



CHKDSK with XP Embedded on CF Cards

Tech Note

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XP Embedded on CF Cards

EFW

When using XP Embedded on a CF card the Enhanced Write Filter (EFW) is used to limit the number of writes to the CF card. All CF cards can only handle a limited number of writes to any sector before the sector is worn out. On most commercial CF cards this number is 300,000. Newer CF cards use “wear leveling” to reduce this issue but it still a major consideration when using CF cards. In addition to this writes to CF cards are extremely slow compared to hard drives or SSD greatly reducing performance.

To solve this problems Microsoft developed the EFW. The EFW gets around the limitation of CF cards by buffering all writes to CF cards. When XPe writes to the CF card the write is only posted to a buffer in RAM. The EFW does not actually write the data to the HDD until told to do so. This is done with the EFW “commit” command. By buffering the writes the EFW gets around the CF write limitations.

The problem is the EFW causes the OS to act differently than what is seen with XP Pro. One example is that if the EFW is not committed to the CF before shut down and changes have been made to the OS like adding a program or driver they will not be on the system when it reboots because they were not written to the CF card.

Depending how the system is to be used a script can be run at shutdown to commit the EFW. In most cases this makes XPe with the EFW work just like XP pro. If a program or driver is loaded it will be present after the system is rebooted as expected. This is how the generic version of XPe that J2 ships is configured. It should be noted that if the system is shut down improperly (AC power failure) that all data in the EFW will be lost.

There are some very good reasons why you may not wish to commit writes to the CF card every time the systems is rebooted. If all transaction data is written to a server and no data is stored locally you may wish not to commit HDD writes to the CF card. The advantage of this is it is very hard for a systems disk image to become corrupted. The CF card is only read during boot up and never written too. Every time the system reboots the system is guaranteed to be the same as when first installed. If a Windows virus infected the system it would be cleared when the system is rebooted since no writes where done to the CF card. System updates can still be made but would require the EFW to be committed to the CF manually.

CHKDSK (Check Disk)

When using the EWF `chkdsk.exe` (sometimes called scandisk) with the `/F` option a few issues arise.

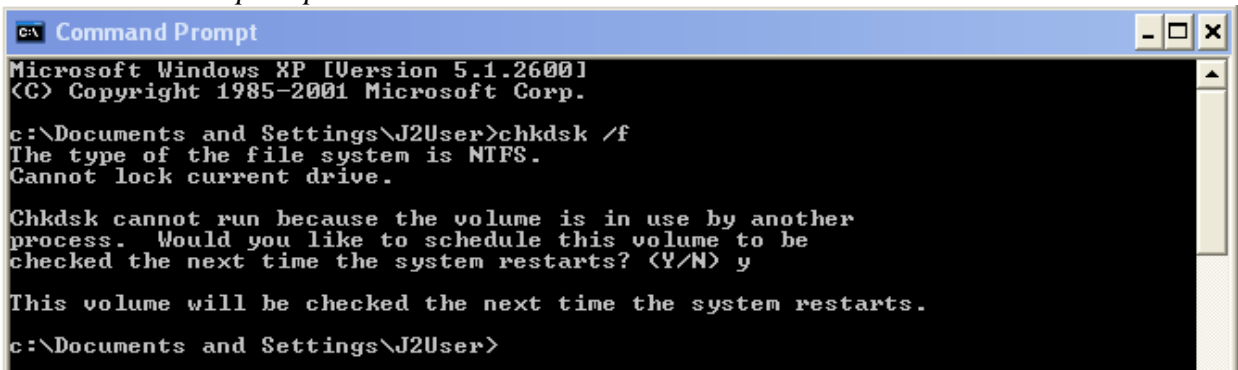
1: If a check disk is scheduled to run at reboot and the system is rebooted without committing the EWF to the CF the check disk will not run at reboot because the flags to tell it to where not saved.

2: If a check disk is scheduled to run at reboot and the system is rebooted with committing the EWF to the CF the check disk will run at reboot but will fail and reboot continuously because the EWF is enabled.

When it is necessary to run `chkdsk.exe` the EWF must be disabled. Here are the steps required.

