How Hardware and Software Work Together - Chapter #2

Amy Hissom

Key Terms

1. Autoexec.bat – Stands for automatically executed batch file, the file that DOS automatically executes when a computer boots up. This is a convenient place to put commands you always want to execute at the beginning of a computing session. For example, you can set system parameters such as the date and time, and install memory-resident programs.

2. Child Directory – (Another name for subdirectory) A directory or folder contained in another directory or folder.

3. Cluster – A group of disk sectors. The operating system assigns a unique number to each cluster and then keeps track of files according to which clusters they use.

4. CMOS Setup – **(1)** the CMOS configuration chip. **(2)** The program in system BIOS that can change the values in the CMOS RAM.

5. Config.sys – The configuration file for DOS systems. Whenever a DOS computer boots up, it reads the CONFIG.SYS file (if it exists) and executes any commands in it. The most common commands are BUFFERS= and FILES=, which enable you to specify the buffer size and the number of files that can be open simultaneously. In addition, you can enter commands that install drivers for devices.

6. Desktop – In graphical user interfaces, a desktop is the metaphor used to portray file systems. Such a desktop consists of pictures, called icons that show cabinets, files, folders, and various types of documents (that is, letters, reports, pictures). You can arrange the icons on the electronic desktop just as you can arrange real objects on a real desktop -- moving them around, putting one on top of another, reshuffling them, and throwing them away.

7. Device Driver – A program that controls a device. Every device, whether it be a printer, disk drive, or keyboard, must have a driver program. Many drivers, such as the keyboard driver, come with the operating system. For other devices, you may need to load a new driver when you connect the device to your computer. In DOS systems, drivers are files with a.SYS extension. In Windows environments, drivers often have a.DRV extension. A driver acts like a translator between the device and programs that use the device. Each device has its own set of specialized commands that only its driver knows. In contrast, most programs access devices by using generic commands. The driver, therefore, accepts generic commands from a program and then translates them into specialized commands for the device.

8. Direct Memory Access (DMA) Channel – a technique for transferring data from main memory to a device without passing it through the CPU. Computers that have DMA channels can transfer data to and from devices much more quickly than computers without a DMA channel can. This is useful for making quick backups and for real-time applications. Some expansion boards, such as CD-ROM cards, are capable of accessing the computer's DMA channel. When you install the board, you must specify which DMA channel is to be used, which sometimes involves setting a jumper or DIP switch.

9. Directory Table – An OS table that contains file information such as the name, size, time and date of last modification, and cluster number of the file’s beginning location.

10. File Allocation Table (FAT) – A table that the operating system uses to locate files on a disk. Due to fragmentation, a file may be divided into many sections that are scattered around the disk. The FAT keeps track of all these pieces. In DOS systems, FATs are stored just after the boot sector. The FAT system for older versions of Windows 95 is called FAT16, and the one for new versions of Windows 95 and Windows 98 is called FAT32.

11. File Extension – a three-character portion the name of a file that is used to identify the file type. In command lines, the file extension follows the filename and is separated from it by a period. For example, Msd.exe, where exe is the file extension.

12. File System – The system that an operating system or program uses to organize and keep track of files. For example, a hierarchical file system is one that uses directories to organize files into a tree structure.

13. Filename – The first part of the name assigned to a file. In DOS, the filename can be no more than eight characters long and is followed by the file extension. In Windows, a filename can be up to 255 characters.

14. Folder – (Same as a Subdirectory or child directory) A directory or folder contained in another directory or folder.

15. Graphical User Interface (GUI) – A program interface that takes advantage of the computer's graphics capabilities to make the program easier to use. Well-designed graphical user interfaces can free the user from learning complex command languages. On the other hand, many users find that they work more effectively with a command-driven interface, especially if they already know the command language.

16. Hardware Compatibility List (HCL) – The list of all computers and peripheral devices that have been tested and are officially supported by Windows NT/2000/XP

17. Hardware Interrupt – An event caused by a hardware device signaling the CPU that it requires service.

18. I/O Address – Numbers that used by devices and the CPU to manage communication between them. Also called ports or port addresses.

19. Initialization Files – Configuration information files for Windows. System.ini is one of the most important Windows 9x/Me initialization files.

20. Interrupt Request (IRQ) Line – A line on a bus that is assigned to a device and is used to signal the CPU for servicing. These lines are assigned to a reference number (for example, the normal IRQ for a printer is IRQ 7).

21. Logical Drive – A part of a physical disk drive that has been partitioned and allocated as an independent unit, and functions as a separate drive altogether. For example, one physical drive can be partitioned into drives F:, G:, and H:, each representing a separate logical drive but all still part of the one physical drive.

22. Memory Address – A number assigned to each byte in memory. The CPU can use memory addresses to track where information is stored in RAM. Memory addresses are usually displayed as hexadecimal numbers in segment/offset form.

23. Multitasking – Doing more than one thing at a time. A true multitasking system requires two or more CPUs, each processing a different thread at the same time. Compare to cooperative multitasking and preemptive multitasking.

24. New Technology File System (NTFS) – the file system for the new Windows NT/2000/XP operating systems. NTFS cannot be accessed by other operating systems such as DOS. It provides increased reliability and security in comparison to other methods of organizing and accessing files. There are several versions of NTFS that might or might not be compatible.

25. Operating System (OS) – Software that controls a computer. An OS controls how system resources are used and provides a user interface, a way of managing hardware and software, and ways to work with files.

