HS40/8839 diagnostics firmware update*, and enter an optional description of the task).

16. Click the **Advanced** tab, and modify the command list this way. You can extract a copy of this file from the embedded file in section 1.4 above.:

```
; ****************************************************************
; * Remote Deployment Manager
; * (C) Copyright IBM Corp. 2004 All rights reserved.
; ****************************************************************
; * User-generated command list for the Custom task that can flash
; * Diagnostics, reboot, and run Scan.  Target system is a HS40
; * model 8839 blade.
; ****************************************************************
BOOTTYPE !LOADDOS /ENVIRONMENT/DOS71F
WAKE
!!SETENV
!%%RAMDSK%%

!mtftp get %%SERVER_IP%% TEMPLATE\%%TASKTEMPLATEID%%\%%TASKTOID%%\DIAGFW.BAT DIAGFW.BAT
!DIAGFW.BAT
BOOTTYPE !LOADDOS /ENVIRONMENT/DOS71X
!!REBOOT
!!SETENV
!scan.bat /n
HandleScanOutput
UpdateAssetID
!!SHUTDOWN

END
```

Note: The command list is a list of RDM and DOS commands that are the Custom task logic. Refer to Appendix A, "Command list commands", in the *Remote Deployment Manager 4.30 User's Reference* for information on commands and syntax within a command list.
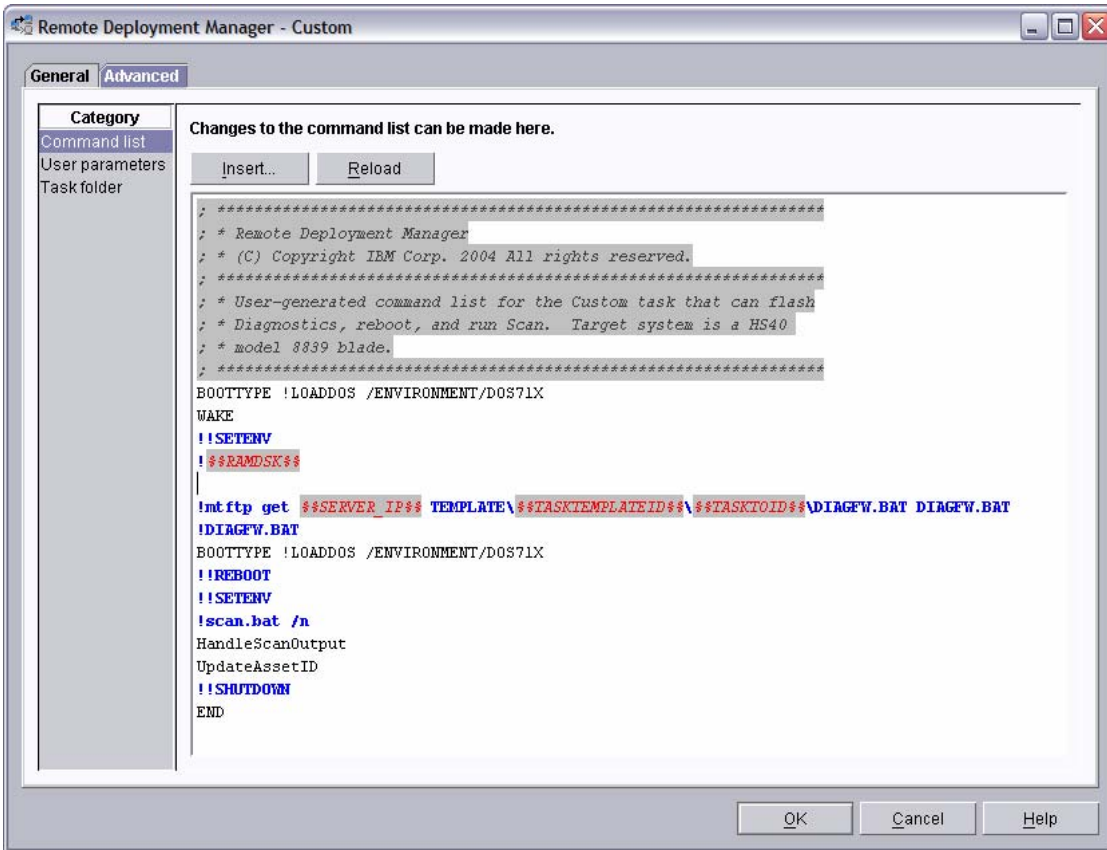
17. Place the cursor on the blank line (see the picture, above), and select the **Insert** button. The *Command List Editor Wizard* window appears.
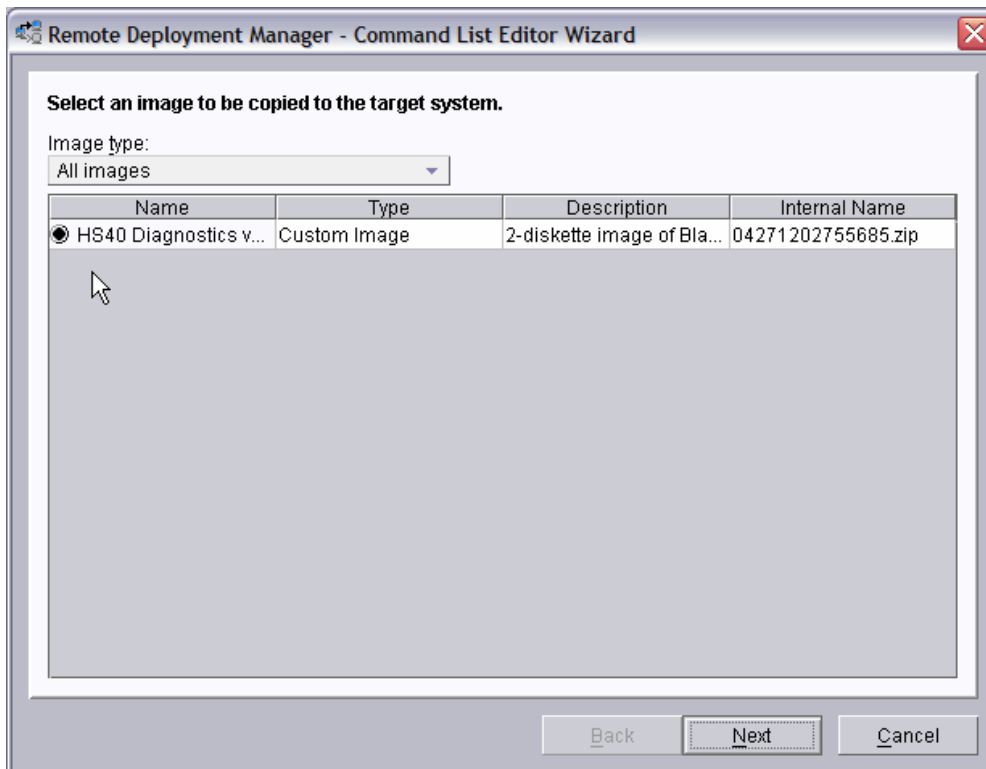
18. Select the custom image that you created in step 3.2 above, and then select the **Next** button.

19. Enter the appropriate data to generate the correct commands to download and unzip the custom image you created in section 3.2 above:

   o   Select DOS as the target operating system.

   o   Leave the transfer mode as Unicast.

   o   Add an optional comment, if you like.

   o   Enter the path and name that you want the image file to have on the target system.

   o   Select the check box to generate an unzip command, and enter the path for the unzipped files.

