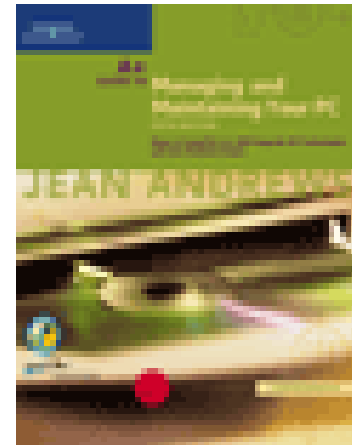# A+ Guide to Managing and Maintaining Your PC

Fifth Edition

Chapter 1

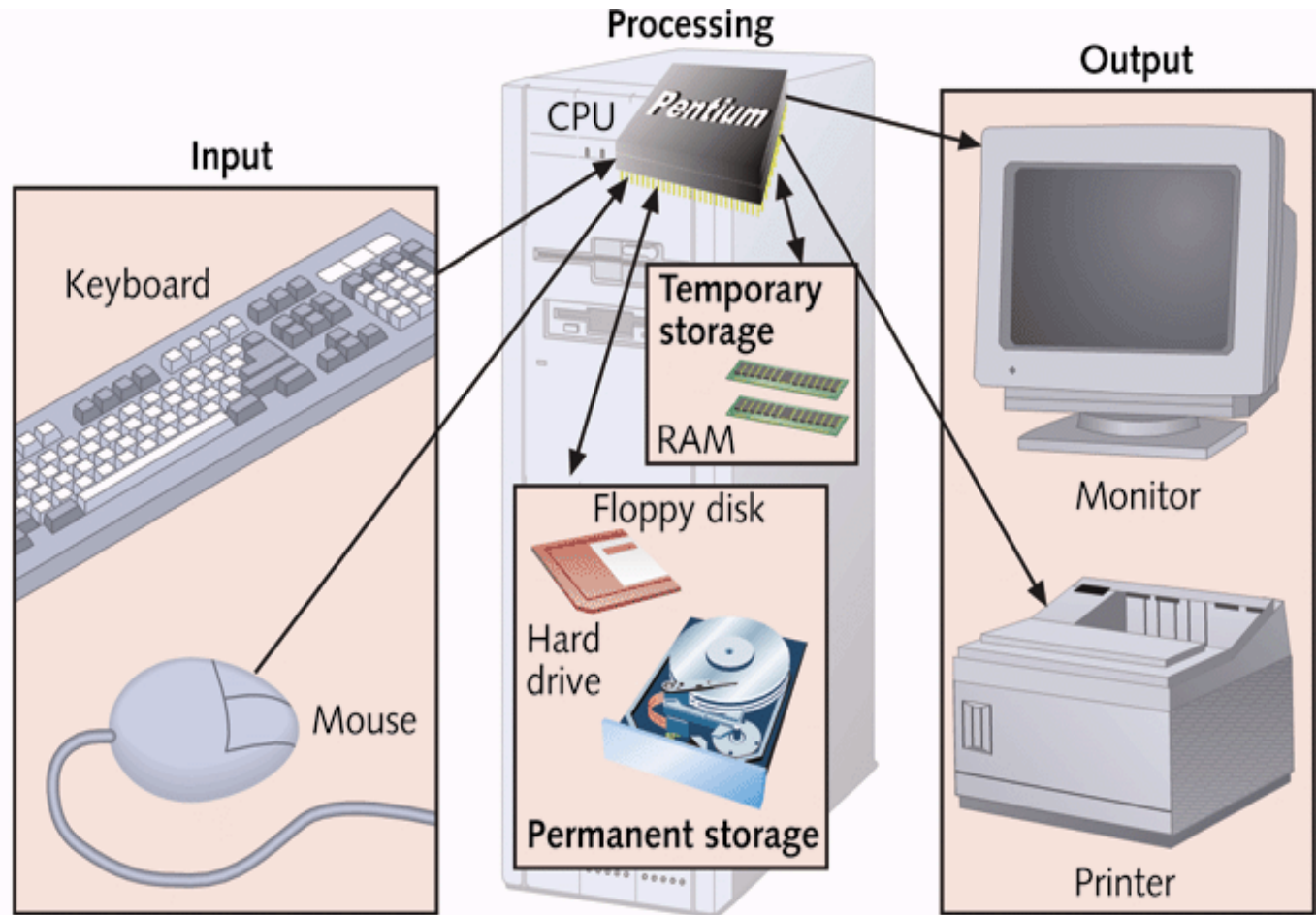# Introducing Hardware

