

Growing an OS Disk with Ghost 8

Dell Systems

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GROWING AN OS DISK WITH GHOST 8 ON DELL SYSTEMS

Dell systems originally shipped with 9GB system disks. Current production systems ship with 36GB disks. In the event you need to replace the current system disk with a larger one due to software needs or replacement disk size changes, the following procedure will prove helpful.

The Ghost 8 (also called Ghost 2003) executable allows us to access NTFS partitions during the Ghost procedure. If you have a Recovery partition with sufficient free space, you may ghost to that, or you can write the Ghost image to any one of the non-system NTFS disk partitions available.

The basic outline of the procedure is as follows:

Check for current PERC versions

Update PERC firmware and/or drivers if necessary

Backup up internal disk data if needed

Disable services and check system information

Record PERC configuration information

Create current system disk Ghost image

Remove old system disks; Install and configure new system disks

Restore all other drives and configure in PERC if required

Ghost old system image to new system drives

Adjust any drive letters and handle any other errors

Return system to production and test

Each step is detailed in the numbered sections following.

Requirements:

- This document details use with the PERC 2/DC and 3/DC controllers present on Dell PowerEdge 6400 and 6600 servers as well as the PERC 4/Di on the PE2600 server. For use with other systems, refer to the RAID controller information for that system provided in the *Workflow Systems Hardware Setup for Prinergy Systems* and adjust the procedure as necessary.
- This procedure has only been tested out on Windows 2000 systems.
  NOTE: Ghost 8 executable (GHOST2K3.EXE) MUST NOT BE USED ON NT4 SYSTEMS as it will cause BSODs on system startup.
- This procedure has only been tested on systems disks that are set as Basic Disk – not Dynamic Disk.

- This procedure has not been tested on systems with stripe or extended disk sets in Windows 2000. If your system contains any of these, please check with the TIS group or a PSS to determine if this procedure has been checked out yet.

Materials Needed:

- Windows 2000 Resource Disk for Dell systems – version A-N or better
  pn: 21-0151A-N
- Replacement systems disks for the new OS partitions
- XX0352 – Perc Driver Upgrade Procedure
- XX0351 – Perc Firmware Upgrade Procedure
- 72-3650A-J-PR01.pdf – Upgrading Dell Server Agent and Array Manager

References:

The following documents detail information about Creo's Dell systems and PERC controllers that will be required or helpful.

Windows 2000 installation using Ghost Image – 72-3476B-P-PR01.pdf
[section 3 – using Ghost]

Dell Server Hardware Setup – 72-3572A-N-PR01.pdf
[all platform sections, step x.3 – setting up Mirror disks]

Creo TechPlanet PERC RAID site

Creo TechPlanet Dell Server Platforms site

PE6400 and Perc2/DC How to recover from RAID configuration loss – XX-0300A-A

RAID Backup Procedure – XX-0057A-D-PR01

1. CHECK FOR CURRENT PERC VERSIONS

PERC [Power Edge RAID Controller] is Dell's implementation of a build-in RAID controller for the server models Creo integrates. There are several different models coming from two different sources – Adaptec and American Megatrends Inc. (AMI/LSI). The procedure for updating the driver and firmware is slightly different between the controllers from these two sources.

The following table details the different PERC controllers, the Dell systems they are installed in, and the driver and firmware levels for these systems, as posted on the TechPlanet Dell PERC Downloads page (May, 2004).

Adaptec PERC Controllers			
Model	Dell Systems	Firmware	W2K Driver
Perc 2Si	PE2400	2.7-1 Build 3571	2.7.1.499
Perc 3Di	PE2500, 4400, 4600	2.7-1 Build 3170	2.7.1.499

AMI/LSI PERC Controllers			
Model	Dell Systems	Firmware	W2K Driver
Perc 4 Di	PE2600	2.48	5.35.2
Perc 2 DC	PE6400	1.06	2.68
Perc 3 DC	PE6400, PE6600	1.74	5.32

Check the TechPlanet site for the platform you are working with for any updates beyond those detailed in the list above.

Ensure you have a qualified driver/firmware set for the upgrade you will be doing. Check the current installed driver and firmware version to see if they are up-to-date, and update as required by the procedures mentioned in the following section.