20. Select the *Finish* button to add the generated commands to the command list.

```
Remote Deployment Manager - Custom

General  Advanced

Category                Changes to the command list can be made here.
Command list
User parameters          Insert...        Reload
Task folder
                         ; *****************************************************************
                         ; * Remote Deployment Manager
                         ; * (C) Copyright IBM Corp. 2004 All rights reserved.
                         ; *****************************************************************
                         ; * User-generated command list for the Custom task that can flash
                         ; * Diagnostics, reboot, and run Scan.  Target system is a HS40
                         ; * model 8839 blade.
                         ; *****************************************************************
                         BOOTTYPE !LOADDOS /ENVIRONMENT/DOS71X
                         WAKE
                         !!SETENV
                         !$$RAMDSK$$
                         ;Include Diagnostics firmware image
                         !mtftp get $$SERVER_IP$$ image\04271202755685.zip $$RAMDSK$$\DIAG.ZIP
                         !unzip -o $$RAMDSK$$\DIAG.ZIP -d $$RAMDSK$$
                         !del -f $$RAMDSK$$\DIAG.ZIP
                         !mtftp get $$SERVER_IP$$ TEMPLATE\$$TASKTEMPLATEID$$\$$TASKTOID$$\DIAGFW.BAT DIAGFW.BAT
                         !DIAGFW.BAT
                         BOOTTYPE !LOADDOS /ENVIRONMENT/DOS71X
                         !!REBOOT
                         !!SETENV
                         !scan.bat /n
                         HandleScanOutput
                         UpdateAssetID
                         !!SHUTDOWN
                         END

                                                    OK       Cancel       Help
```

21. Click the **OK** button to create the task.

3.5 Copy files into the task folder

When creating a custom task (or modifying any task), you must choose where to store the files that the task will use. In this case, we choose the task folder, because the batch file is specific to this task. A side benefit of doing this is that the file will never be deleted or changed by a future RDM update.

22. Edit the task you just created.

23. Select the **Advanced** tab.

24. Select the **Task folder** category. Make a note of the task folder name: C:\Program Files\IBM\RDM\repository\template\3\546

25. Copy the file that you created in section 3.3 above into the task folder:

    COPY C:\DIAGFW.BAT C:\Progra~1\IBM\RDM\repository\template\3\546

3.6 Test the new custom task

26. Power on a model 8839 BladeCenter server in a way that forces a network boot. RDM will run its Scan task on the system and power it off. The system will appear in the middle pane of a Director console.

    Note: Skip this step if you have previously discovered the system and run an RDM Scan task on the system.
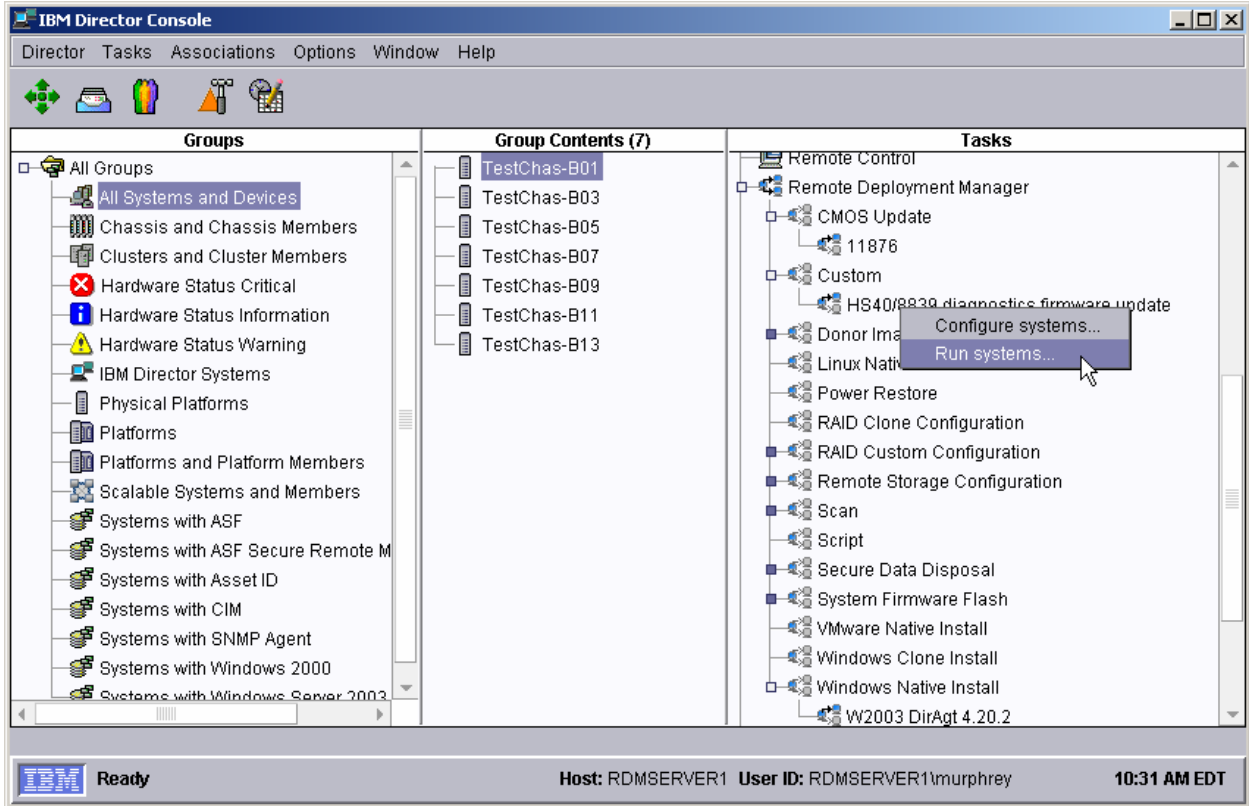
27. Drag the entry for that system and drop it on the new *8839 BIOS/Diagnostics firmware update* task in the right pane. The menu appears. Click **Run systems …** in the menu. A message window appears.

