

an executive
white paper

industry standard
servers
server storage and
infrastructure group

april 2003
doc. no. 5981-7156EN



Procedures of Expanding an “Active” Volume Within the Microsoft Windows 2000® Operating System

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scope of this paper

This document outlines the procedures of expanding an “active” volume within the Windows 2000 operating system. Though this document deals specifically with HP products and their hardware RAID solutions, the general outline could be followed on any machine.

Additionally, this document focuses on Microsoft’s utility DISKPART to expand the drive. “Expanding” refers to the action of increasing the size of a volume to obtain more usable space; e.g. increasing a 200GB drive “F:” to 300GB. Other utilities are available and should be used according to their respective instructions.

prerequisites

The following requirements are specified in Microsoft Knowledge Base Article – [Q304736](#), “How to Extend the Partition of a Cluster Shared Disk”. Though the article refers to storage available to Clusters, the document’s guidelines apply to non-clustered systems as well:

- The additional disk space must appear as free space at the end of the existing drive, and it must be directly behind the existing volume that is to be extended.
- The extension must not rely on software fault tolerance to combine the existing partition and free space.
- The disk signatures of the existing drive remain the same.
- Use the Physical Disk Resource type for the disk. If a third-party manufacturer provides the disk resource, you must contact that manufacturer for information about how to increase disk space.

pre-setup

Use the following procedure to setup the unit prior to expanding the drive:

1. First, and foremost, have a recent backup of all data. This procedure is intensive and essentially causes a regeneration of the RAID structure on the drive being expanded.
2. Ensure the latest release of the Operating System. This includes any service packs and patches.
3. Update any device driver specific to the storage device.
4. Update any configuration utility needed for the coming expansion. In HP’s case, this is the Array Configuration Utility.
5. Update all system ROMs and Array Controller ROMs.
6. Update all Hard Drive ROMS.
7. Run a diagnostic report on the storage and drive subsystem. In this case, use the Array Diagnostic Utility. This report should be examined to determine if any of the drives may be approaching a failing state, i.e. high read or write error counts. Drives may be on their way to failing but not quite dysfunctional enough to have triggered a threshold alarm. (The coming expansion rewrites the RAID striping, so it is best to be forewarned of any issues that could cause failures).

**pre-setup
cont'd.**

8. **NOTE:** It is very important that the additional drives to be added are in "pristine" condition. In other words, they should contain no data on them at all from previous setups. If necessary, use the manufacturer's guidelines on erasing the drives. The following is a quick guideline for erasing drives in an HP system. (The directions below are best done on a non-production server if one is available).

- a. Create a System Erase diskette from the latest version available. This utility can be found on the HP website.
- b. Shut down the entire system including any external drive enclosures.
- c. Remove all drives with existing data from the unit. They must not be present in the system if you want to maintain their data structure. Even though a fully updated system will not require the user to reinstall the drives in the exact same order, common practice is to remember the order in which the drives were removed and replace them in their original slots.
- d. Install the drives to be fully erased.
- e. Boot the system with the Erase Utility diskette and choose to erase everything.

NOTE: If this procedure is being performed on the production system, any past changes to the systems BIOS will be erased and values returned to default. Make sure you are familiar with the system and know what post-erase customizations need to be set.

- f. Shut down the system, remove the cleared drives, and reinstall the old drives.
- g. Boot the system. The default operating system, as well as the time and the date, will need to be set. This can be done through the ROM configuration utility or the HP System configuration utility, depending on the model of system being used.
- h. Allow the system to fully boot the operating system and check the appropriate event logs to ensure the system is stable.

