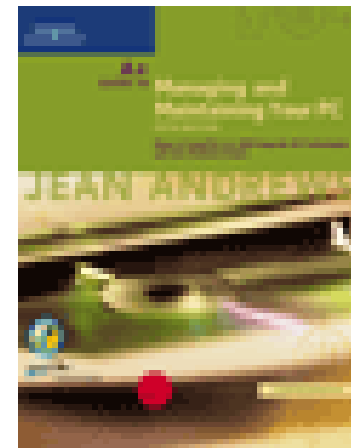


A+ Guide to Managing and Maintaining Your PC

Fifth Edition

Chapter 3



Understanding the Boot Process and Command Line

You Will Learn...

- About the boot process and some tools for troubleshooting a failed boot
- To use many commands at the command prompt

Booting Up Your Computer

- **Hard** (cold) boot
 - power off with switch
 - harsher on equipment (sort of)
- **Soft** (warm) boot
 - OS restarts the computer
 - problem: doesn't always completely clear out RAM since it's the OS doing it.
- **Reset**
 - turns off power, but not as hard on computer

Booting Up Your Computer

- **Startup BIOS** is in control when boot process begins
 - ◆ Turns control over to the OS in the 2nd step of the boot process

Steps in the Boot Process

1. ROM BIOS Startup runs power-on self test (POST) and assigns resources

Reads config info from **DIP switches**, **jumpers**, and **CMOS**, and assigns system resources to various devices.

Let's go to page 80 in your book for a detailed walk through.

2. ROM BIOS startup program searches for and loads an OS

CMOS info tells Startup BIOS where the OS is located. BIOS reads the OS start files into RAM, and then turns control over to those programs.

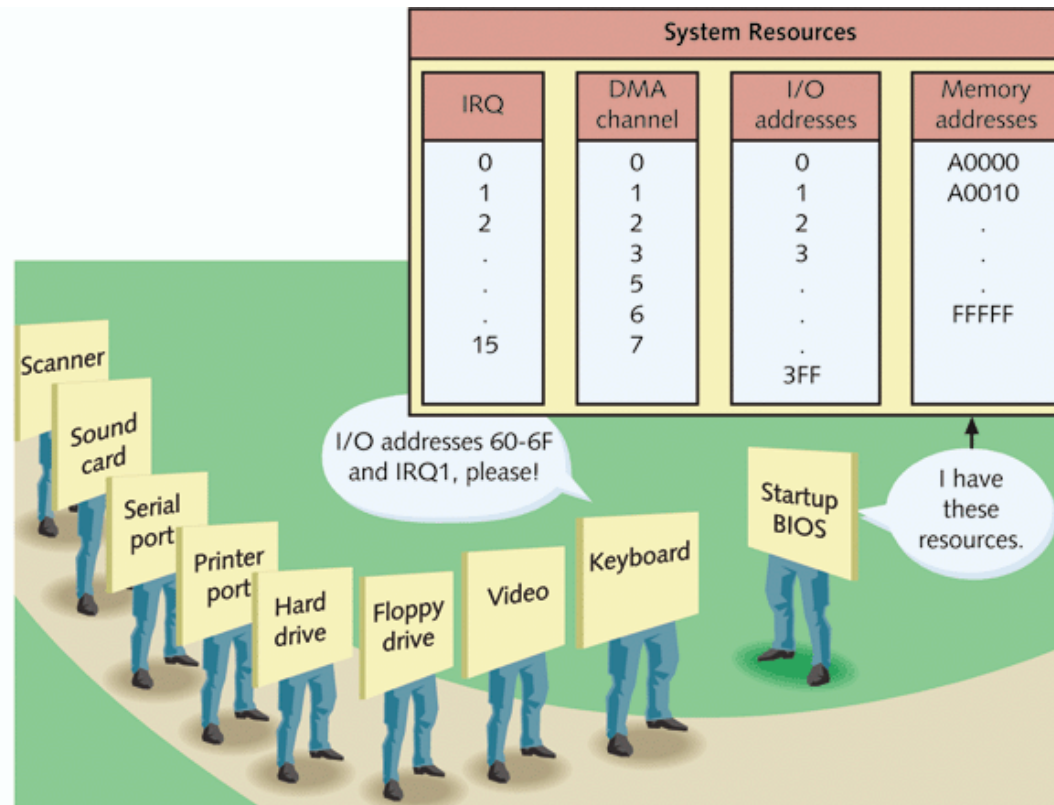
CMOS boot sequence determines the boot device order.

3. OS configures the system and completes its own loading

Mouse, CD-ROM, scanner, etc. drivers are loaded from the hard drive

4. Application software is loaded and executed

Boot Step 1: POST



Let's go to page 80 in your book for a detailed walk through.