1: Run “`chkdsk /f`” from the command prompt or Check Disk for the Windows as shown.

From a command prompt

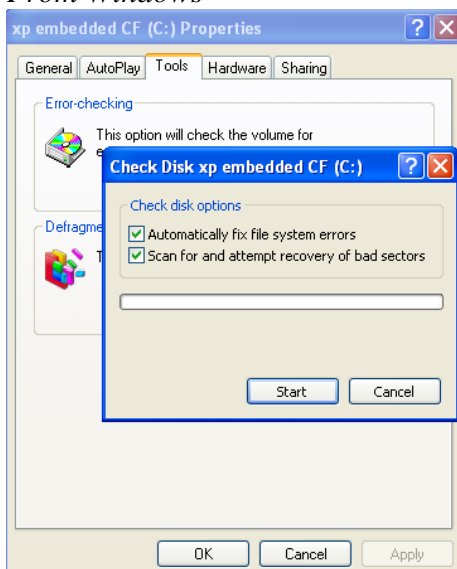


```
c:\ Documents and Settings\J2User>chkdsk /f
The type of the file system is NTFS.
Cannot lock current drive.

Chkdsk cannot run because the volume is in use by another
process. Would you like to schedule this volume to be
checked the next time the system restarts? (Y/N) y

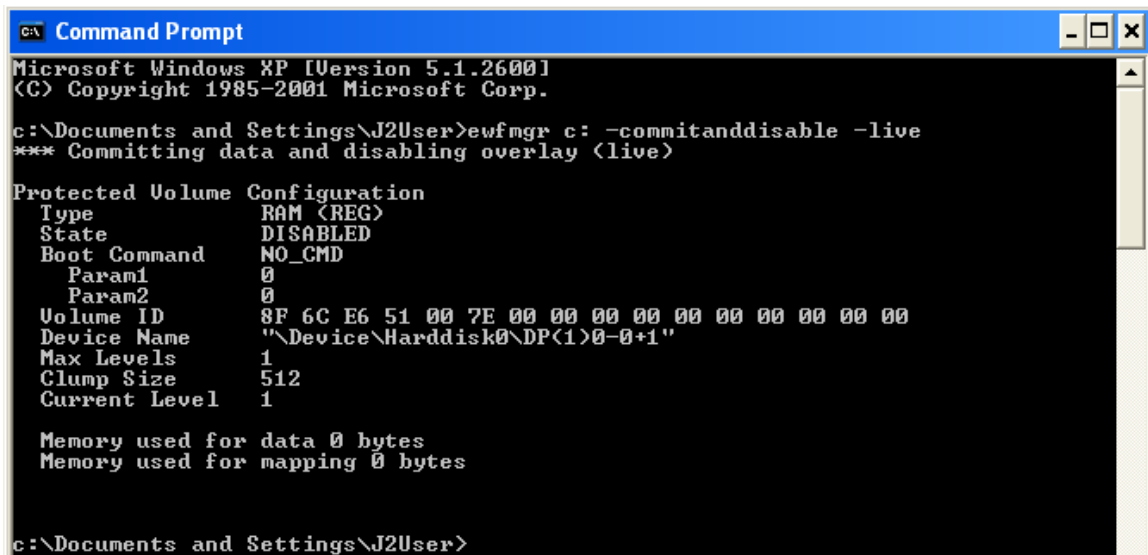
This volume will be checked the next time the system restarts.
c:\ Documents and Settings\J2User>
```

From Windows



- 2: Disable the EWF and commit changes by running “*ewfmgr c: -commitanddisable -live*” from the command prompt.