    Note: You could, instead, drag the task and drop it on the system – the Director/RDM drag/drop operation works the same way in either direction.
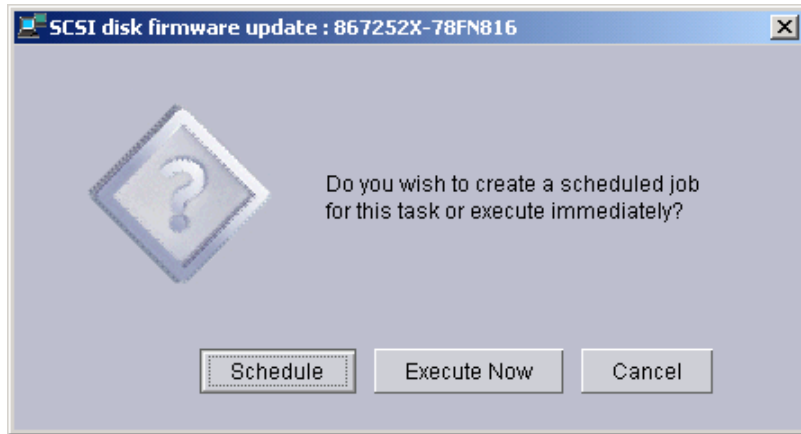
28. Click the **Execute now** button. The target system will wake up (i.e., automatically power itself on) and do a network boot.

29. Immediately after the **Starting PC DOS…** message appears on the system's monitor, press the F8 key. This allows you to step through all of the batch files and the CommandList file statement-by-statement.

30. Press the "y" key to execute each statement in-turn. Observe each statement, and watch for any errors that may occur.

    Note: If an error occurs, debug it, fix it as appropriate (usually in one of the files you created or modified above), and then rerun the test.

    To rerun the test, you will usually need to do the following:

    e.   Power off the server with the power switch.

    f.   Right-click on the server in the middle pane.

    g.   Click the **Remote Deployment Manager** and the **Cancel Tasks** menu items.