Figure 3-1 Boot Step 1: ROM BIOS startup program surveys hardware resources and needs and assigns system resources to satisfy those needs

How the BIOS Finds and Loads the OS

- Startup BIOS looks to CMOS to find which device is the boot device.
 - Goes to the **Master Boot Record** at the very beginning of the physical hard drive.
 - **MBR has two items: partition table** (tells where logical hard drives are) and the **master boot program**.
 - BIOS runs the master boot program, which has the BIOS go to the boot device, and load the **boot loader program** (**Ntldr** in WinXP, **io.sys** in older versions).
 - The boot loader program starts the loading of the OS, which takes over control from the BIOS.

How the BIOS Finds and Loads the OS

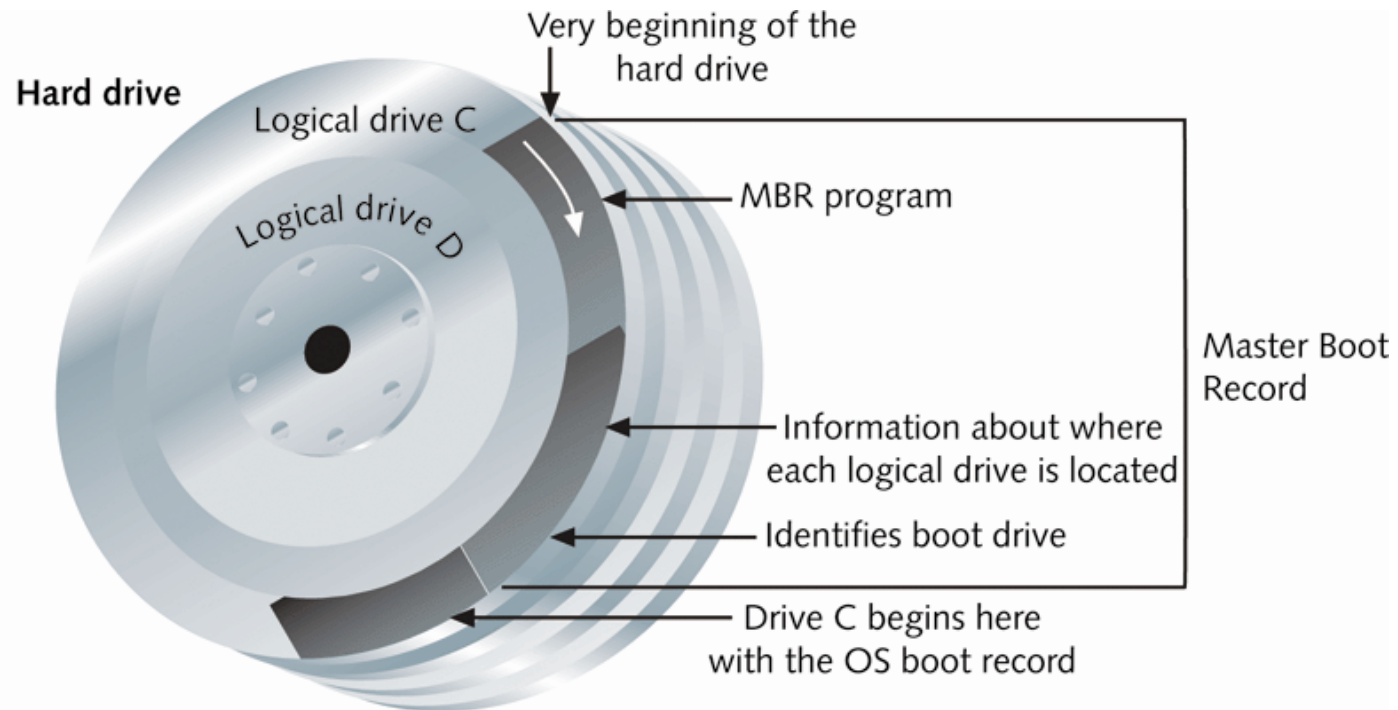


Figure 3-2

A hard drive might contain more than one logical drive; the Master Boot Record at the beginning of the drive contains information about the location of each logical drive, indicates which drive is the boot drive, and holds the master boot program that begins the process of loading an operating system

Loading the MS-DOS Core of Windows 9x

- Brings OS to real-mode command prompt
- Relevance: Real-mode DOS core often used as a troubleshooting tool

NOTE: Windows XP does **not** have a **DOS core**, and does **not** contain the same, customizable boot files that older versions of Windows has.