Commit EWF and disable



```
C:\ Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

c:\Documents and Settings\J2User>ewfmgr c: -commitanddisable -live
*** Committing data and disabling overlay (live)

Protected Volume Configuration
Type                RAM (REG)
State               DISABLED
Boot Command        NO_CMD
  Param1            0
  Param2            0
Volume ID           8F 6C E6 51 00 7E 00 00 00 00 00 00 00 00 00
Device Name         "\Device\Harddisk0\DP(1)0-0+1"
Max Levels          1
Clump Size          512
Current Level       1

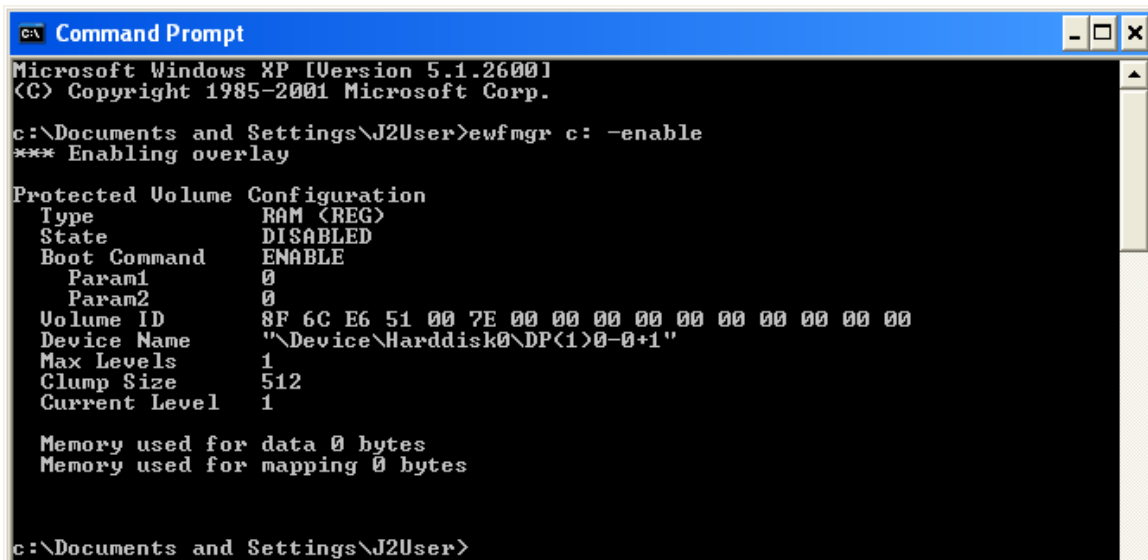
Memory used for data 0 bytes
Memory used for mapping 0 bytes

c:\Documents and Settings\J2User>
```

- 3: Reboot the system, CHKDSK will run on boot up before loading XPe.

- 4: Re-enable the EWF after booting by running “*ewfmgr c: -enable*” at the command prompt. The system must now be rebooted for the EWF to be enabled.

Enable EWF then reboot



```
C:\ Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

c:\Documents and Settings\J2User>ewfmgr c: -enable
*** Enabling overlay

Protected Volume Configuration
Type                RAM (REG)
State               DISABLED
Boot Command        ENABLE
  Param1            0
  Param2            0
Volume ID           8F 6C E6 51 00 7E 00 00 00 00 00 00 00 00 00
Device Name         "\Device\Harddisk0\DP(1)0-0+1"
Max Levels          1
Clump Size          512
Current Level       1

Memory used for data 0 bytes
Memory used for mapping 0 bytes

c:\Documents and Settings\J2User>
```

Note: Running XPe on a CF card without the EWF enabled will cause the system to run slow and wear out the CF card.

If check disk is run and the EWF is committed but the EWF is not disabled before rebooting the system will try to run CHKDSK on boot up but will fail and continually reboot. To get out of this loop it will be necessary to use a PS2 keyboard to exit CHKDSK. A USB keyboard will not work because the drivers are not loaded yet. The system will then boot and you can disable the EWF so the check disk can run. Reboot the system and let CHKDSK run and then enable the EWF when Windows is booted. Remember to reboot the system after enabling the EWF so the setting takes effect.

Defragment

Defragment should not ever be run on a CF card. Running defrag does not improve performance because all sectors on a CF card are accessed at the same speed. More importantly defrag will use a tremendous number of writes which will wear out the CF that much faster.

Conclusion

Running XP Embedded from a CF card provides a very reliable and cost affect system. It is however important to understand the differences and quirks of using the EWF to get the most out of the system.