26. Partition – A division of a hard drive that can be used to hold logical drives.

27. Path – (1) a drive and list of directories pointing to a file such as C:\Windows\command. (2) The OS command to provide a list of paths to the system for finding program files to execute.

28. Polling – A process by which the CPU checks the status of connected devices to determine if they are ready to send or receive data.

29. Port Address – (Same as I/O address) Numbers that used by devices and the CPU to manage communication between them.

30. Preemptive Multitasking – A type of pseudo-multitasking whereby the CPU allows an application a specified period of time and then preempts the processing to give time to another application.

31. Protected Mode – an operating mode that supports preemptive multitasking, the OS manages memory and other hardware devices, and programs can us a 32-bit data path. Also called 32-bit mode.

32. Real Mode – A single-tasking operating mode whereby a program has 1024k of memory addresses, has direct access to RAM, and uses a 16-bit data path. Using a memory extender (Himen.sys) a program in real mode can access memory above 1024k. Also called 16-bit mode.

33. Registry – A database that Windows uses to store hardware and software configuration information, user preferences, and setup information.

34. Root Directory – the main directory created when a hard drive or disk is first formatted. In Linux, it's indicated by a forward slash. In DOS and Windows, it's indicated by a backward slash.

35. Sector – On a disk surface one segment of a track, which almost always contains 512 bytes of data.

36. Shadow RAM or Shadowing ROM – ROM programming code copied into RAM to speed up the system operation, because of the faster access speed of RAM.

37. Shell – the portion of an OS that relates to the user and to applications.

38. Startup BIOS – Part of the system BIOS that is responsible for controlling the PC when it is first turned on. Startup BIOS gives control over to the OS once it is loaded.

39. Subdirectory – (Another name for child directory) A directory or folder contained in another directory or folder.

40. System BIOS – BIOS located on the motherboard.

41. System Resource – A channel, line, or address on the motherboard that can be used by the CPU or a device for communication. The four system resources are IRQ, I/O address, DMA channel, and memory address.

42. System.ini – A text configuration file used by Windows 3.x and supported by Windows 9x/Me for backward-compatibility.

43. Terminate-and-stay-resident (TSR) – A program that is loaded into memory and remains dormant until called on, such as a screen saver or a memory-resident antivirus program.

44. Track – One of many concentric circles on the surface of a hard drive or floppy disk.

45. Volume – (Same as Logical Drive) A part of a physical disk drive that has been partitioned and allocated as an independent unit, and functions as a separate drive altogether. For example, one physical drive can be partitioned into drives F:, G:, and H:, each representing a separate logical drive but all still part of the one physical drive.

REVIEWING THE BASICS

1. List four major functions of an OS.
Manages hardware, runs applications, provides an interface for users, and stores, retrieves, and manipulates files.

2. List three well-known Os.
DOS, Windows 9x/Me, Windows NT/2000/XP, UNIX, a version of UNIX called Linux, OS/2, and the Mac OS.

3. Which operating system is only used on Apple Macintosh computers?
Mac OS

4. What is the latest Microsoft operating system for desktop computers?
Windows XP

5. Which operating system often used for server applications is a scaled-down version of Unix?
Linux

6. Which file system is used by floppy disks?
FAT

7. What are two file systems used by hard drives?
FAT & NTFS

8. Real mode operates using a(n) 16 -bit data path, and protected mode uses a(n) 32 -bit data path.

9. Which Microsoft operating system(s) support 16-bit device drivers or 32-bit device drivers?
Windows 95 and Windows 98

10. Real mode allows programs direct access to RAM, but protected mode does not.

11. List three text files that Windows 9x/Me supports for loading device drivers in order to remain backward-compatible with DOS and Windows 3.x.
Config.sys, Autoexec.bat, and System.ini

12. List three types of information that are kept in the Windows registry.
(1) Hardware and software configuration information (2) User preferences (3) Application settings that are used when the OS is first loaded and are accessed as needed by hardware, applications, and users.

13. Device drivers loaded from Config.sys run in 16-bit real mode.

14. Device drivers loaded from autoexec.bat run in 16-bit real mode.

15. List four ways to launch an application from the Windows desktop.
(1) shortcut icons (2) Start Menu (3) Run command (4) windows explorer or My Computer

16. List four system resources that software uses to manage hardware.
(1) I/O addresses (2) IRQs (3) DMA Channels (4) Memory addresses

17. What is the IRQ of the system timer?
0

18. What IRQ does COM2 use?
3

19. Which DMA channel is used to cascade into the lower four DMA channels?
4

20. How is hardware interrupt initiated?
By placing voltage on the designated interrupt request (IRQ) line assigned to it.

21. If memory addresses are used by the CPU to access memory, then what are I/O addresses used for?
Hardware devices that software uses to send a command to a device.

22. What is the I/O address range for the keyboard?
0060-006F

23. Why are DMA channels not as popular as they once were with high-speed devices?
Because their design makes them slower than newer methods.

24. Name a device that uses polling in order to be serviced by the CPU?
Joystick

25. Name one Windows 2000/XP and Windows 9x/Me utility that allows you to see the IRQ assignments made to devices.
Device Manager

THINKING CRITICALLY

1. Name one system resource that a video card most likely will not need.
DMA channel

2. Is a mouse more likely to be controlled by a device driver or by system BIOS?
System BIOS

3. Name one device that is likely to be controlled by system BIOS.
Keyboard

4. If your printer is giving you trouble, what is the best way to obtain an update for the device driver?
Through the printer manufacturer's Web site!