Functions of a Computer

Figure 1-1   Computer activity consists of input, processing, storage, and output
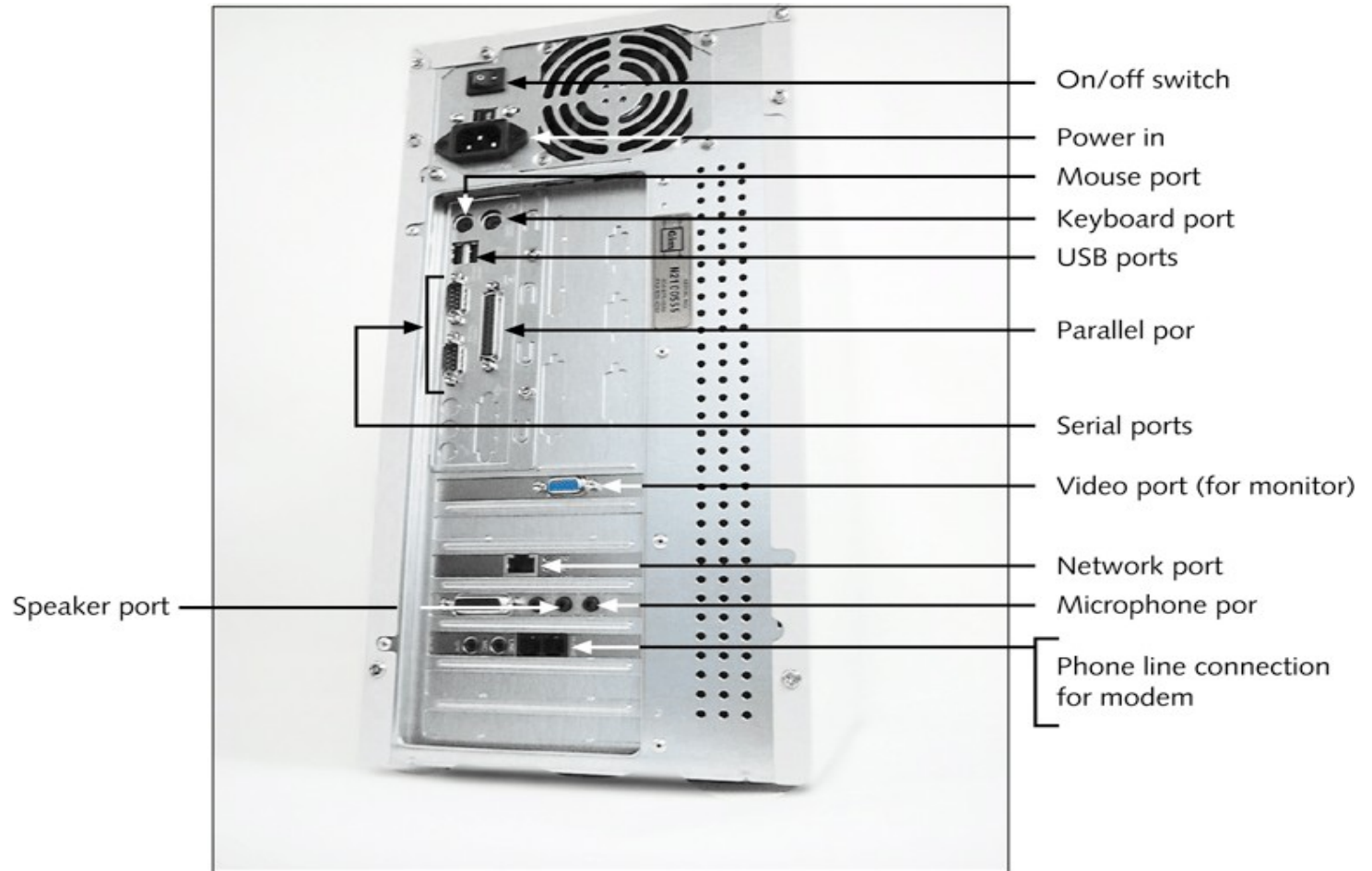
Ports