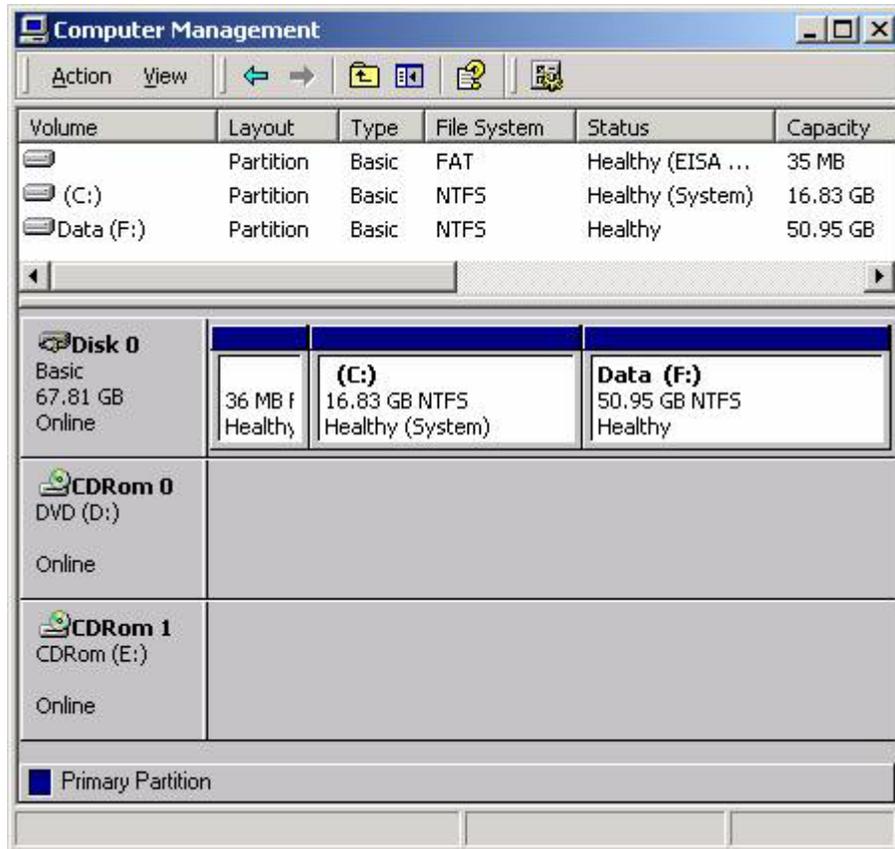
Once the above steps are complete, continue with the expansion.

**array
expansion****Current Layout of Volumes**

It is necessary to know and understand the current layout of the volumes and how they are placed on the array drives. Note from the prerequisites section above, that the volume to be expanded must be at the end of an array – the last Windows volume on the array – and that the free space added must then be directly behind that.

In the following example in Figure 1, the original array is 4x18GB SCSI hard drives in a RAID 5 configuration. This gives an effective available space of around 70GB.

Figure 1.