    h.   Go back to step 27 above.
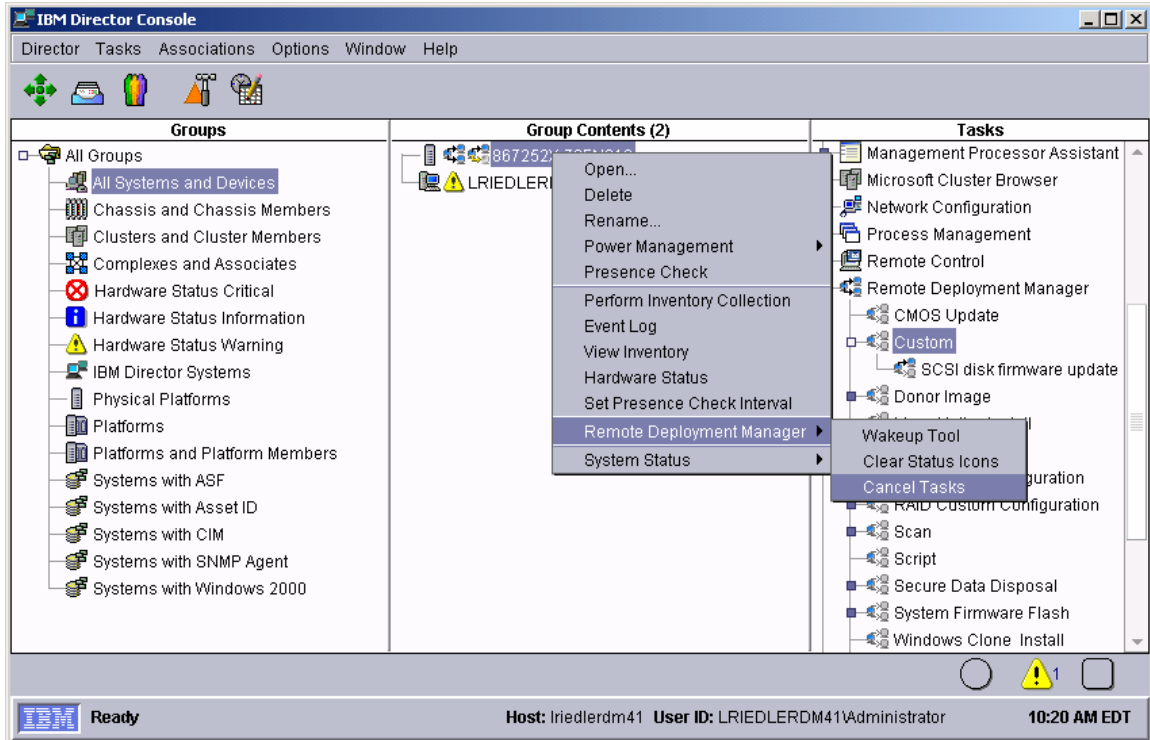
3.7 Create other task instances

If you need to flash diagnostics on more than one kind of target system, or if you need to flash a different diagnostics level, then you must create another task. The easiest way to do that is to copy the task you just created and make some simple changes.

31. Create another Custom image for your new Diagnostics firmware. Use the procedure in section 3.2 above.

32. In the *Tasks* pane of the IBM Director console, right click on the previous custom task. Select **Copy task…** from the menu.

33. Enter a name and optional description for the new task.

34. Make the changes required to make the new task do what you want.

35. Test your new task. Use the procedure in section 3.6 above.

4 Notices

This information was developed for products and services offered in the U.S.A.

IBM might not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service might be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right might be used instead. However, it is the user responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM might have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

> *IBM Director of Licensing*
> *IBM Corporation*
> *North Castle Drive*
> *Armonk, NY 10504-1785*
> *U.S.A.*

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement might not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM might make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product, and use of those Web sites is at your own risk.

IBM might use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Some software might differ from its retail version (if available) and might not include all user manuals or all program functionality.

IBM makes no representations or warranties regarding third-party products or services.

4.1 Edition notice

4.2 Trademarks

The following terms are trademarks of International Business Machines Corporation in the United States, other countries, or both:

IBM

IBM (logo)

Asset ID

IntelliStation

LANClient Control Manager

Netfinity

ServeRAID

ThinkPad

Wake on LAN

xSeries

Adaptec is a trademark of Adaptec Inc. in the United States, other countries, or both.