Figure 1-4 Input/output devices connect to the computer case by ports usually found on the back of the case

Hardware Inside the Case
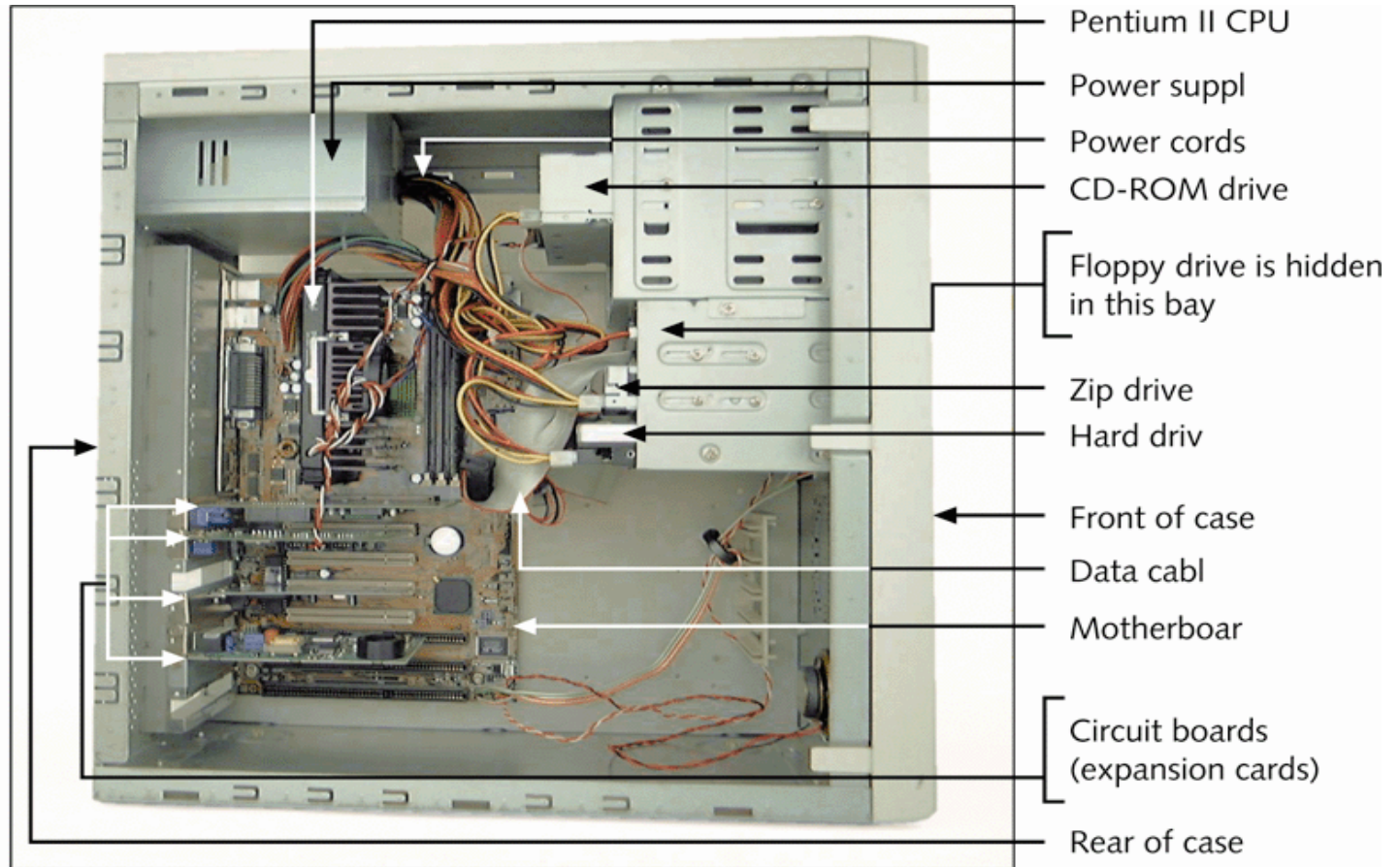

Figure 1-7 Inside the computer case

Pentium II CPU