Loading the MS-DOS Core of Windows 9x (continued)

- Files necessary to boot to command prompt
 - ◆ Io.sys
 - ◆ Msdos.sys
 - ◆ Command.com
- To customize 16-bit portion of load process
 - ◆ Autoexec.bat

Boot Step 3: OS Initializes Itself (Win9x)

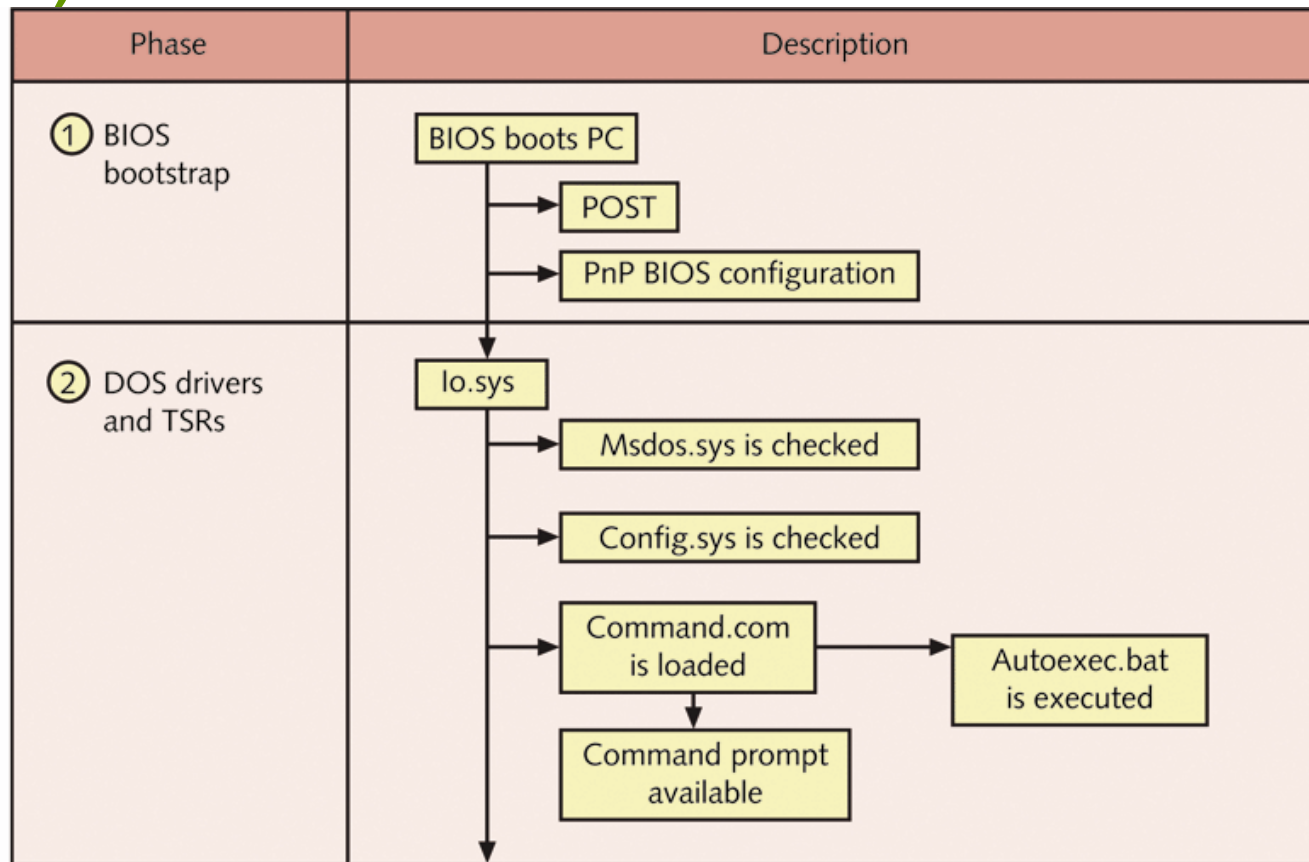


Figure 3-4 Boot Step 3: Operating system completes the boot process; MS-DOS core is loaded and command prompt presented to user

Emergency Startup Disks

- Bootable disks with some utility programs to troubleshoot a failed hard drive
- Each OS provides automated method to create a rescue disk (Windows 9x) or set of disks (Windows 2000)
- **Windows XP** uses an entirely different recovery approach and does not use rescue or emergency disks. We'll cover this in later chapters.

