

## Restoring System State in Windows 2000 to Dissimilar Hardware.

In Windows 2000 and later critical functional information is bound into the system state of a Server, and is not easily recovered by simple file backups. If for testing or disaster recovery purposes you need to recover an Active Directory Domain and or Exchange Enterprise, you have no choice but to recover the system state of at least one Domain Controller, and if you wish to retain your sanity, all of your Exchange Servers. If source and destination hardware are similar, the process is fairly easy and painless. If source and destination hardware are dissimilar, this paper is about the hoops you're going to need to jump through to have any chance of success.

### Backing up Windows 2000 in General

To produce a valid backup of a Windows 2000 system you need to perform a complete file backup plus the System State.

### Restoring System State in General

To restore a system, whether to identical hardware or different hardware, the initial steps are the same.

- Partition the hard drives or disk arrays so that each logical drive is the same size or larger than on the original system. At minimum you must make sure that each volume will larger than the data to be contained on it.
- Install the same version of Windows 2000 (ie Professional, Advanced Server) with the same Service Pack and Encryption level. Install all drivers for the new system as well. Make sure the drive letter assignments match those on your original system.
- Make an ERD on your Target System.
- Restore the system. Select the Option to over-write all files and choose System State in addition to all your files. Restore all files to their original location.
- Make a small recovery partition (or use a partition you are not immediately restoring), place the following files into the root of your recovery partition:

```
%WINDIR%\SYSTEM32\HAL.DLL  
%WINDIR%\SYSTEM32\NTD.DLL  
%WINDIR%\SYSTEM32\NTKRNLPA.EXE  
%WINDIR%\SYSTEM32\NTOSKRNL.EXE  
BOOT.INI
```

If your hardware matches your original hardware closely enough when you reboot the system it will come up and detect any hardware changes. If it stops on a particular device see if you can boot in Safe Mode and delete that device. If you are hanging on a device you believe is non-critical, even when trying to boot in safe mode, try booting into recovery console and disabling the device from there.

# Reinstalling Windows 2000 After Restoring Another Computer's System State

## HAL and Boot Device

The two most significant components in terms of migrating a computer to different hardware are the Boot Device and the Hardware Abstraction Layer. A different chip used in the IDE Controller can result in a different IDE driver being used by Windows 2000, or the slot on the PCI bus can change the parameters used with a SCSI controller, in other words the Boot Device Driver is extremely sensitive to the slightest changes. The Blue Screen '7B Inaccessible\_Boot\_Device' means that you have the wrong boot device driver. If the HAL is different you will still blue-screen even when you try to boot in safe mode.

## Reinstall (Upgrade) Windows 2000

Reboot the system from the appropriate Windows 2000 CD into the Recovery Console. Copy the files in the root of the recovery partition to their proper locations, you can only copy files from the root of a partition other than the system partition for the installation you are recovering.

Reboot from the Windows 2000 CD again. One of the first screens should ask if you want to install Windows 2000 or if you want to Repair an existing installation. You want to install. The next screen should ask you if you want to Repair (option R) or install a fresh copy, and list the installation(s) of Windows 2000 it found. Choose option R. If you are prompted for a partition to install without being prompted for R, press F3 to abort. It is desirable to use the second Repair option because this Repair option will run as if you were upgrading from an older version – it will try to preserve your software and system state while replacing all drivers and OS components.

If you needed to abort: First reboot into recovery console and run CHKDSK /P /R, after that has concluded run FIXMBR. Restart and try to upgrade Windows 2000. If you still cannot upgrade the installation you will need to use the ERD you created. This method is less desirable because it will use the ERD to build its hardware configuration rather than completely re-detecting hardware.

Your chances of a fully successful transplant are greater if you can invoke the Re-install/upgrade option than if you are forced to the ERD. If you fail at this point you will need to start again. Switching to a different days backup is also recommended in this situation as the backup may be at fault. Prior to Windows 2000 Service Pack 2 there was a major flaw in the API which caused system state restores to fail about half the time.

After reinstallation, you will need to re-apply service packs.

## Manual HAL Selection

During boot from the Win2K CD, when the F6 option is displayed, pressing F5 will allow you to select which HAL to install. You remember copying HAL.DLL earlier; you were in effect doing this then. But if you're having no luck getting the OS to Upgrade, I know you'll try anything no matter how hopeless.

## The Recovery Console

The Recovery Console can be accessed: by booting from a Windows 2000 CD, and pressing R to Repair at the first prompt. The Console is available on the next screen.

The Recovery Console can be added to the boot options of a functional system by running "CDROM:\i386\winnt32.exe /cmdcons" .

The Recovery Console requires the Local Administrator account's password to login. For a Domain Controller this is the Active Directory Recovery Password that you created when installing your first Domain Controller. If you lost or forgot this password, you will not be recovering Active Directory.

## History

June 2001 by John Karr

## Revision History

Additional research by Bryan Austin at First Investors, Summer 2002

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