Power suppl

Power cords

CD-ROM drive

Floppy drive is hidden in this bay

Zip drive

Hard driv

Front of case

Data cabl

Motherboar

Circuit boards (expansion cards)
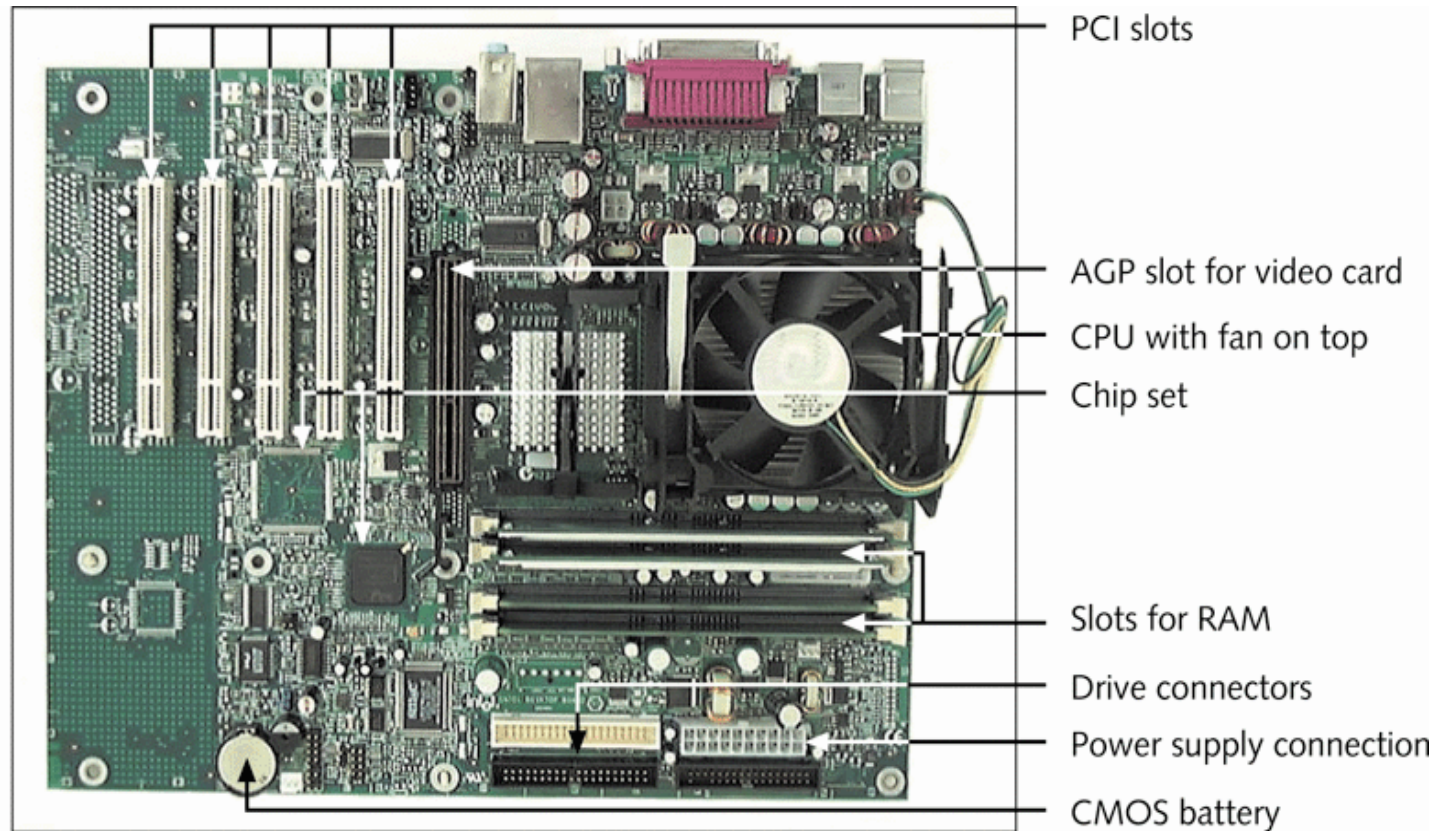
Rear of case