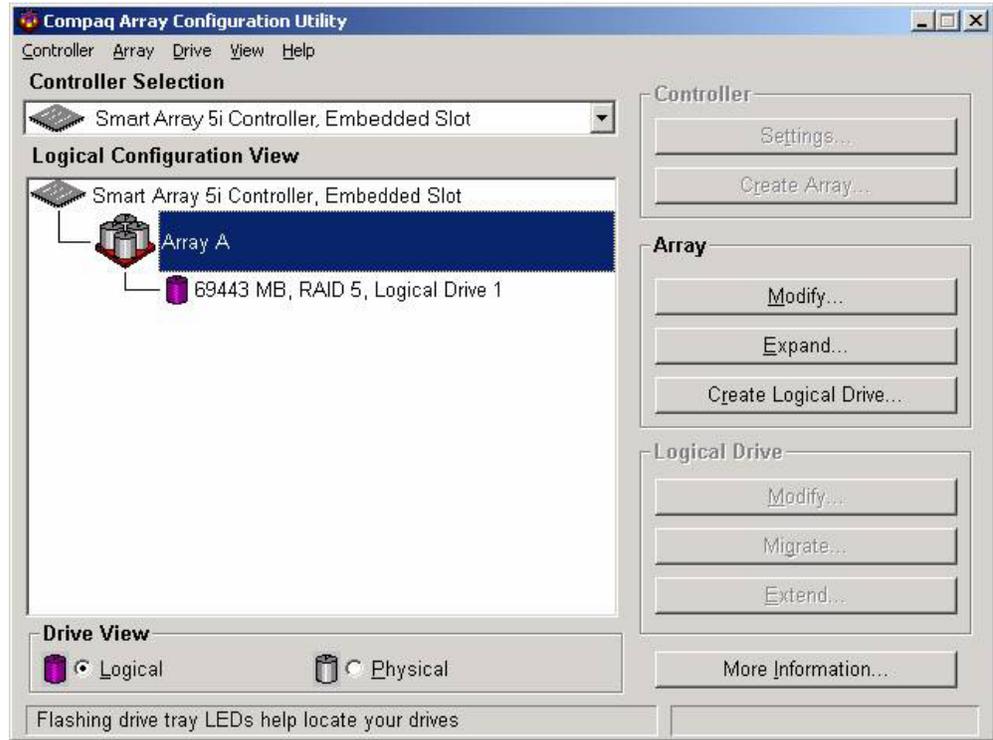


NOTE Disk 0 above. Drive F: "Data" is the drive to be expanded. It is at the end of the array drive and the new space to be added will fall immediately after that.

Adding Physical Devices and Expanding the Array

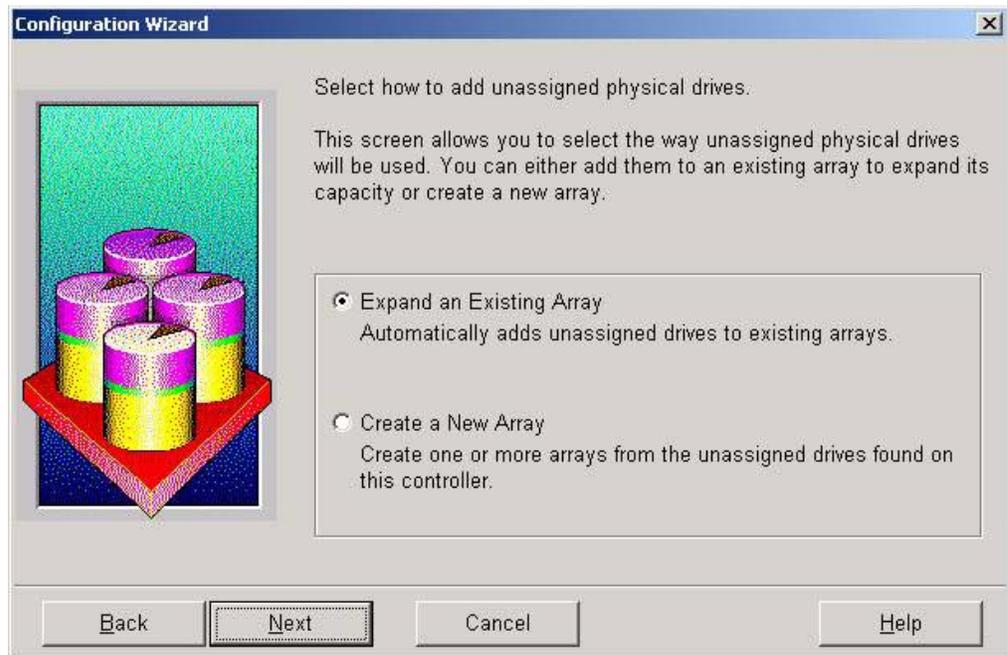
The following is the procedure for adding the drives to the array. Using the given example in Figure 2 below, note the HP Array Configuration Utility layout for the array.

Figure 2.