2. UPDATING PERC DRIVER AND FIRMWARE

If your PERC firmware and driver need updating, as indicated in the previous section, complete this before continuing. The procedure used for updating driver and firmware depends upon which brand of PERC controller you have, and is detailed in the Dell Hardware Setup for Prinergy Systems document.

Updating Adaptec PERC Drivers and Firmware

With the Adaptec controllers, update the driver first, then the firmware.
Using *XX0352AAPercDriverUpgrade.pdf* as a guide, update the driver in Windows 2000.
Using *XX0351AAPercFWUpgrade.pdf* as a guide, update the firmware on the system.

Updating AMI/LSI PERC Firmware and Drivers

With the AMI controllers, the firmware should be upgraded first, then the driver.
Using *XX0351AAPercFWUpgrade.pdf* as a guide, update the firmware on the system.
Using *XX0352AAPercDriverUpgrade.pdf* as a guide, update the driver in Windows 2000.

Updating Array Manager

For all systems, the Array Manager and Dell Server Manager should be up-to-date. Follow the procedures in *72-3650A-J-PR01.pdf - Upgrading Dell Server Agent* to check and update the utilities. The current Dell OpenManage Array Manager version as of this writing is 3.4.1. Check TechPlanet and your Dell Windows 2000 Resource CD to determine the supported version at installation time.

NOTE: If you are currently running Dell OpenManage version 3.x, you may update Array Manager along with the other OpenManage components just by running the setup program of a newer OpenManage version. Version 3.6 is on the Windows 2000 Resource Disk for Dell Systems version 21-0151A-N and includes Array Manager 3.4.1.

3. PREPARATION AND BACKING UP YOUR LOCAL PERC DISKS

This procedure carries with it a certain amount of risk to all data on any internal disk in the Dell system. The customer must be made aware of this, and if they contain any customer job information, this must be backed up to tape or an alternate disk location unless they are willing to accept the risk. We have completed many upgrades using this method without loosing data, but it is at the customers own risk if they choose not to back up their data before you continue. Refer to document *XX0057AD – Raid Backup Procedure* for more information on performing RAID backups.

Some typical job volume backup times are presented below:

Destination Media	Typical Speed	Notes
DLT 4000	1 GB per hour	Sometimes up to 5 GB/hr
DLT 7000/8000	5 – 7 GB per hour	
Clariion CL1400	13 GB per hour	10 bay UltraSCSI dual-controller
Clariion FC5700	51 GB per hour	20 bay FibreChannel
100bT Ethernet limitations	17 – 32 GB per hour	Typically 5 – 9 MB/sec
Gigabit Ethernet limitations	175 GB per hour	Typically 40 – 50 MB/sec

The system disk will be backed-up using Ghost, and the original system disks will still be present as well, so no additional backup of these is needed.

To ensure you are prepared before continuing with the system Ghost, complete the following steps:

1. If this is a Prinergy system, check that the Prinergy Backup has completed successfully. Correct any backup problems before continuing.
   If this is an iMPAct system, stop the applications and use the BackRest utility to create a current application backup onto a non-system drive. Use NT Backup to save the current System State as a file to the same location.
2. Ensure any non-system customer data has been backed up by the customer as mentioned above.

3. Stop all applications. In Services, stop and disable all Oracle, Prinergy, and iMPAct database and application services that automatically start.
4. Make a record of the drive letter configuration for reference later on.
5. Check for paths in the security logon registry entries. If these entries have paths in them, you may not be able to log in once you've ghosted to your new disks. Check the following registry keys:

   HKEY_LOCAL_MACHINE\Software\Microsoft\Windows NT\Current Version\Winlogon\Userinit

   HKEY_LOCAL_MACHINE\Software\Microsoft\Windows NT\Current Version\Winlogon\GinaDLL

   If the values contain a path reference, such as "D:\WINNT\system32\userinit.exe", change the value to just "userinit.exe" (or "awgina.dll" as the case may be).
6. Open the System Event Monitor log and check for errors. Correct any problems necessary and clear the log. Reboot the server and ensure that the problems are handled by checking the log again.

4. RECORDING PERC CONFIGURATIONS

It is necessary to have an accurate current record of the PERC configuration information before continuing. This procedure details the steps for the PE6400 and PE6600 servers. Check for details on other PERC controllers in the system references mentioned earlier.