The Motherboard

Figure 1-8 All hardware components are either located on the motherboard or directly or indirectly connected to it because they must all communicate with the CPU
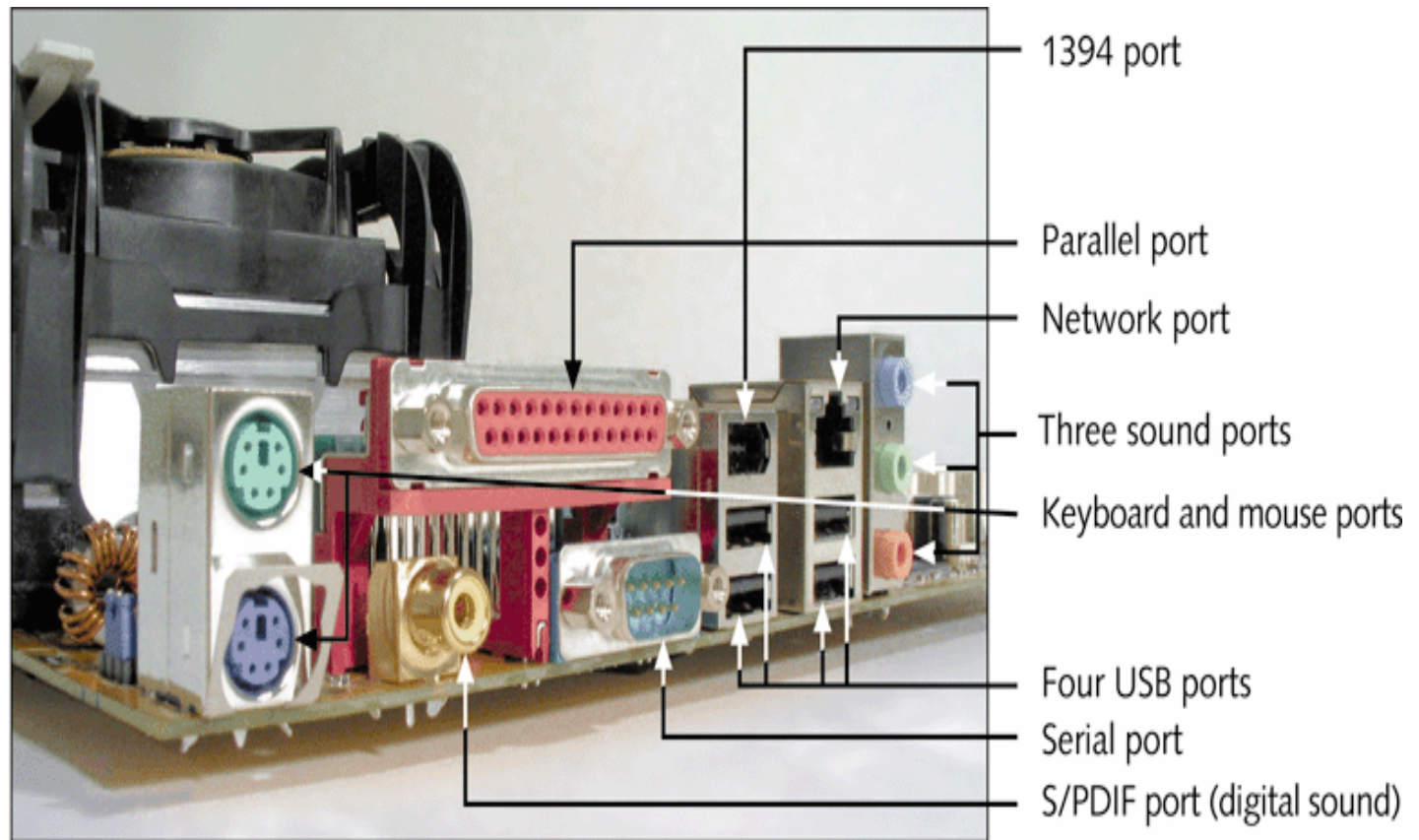
The Motherboard (continued)