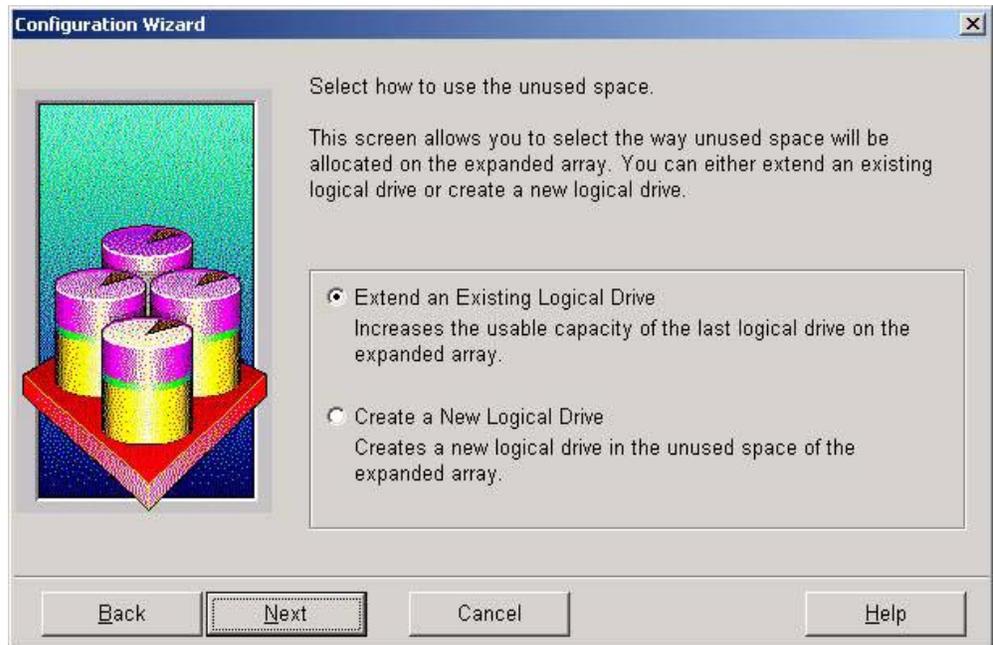
1. Follow the instructions of the system for adding a drive. For an HP system with hot-plug drives, it is safe to add the drives to a running system.
2. Run the HP array configuration utility. The first notice will be that deconfigured drives have been detected.
3. When prompted, select what you want to expand the existing array. Choose to add the drives to the current array. Do NOT select to create another array. Remember the drive(s) must be added to the existing set of array drives that contain the volume to be expanded. See Figure 3 on the next page.

Figure 3.



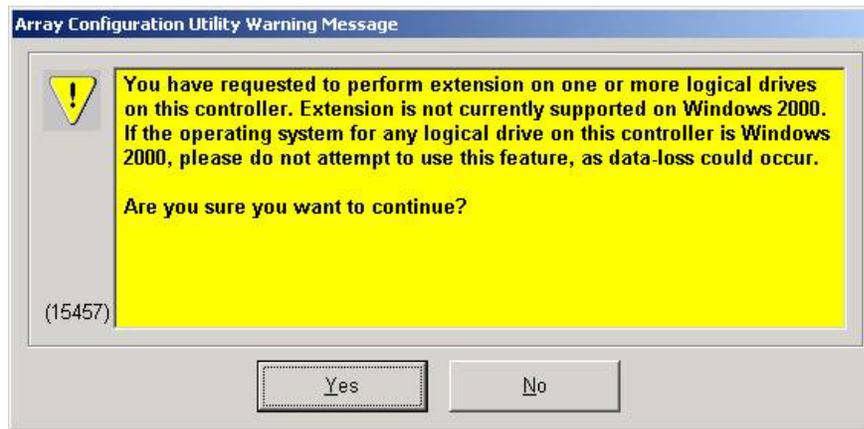
4. When prompted, select to Extend the Existing Logical Drive. Do NOT create a new logical drive with the free space. The extra space needs to be left unallocated for the extension. See Figure 4 below.

Figure 4.



- Since Windows 2000 is the operating system, there will be warnings that the operation could be data destructive. Accept the warnings and continue. Figure 5 below is an example.

Figure 5.