1. Reboot the Server and hit **<ctrl>M** to get into the PERC Bios.
2. Select **Objects** / **Physical Drive**. You will notice the disks will be labeled ONLIN Ax-y where x=LUN, y=Disk ID in LUN. You should notice that your OS LUN consists of disks A0-0 and A0-1 in channel 0.
3. For each disk note the disk location (Channel - ID) and which LUN it is assigned to (Ax-y). Write this information down and save it.
4. Hit **<Esc>**.
5. Under the Objects menu select **Logical Drive** (Logical Drive = LUN).
6. For each Logical Drive select **Logical Drive x** / **View Update Parameters** and note the following:

   i) RAID Level

   ii) StripeSize
7. **<Esc>** back to Exit the PERC BIOS. Press **<Ctrl>**+**<Alt>**+**<Delete>** to reboot the system.

5. CREATING A SYSTEM DISK GHOST IMAGE

1. Insert and boot to the *Dell Windows 2000 Resource CD*.
2. Navigate to the Dos_Util directory and start **GHOST2K3.EXE**
   Note: If this is the first time Ghost2k3 has been run on this system, it will ask to mark these drives as usable in Ghost. Select **OK** and continue.
3. Select **Local** / **Disk** / **To Image**.
4. Select the System disk (usually the first one – but check size to be sure) using the space bar and continue.
5. For the destination, tab to the dropdown field at the top and arrow-down to select the partition you want to write this image to. NTFS disks are noted in a *drive:volume* format such as *2:2 [Data] NTFS drive*. Navigate to the location where you want the image stored.
6. Tab to the image name field and enter a name. Tab down and enter descriptive data in the description field, and be sure to include your name and the date.
7. Tab to the **Save** button and press <**Enter**>. Arrow over and select **High** compression; **Yes** to proceed with the Ghost image.
8. The image may be split into multiple (*.GHS) additional files. Once complete, exit Ghost.

6. INSTALLING THE NEW SYSTEM DISKS

1. Power down the system. Power down any external disks (RAIDs) and other devices.
2. Label all internal disks for their locations (see ID numbers on chassis below disks).
3. Remove the two system disks completely and set aside.
4. Pull all remaining disks out about 1" so they are fully disengaged.
5. Insert the two new system disks in place (ensure they are fully seated).
6. Power up, and select <**ctrl**>**M** to enter the PERC BIOS.
7. Select **Configure** / **Clear Configuration** / **Yes** to clear the PERC configuration.
8. Select **View Add Configuration**. You should see 2 disks, **0:0** and **0:1** and both should show **ready**.
9. Select the system mirror set:
   i) Use the arrow keys to highlight **Disk 0:0** and select it by hitting the <**Space**> bar.
   ii) Select **Disk 0:1** the same way.
   iii) Hit <**Enter**> to complete your array selection. You should now have

Disk 0:0	A0-0
Disk 0:1	A0-1

10. Hit <**F10**> to configure the LUN.
    Note: LD=LUN for Perc2DC, Axx=LUN for Perc3DC.
    Note: For Perc3/DC, LUN is selected when it turns grey, unselected is turquoise.
11. You will be prompted to configure LD-0 (your new OS drive set). Do the following:
    i) for PERC 3/Dc and 4/Di:
       a. Press <**space**> to select the LUN. The highlighted LUN should turn **Grey** in color. It should say **Span-1**.
       b. Hit <**F10**> to configure.
    ii) Continue with the following settings for both models:

RAID	1
Size	Default
Advanced	
Stripe Size	128KB
Write Policy	WRBACK
Read Policy	READAHEAD
Cache Policy	Cached IO

    iii) Hit <**Esc**> and then **Accept**.
    iv) Hit **Yes** to save your configuration.
    v) Hit <**Esc**> back to the main PERC BIOS menu.
    vi) Select **Initialize** to make the new disks usable. Press <**space**> to select Logical Drive 0 and <**F10**> to initialize.
    Note: If asked to select between Scrub and Clear, select **Clear**.
    vii) Hit <**Esc**> and **Yes** to exit the PERC BIOS.
12. Power down the system (press the power button).