1394 port
Parallel port
Network port
Three sound ports
Keyboard and mouse ports
Four USB ports
Serial port
S/PDIF port (digital sound)

Figure 1-9 A motherboard provides ports for common I/O devices

Types of Expansion Slots
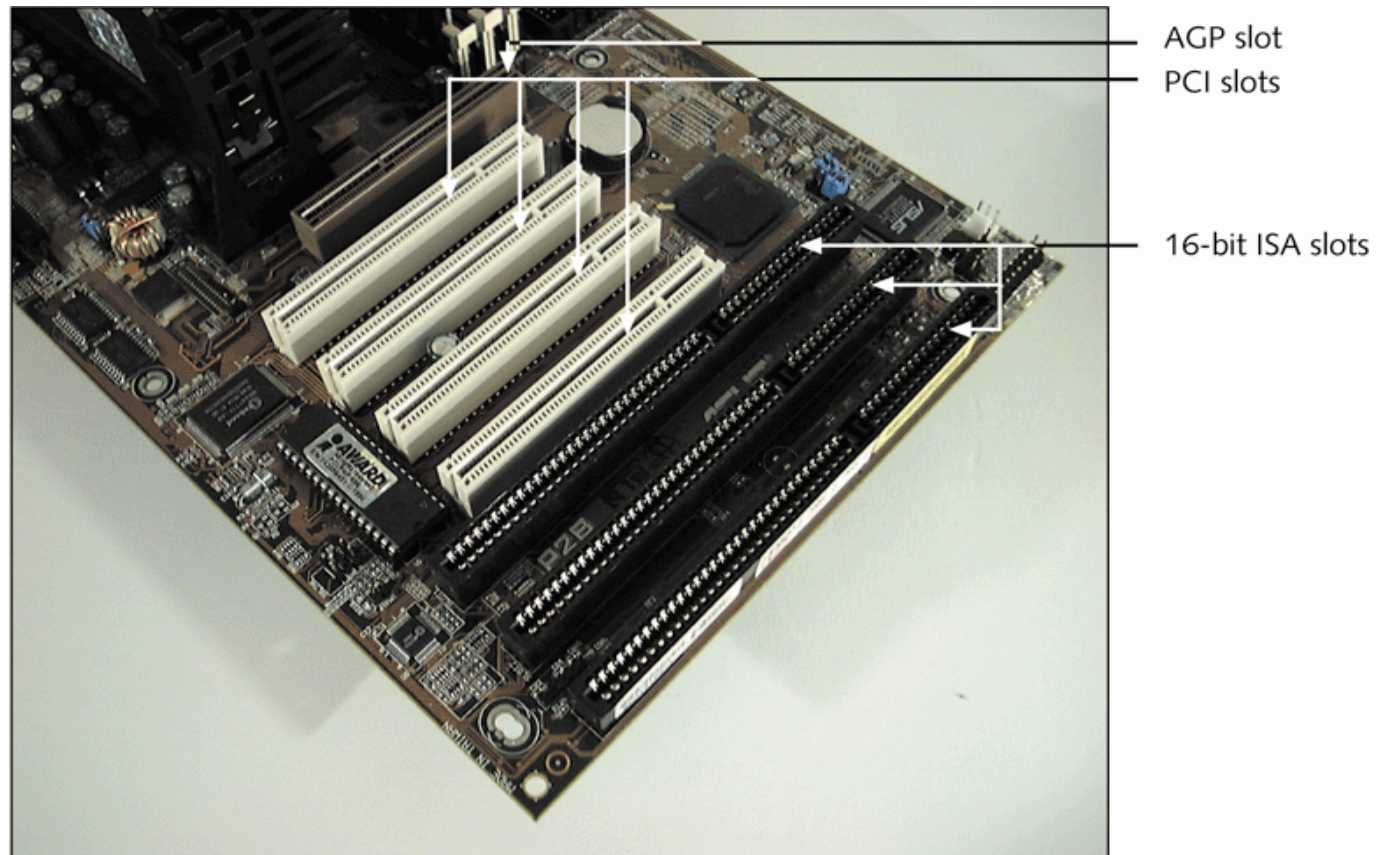

AGP slot
PCI slots
16-bit ISA slots

Figure 1-28 PCI bus expansion slots are shorter than ISA slots and offset farther; the one AGP slot is set further from the edge of the board