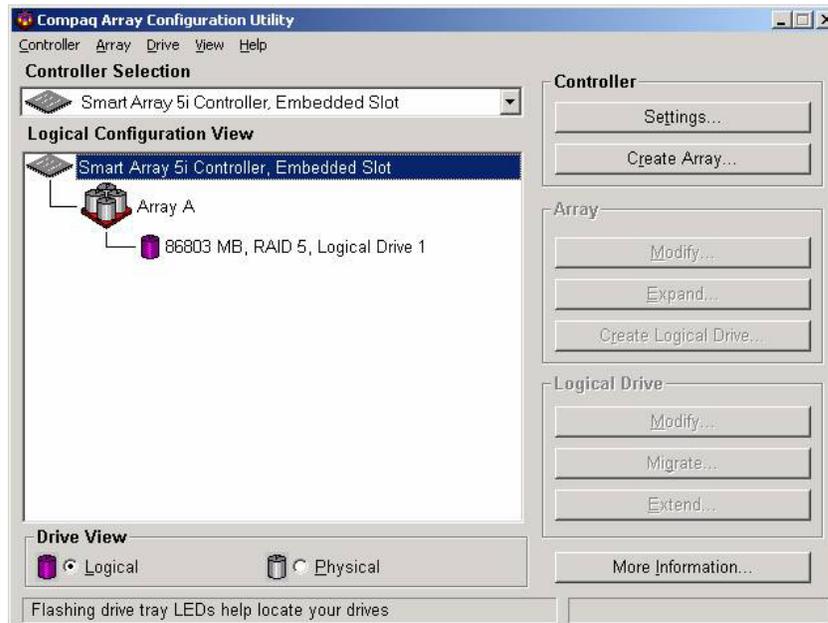


- Once the configuration has been set, you must save it. Choose Save Configuration under the Controller menu of the Array Manager.

NOTE: This is the point at which information is committed and the extension process begins so be sure all desired settings are correct.

In this example, the new array looks like the following in Figure 6.

Figure 6.

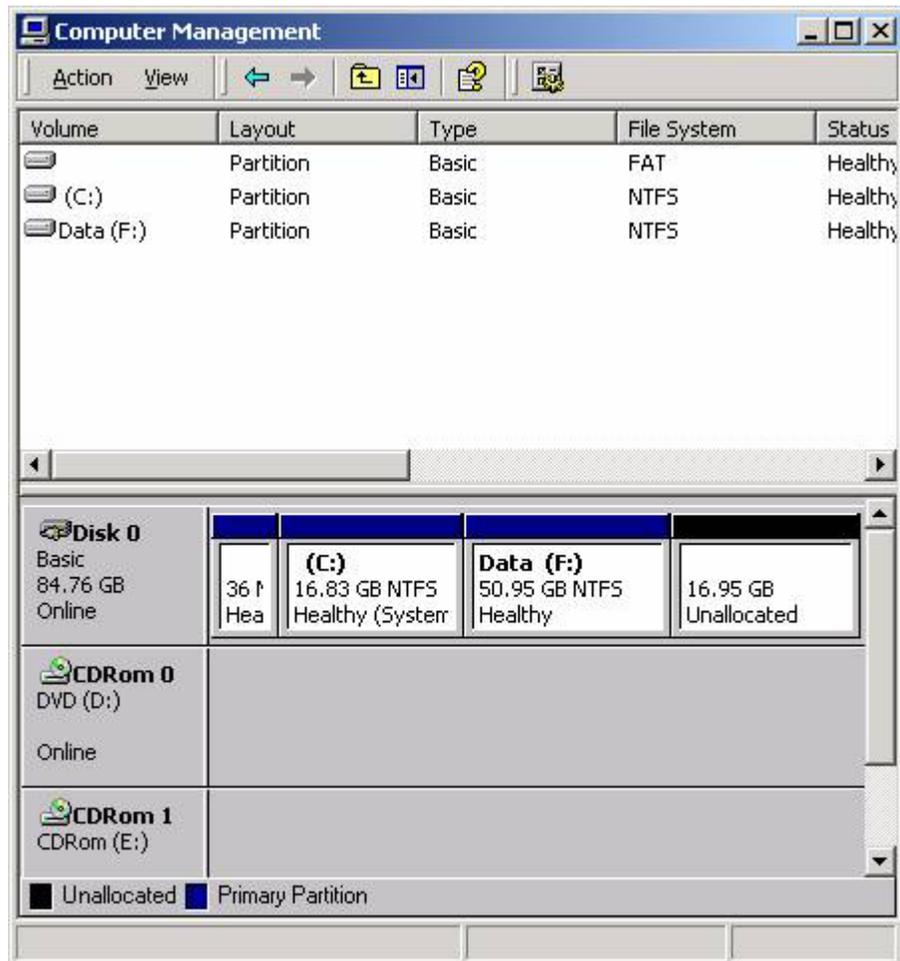


The above process takes a while to regenerate the entire array being expanded. The system can take 10GB per hour or longer. Leave the system running until the array extension has completed.

extending the Windows volume

Once the Array extension has finished, the unallocated space should be visible in the Windows Disk Management shown below in Figure 7. If not, reboot the system and return to Disk Management.