Microsoft, Windows, and Windows NT are trademarks of Microsoft Corporation in the United States, other countries, or both.

Other company, product, or service names might be trademarks or service marks of others.

5 Glossary

BAT file. A file that contains a batch program (that is, a set of commands).

bind. Associating one or more systems to a task. This causes all information to be verified (by one of the STC modules) and a resulting job to be scheduled to run.

console, or RDM Console. The group of programs that make up the user interface to RDM. RDM is client/server in nature so that the Console might run on any computer and not necessarily be running on the same computer as the RDM server or other RDM components. The RDM Console is actually an IBM Director Console on which the RDM Console component is installed.

image. An image is the software stored on a deployment server that is downloaded to a system during an operation. Images vary in size and in the type of software they provide to the system. The purpose and content of each image depends on the task to be accomplished, as well as the method used to download the image from the deployment server to the system. A *native* image is built off a product installation CD. A *clone* image is copied from a donor system.

job. An object managed by the scheduler and created by STC. A job is a binding of one task and one or more systems. A job can be scheduled to run once or to recur. Sometimes a job is called by a different name (Scheduled Task, Running Task), to emphasize some aspect of the job.

managed system. The IBM Director term for its system. Mentioned here only for clarity; the term *system* is preferred when referring to an RDM system.

preboot DOS agent. The preboot DOS agent is a DOS operating system with a communications stack that is booted from the network by the bootstrap agent. The preboot DOS agent performs actions on a system as directed by the RDM server.

Preboot Execution Environment (PXE). PXE is an industry standard client/server interface that allows networked computers that are not yet loaded with an operating system to be configured and booted remotely. PXE is based on Dynamic Host Configuration Protocol (DHCP). Using the PXE protocol, clients can request configuration parameter values and startable images from the server.

The PXE process consists of the system initiating the protocol by broadcasting a DHCPREQUEST containing an extension that identifies the request as coming from a client that uses PXE. The server sends the client a list of boot servers that contain the operating systems available. The client then selects and discovers a boot server and receives the name of the executable file on the chosen boot server. The client downloads the file using Trivial File Transfer Protocol (TFTP) and executes it, which loads the operating system.

Redundant Array of Independent Disks (RAID). RAID is way of storing the same data in different places (thus, redundantly) on multiple hard disks. By placing data on multiple disks, I/O operations can overlap in a balanced way, improving performance. Multiple disks increase the mean time between failure (MTBF) and storing data redundantly increases fault-tolerance.

system. An individual, target system being deployed or managed by RDM. In IBM Director terminology, an RDM system is always a platform managed object. These can represent any of the supported-by-RDM systems. They cannot represent an IBM Director object that RDM does not process, such as a chassis or an SNMP object.

task. An already defined and configured unit of work that is available to be applied to a system or a group (of systems). You create a task by clicking on the applicable task template from the RDM main console. RDM is installed with predefined tasks, such as data disposal and scan.

task template. A prototype of a specific kind of RDM task. This is a term used to describe the different kinds of tasks shown on the task pane in the main window of the RDM console. Each task template has its own characteristics and attributes. RDM comes with a set of task templates.

Wake on LAN. Technology developed by IBM that allows LAN administrators to remotely power up systems. The following components are essential for the Wake on LAN setup:

- Wake on LAN-enabled network interface card (NIC).

- Power supply that is Wake on LAN-enabled.

- Cable which connects NIC and power supply.

- Software that can send a magic packet to the system.

If the system has the first three of the previous components, the system is called a Wake on LAN-enabled system. Even though a system might be powered off, the NIC keeps receiving power from the system power supply to keep it alive. A network administrator sends a magic packet to the system through some software, for example, RDM or Netfinity IBM Director. The NIC on the system detects the magic packet and sends a signal to the power supply to turn it on. This process is also called *waking up the system*. Using RDM, this process can be scheduled for individual systems. The Wake on LAN feature and RDM together make it very easy for you to deploy software on individual systems on a scheduled basis.

IBM ®

Printed in U.S.A.