Using the Command Prompt

- The **command prompt** allows you to access certain utility programs without having to rely on the graphical interface
- There are Multiple ways of accessing a command prompt

How to Access a Command Prompt in Windows

Command window from Windows desktop	All versions
Start, Run, Command.com in Run dialog box	All versions
Startup disks (Windows 2000) or installation CD (Windows XP) to boot PC and load Recovery Console	Windows 2000 or Windows XP

How to Access a Command Prompt in Windows (continued)

Boot from a bootable disk	Windows 9x
Start, Shutdown, Restart in MS-DOS mode	Windows 95/98
Ctrl + F8 while booting	Windows 9x

Launching a Program Using the Command Prompt (continued)

- Type filename of program file at command prompt and press ENTER
- What the OS does:
 - ◆ Attempts to find program file by name,
 - ◆ Copies file into RAM, and
 - ◆ Executes program

Launching a Program Using the Command Prompt (continued)

```
A:\>mem
Bad command or file name

A:\>c:

C:\>cd\windows\command

C:\WINDOWS\COMMAND>mem
```

Memory Type	Total	Used	Free
-----	-----	-----	-----
Conventional	640K	160K	480K
Upper	0K	0K	0K
Reserved	0K	0K	0K
Extended (XMS)	130,036K	2,112K	127,924K
Total memory	130,676K	2,272K	128,404K
Total under 1 MB	640K	160K	480K

```
Largest executable program size          479K (490, 816 bytes)
Largest free upper memory block          (0 bytes)
MS-DOS is resident in the high memory area.

C:\WINDOWS\COMMAND>
```

Figure 3-7 Finding a program file

DOS File and Directory Naming Conventions

- 8.3 format
 - ◆ Up to 8 characters, separating period, and file extension of up to 3 characters (eg, filename.ext)
- Acceptable characters
 - ◆ Letters a through z
 - ◆ Numbers 0 through 9
 - ◆ _ ^ \$! # % & - { } () @ ` `
 - ◆ Do not use space, period, *, ? or \
- Acceptable extensions: .com, .sys, .bat, .exe

Windows File and Directory Naming Conventions

- Up to 255 characters
- Can contain spaces
- When DOS part of system is operating, it
 - ◆ Truncates long filenames
 - ◆ Assigns new 8-character names (eg, Mydocu~1.doc)

Wildcards

- Question mark (?)
 - ◆ Wildcard for one character
- Asterisk (*)
 - ◆ Wildcard for more than one character

Commands to Manage Disks, Drives, Files, and Directories

<i>Command</i>	<i>Function</i>
Dir	Lists files and directories (try <code>DIR > testing.txt</code>)
Rename or Ren	Renames a file or folder
Type	Displays contents of text file on screen
Del or Erase	Deletes files or groups of files

Result of Dir Command

```
C:\>DIR \GAME /P

Volume in drive C has no label
Volume Serial Number is 0F52-09FC
Directory of C:\GAME

.           <DIR>      02-18-93   4:50a
..          <DIR>      02-18-93   4:50a
CHESS      <DIR>      02-18-93   4:50a
NUKE       <DIR>      02-18-93   4:51a
PENTE     <DIR>      02-18-93   4:52a
NETRIS    <DIR>      02-18-93   4:54a
BEYOND    <DIR>      02-18-93   4:54a
          7 file(s)           0 bytes
                               9273344 bytes free

C:\>
```

Figure 3-8 Dir of the \GAME directory

Commands to Manage Disks, Drives, Files, and Directories

<i>Command</i>	<i>Function</i>
Copy	Copies single file or group of files Does not alter original files
Xcopy /C /S /Y /D:	Same general command-source-destination format as Copy Offers several more options
Deltree [drive:]path	Deletes directory tree beginning with specified subdirectory Use with caution!

Commands to Manage Disks, Drives, Files, and Directories

<i>Command</i>	<i>Function</i>
Mkdir [drive:]path or MD [drive:]path	Creates a subdirectory under a directory
Chdir [drive:]path or CD [drive:]path or CD..	Changes current default directory
Rmdir [drive:]path or RD [drive:]path	Removes a subdirectory

Commands to Manage Disks, Drives, Files, and Directories

<i>Command</i>	<i>Function</i>
Attrib	Displays or changes read-only, archive, system, and hidden attributes assigned to files
Sys Drive:	Copies system files needed to boot to a disk or drive
Chkdsk [drive:] /F /V	Reports information about a disk

Commands to Manage Disks, Drives, Files, and Directories

<i>Command</i>	<i>Function</i>
Scandisk Drive: /A /N /P	Scans hard drive for errors and repairs them
Scanreg /Restore /Fix /Backup	Restores or repairs Windows 98 registry
Defrag Drive: /S	Rewrites files on hard drive in contiguous clusters to improve hard drive performance

Commands to Manage Disks, Drives, Files, and Directories

<i>Command</i>	<i>Function</i>
Ver	Displays version of OS in use
Extract filename.cab file1.ext /D	Extracts files from a cabinet file
Debug	Views/manipulates components of a file system on disks and drives (FAT, directories, boot records) Views contents of memory and hexadecimal addresses

Commands to Manage Disks, Drives, Files, and Directories

<i>Command</i>	<i>Function</i>
Edit [path][filename]	Enables editing text files while working at command prompt
Fdisk	Partitions hard drive for first use (not in WinXP)
Format Drive	Formats disk or hard drive /S option makes drive bootable
Unformat	Attempts to reverse effects of accidental format