

## **The booting-up process**

The purpose of a PC is to load and run application software such as word processing, computer-aided engineering, windows or games. An application package is designed for a specific operating system such as MS-DOS, ps/2, Unix or windows 95.e.tc. The operating system provides an environment for different software packages to e installed and run. The link between the operating system and the hardware components of the PC is provided by BIOS(Basic input/output system). BIOS is a set of short routines which are stored in a ROM or an EPROM device hence the name ROM BIOS.

**The function of BIOS** : BIOS routines are stored in a ROM or EPROM chip with memory addresses located in the upper segment of real memory. The number and size of BIOS depend on the manufacturer of the chip and its version, with later versions containing more complex and sophisticated programs. BIOS routines may be divided in to two categories.

1. startup routines.
2. Basic low level input/output routines.

The startup routines are initiated when the system is switched on(cold start) or has been reset (warm start). They include such programs as the initial power on self-test(post) and system initialization.

The I/O routines, which include such programs as print routines and disk read/write, are called when the operation system or an application package wishes to carry out these basic tasks, this simplifies application program writing and helps to ensure compatibility of PC's which have different hardware element or configurations. Access to these routines is provided by a system of soft ware interrupts which cause the processor to halt it operation and start a particular BIOS routines. Each interrupt is given a 4-byte values known as vector which its as a pointer to the required routine. Each vector is allocated four memory locations into which BIOS loads the 4-byte value during the start-up routine. Interrupt vectors are

collected into a table, known as an interrupt vector table, which is located in memory locations at the very start of system.

**The boot-up process:** when a computer system is switched on, a procedure known as boot-up or start-up is initiated by the CPU which runs many other things, runs BIOS and loads the operating system to get the computer ready for use.

Upon power-up (by turning the mains switch on), the power supply performs a self-test procedure which is successful and the correct voltages are established on its output lines, sends a power good (PG) signal to the timer chip on the motherboard. The timer responds by taking the result control line HIGH to start-up the CPU. The following is the sequence of events that will take place in a typical computer system:

**Step 1. bootstrap.** The CPU searches for starting address FFFF:0000 where first instruction is stored. This instruction, which is a jump instruction, directs the processor to the starting address where BIOS is located. This step is traditionally known as the bootstrap after the notion of the PC pulling itself up by its bootstraps.

**Step 2 . post.** The first action of BIOS is to test the system, a routine known as post (power on self-test).

**Step 3. initialization.** Following a successful self-test, BIOS carries out a system initializing routine.

**Step 4. loading the operating system.** This involves the BIOS looking for, loading and executing two hidden system files: IO.sys and MSDOS.sys.

The computer is now under the control of the operating system in the guise of IO.sys.

**Step 5. loading CONFIG.sys and COMMAND.COM.** The operating system takes action to establish the operating environment of the system as specified by the user. Customizing the environment involves, in the first instance, searching the root directory for a file called CONFIG.sys. If one is found, DOS reads and executes all its statements before loading the DOS

kernel, a file called COMMAND.COM. if CONFIG.sys cannot be found, COMMAND.COM is loaded regardless.

The system is now under the control of COMMAND.COM.

**STEP 6.** loading AUTOEXEL.BAT. the CPU looks for a batch file called AUROEXEL.BAT. if it is present, Dos loads it into memory, executes its commands and displays the DOS prompt. If AUTOEXEL, BAT is not present, DOS will request DATE and TIME, before displaying the DOS prompt.

The system is now ready for DOS commands or application programs.

### **External storage (memory unit):-**

Used for large-term memory storage there internal memory. The most common external storage devices are tape and disk devices. External memory operates at much slower speed than internal memory and it stores programs and data that are not currently being used by the CPU. External storage is also known as secondary storage or auxiliary storage.

External storage is normally the place where a large amount of programs and data are stored permanently, when the power is turned off.

External storage devices can be classified either mechanical or magnetic:-

1. Mechanical storage devices:- are punched paper card, and punched paper tape. Both of these are less popular now than in the past.

2. Magnetic storage devices:- In personal computer systems, external storage units store information as magnetic spots on oxide surfaces. Because the magnetic spots do not need a constant supply of power to “refresh “ themselves ( as most RAM chip do), external storage units provide nonvolatile storage. Also, external storage is cleaper per unit of storage than the internal memory.

\* The three most common forms of magnetic media used on personal computers systems are:-

cassette tapes, floppy disk, record again and again. As new information is written, it automatically covers up whatever was there before. To avoid

**accident erasure, both cassette tapes and floppy disks can be write-protected.**

**Top recorders and floppy disk drives will not write on write-protected media.**

**Most hard disks can not be write protected.**