Figure 7.



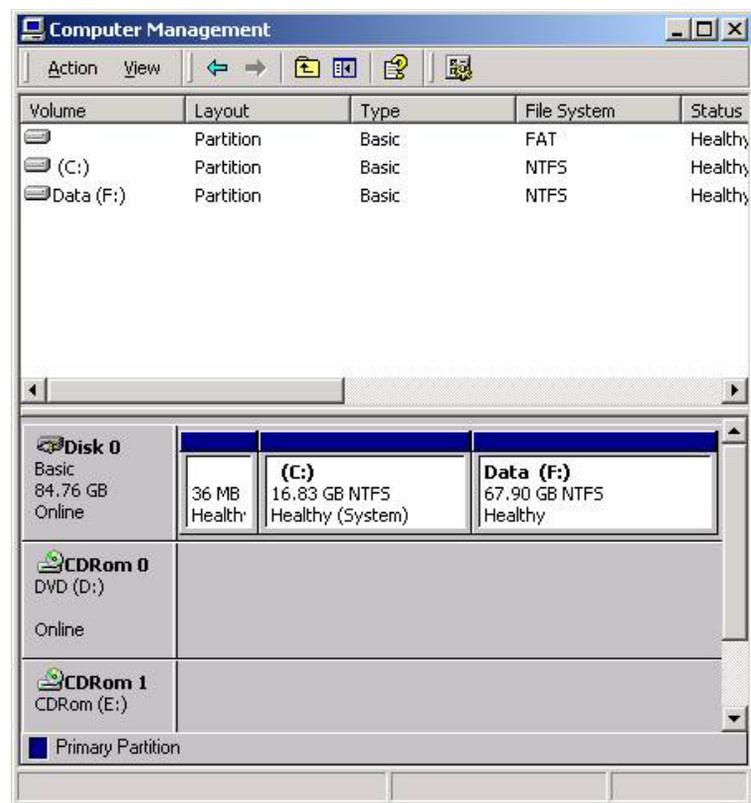
In the Figure 7 example above, the F: drive is ready to be extended to include the unallocated space.

Follow these steps from the referenced Microsoft Knowledge Base article referenced above to perform the volume extension:

1. Download the latest version of Diskpart.exe from Microsoft. Currently the link is at <http://www.microsoft.com/windows2000/techinfo/reskit/tools/>.
2. Click All Programs, point to Administrative Tools, click Computer Management, and then start the Disk Management console. Verify that the new free space is added to the end of the proper drive. Right-click the existing partition, and then click Properties. On the General tab, type a unique name for the partition. This name will be used to identify the partition you want to extend in Diskpart.exe. Quit Computer Management.

3. At a command prompt, type DISKPART, and then press ENTER to start Diskpart.exe.
4. Type LIST VOLUME, and then press ENTER to display the existing volumes on the computer.
5. Type SELECT VOLUME, volume number, and then press ENTER, where volume number is the number of the volume that you want to extend. Note that the volume will have the unique name that you created in step 5, and will have been listed in the output of the command you ran in step 7.
6. Type EXTEND, and then press ENTER to extend the partition into all of the available disk space to the end of the drive.
7. Type EXIT, and then press ENTER.
8. Return to Computer Management and verify the volume has been extended. Using the example above, the disk should be displayed as follows in Figure 9.

Figure 9.



considerations

The primary consideration of this procedure is that the extension is a disk intensive operation and should only be performed on stable systems and even then, only if there is a known good backup.

for more information

If you would like to provide feedback, or if you have a success story to share, please mail to: Levi.Norman@hp.com.



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April 2003 Doc. No. 5981-7156EN

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