7. PLACING REMAINING DISKS ONLINE

1. With the system powered down, insert all the remaining internal disks and power-up any external disks and other devices.
2. Power up the server. When the PERC BIOS section appears, select <**Ctrl**>**M**.
3. Select **Configure** / **View Add Configuration**.
4. You will see your OS Mirror already configured as A0-0 and A0-1. This will not be touched. The other disks showing as Ready will be reconfigured. For each **LUN** other then A0 you had noted from your original configuration notes above do the following:

i) Navigate to the 1st disk in the LUN noted above (if not already there). Select it by hitting the **<space>** bar.

ii) For each disk in the LUN hit **<space>** to select them. Ensure that only the disks for the current LUN are selected.

iii) Once all the disks for the LUN have been selected hit **<Enter>** to complete the selection.

iv) If your system had more LUN groups, complete the above for each group.

5. Hit **<F10>** to configure the LUNs.
6. You will be prompted to configure each LUN starting from LD-1. Do the following:

i) for PERC 3/Dc and 4/Di:

a. Select the LUN (Configurable Arrays). The highlighted LUN should turn Grey in color. Only 1 LUN should be selected at a time.

b. Hit <space> to accept the LUN. It should say Span-x.

c. Hit <F10> to configure.

ii) Continue with the following settings for all the LUNs you are re-configuring:

RAID	What ever was originally recorded for that LUN before
Size	Default
Advanced	
Stripe Size	What ever was originally recorded for that LUN before
Write Policy	WRBACK
Read Policy	READAHEAD
Cache Policy	Cached IO

iii) Hit **<Esc>** / **Accept**.

iv) Hit **Yes** to save the new configuration.

v) Hit **<Esc>** all the way back and exit the PERC BIOS.
NOTE: Ignore message about LUNs not being initialized.
DO NOT INITIALIZE RECONFIGURED LUNs!

7. Insert the Windows 2000 Resource CD and reboot the server (**<Ctrl><Alt><Delete>**).

8. RESTORING SYSTEM DISK FROM GHOST IMAGE

1. Boot into the DOS system from the CD.
2. Navigate to the Dos_Utils directory and start **Ghost2k3.exe**.
   Note: If you are asked to mark the drives for, select **OK** and continue.
3. Select **Local** / **Disk** / **From Image**.
4. Navigate to the image of the system disk you created earlier and select it.

5. Select the System Disk mirror set (usually Drive 1) as the destination. Make sure you have the right disk!
6. In the partitions table, you need to adjust the sizes to accommodate the new disk size:
    i) Note the amount of free space in the original disk image. You will want to retain this approximate amount in the new partition configuration.
    ii) Make the Dell and Boot partitions the same size as on the original image.
    iii) Determine the size for the System partition:
        a. Subtract the Dell, Boot and Freespace from the total disk size.
        b. Divide this by 2.
        c. If you size in step b is larger than 17,200 MB, make your System Partition 17,200 MB (the size required for Japanese Font system partitions). Otherwise, make it 8,600 MB (the standard image System Partition size).
    iv) Use the remaining space for the Datalog partition, keeping at least the same Freespace as in the original image. (You may have to try adjusting the Datalog size down a bit if it keeps rounding up and making your Freespace smaller than the original size).
7. Once the table is correct, tab to **OK** and hit <**Enter**> to start the image writing. Select **YES** and <**Enter**> to proceed with the restore. You will notice the disk activity lights on the system mirror set become very active. You may be prompted to select the span image part way through if your system ghost was larger than one file.
8. Once the imaging is completed, select **Continue** and **Quit** to exit from Ghost. Remove the boot CD.

9. RESTARTING THE APPLICATIONS

1. Boot into the newly ghosted system (<**Ctrl**><**Alt**><**Delete**>). If any questions about newly installed hardware show up, complete the steps necessary (see *Windows 2000 installation using Ghost Image*). If prompted to restart after installing new devices, DO SO NOW (this relates to the new disk drives).
2. Check your drive lettering and ensure that it is all the same as before, referring to the records you noted down in section 3.
3. Open the System Event Monitor log and check for any errors. Correct any situations necessary.
4. If any changes have been needed in the previous steps, reboot the system again and recheck that all configurations and errors have been corrected.
5. Open the Computer Management – Services window and re-set the startup states for any application services you disabled in section 3. Reboot to start the services and ensure they are all running properly.

6. Restart the application software. Check any startup or diagnostic logs to ensure there are no errors. Once running, test the applications again with some work that is known to have processed correctly before the upgrade. This will complete the disk size upgrade procedure.