The Electrical System (continued)
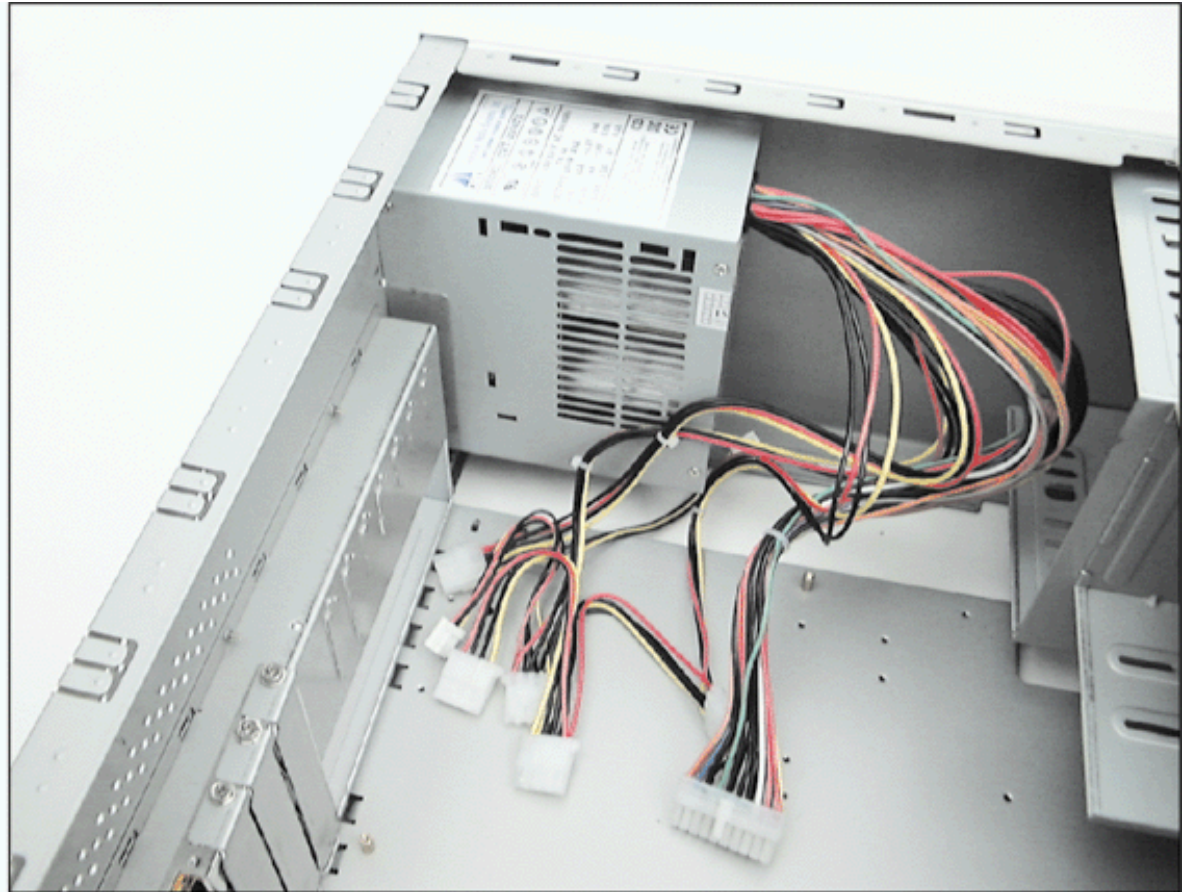

Figure 1-32 Power supply with connections

Instructions Stored on the Motherboard

ROM BIOS (most are flash ROM)

System BIOS

Startup BIOS

CMOS setup

Motherboard BIOS supports ACPI, APM, and Plug and Play technologies
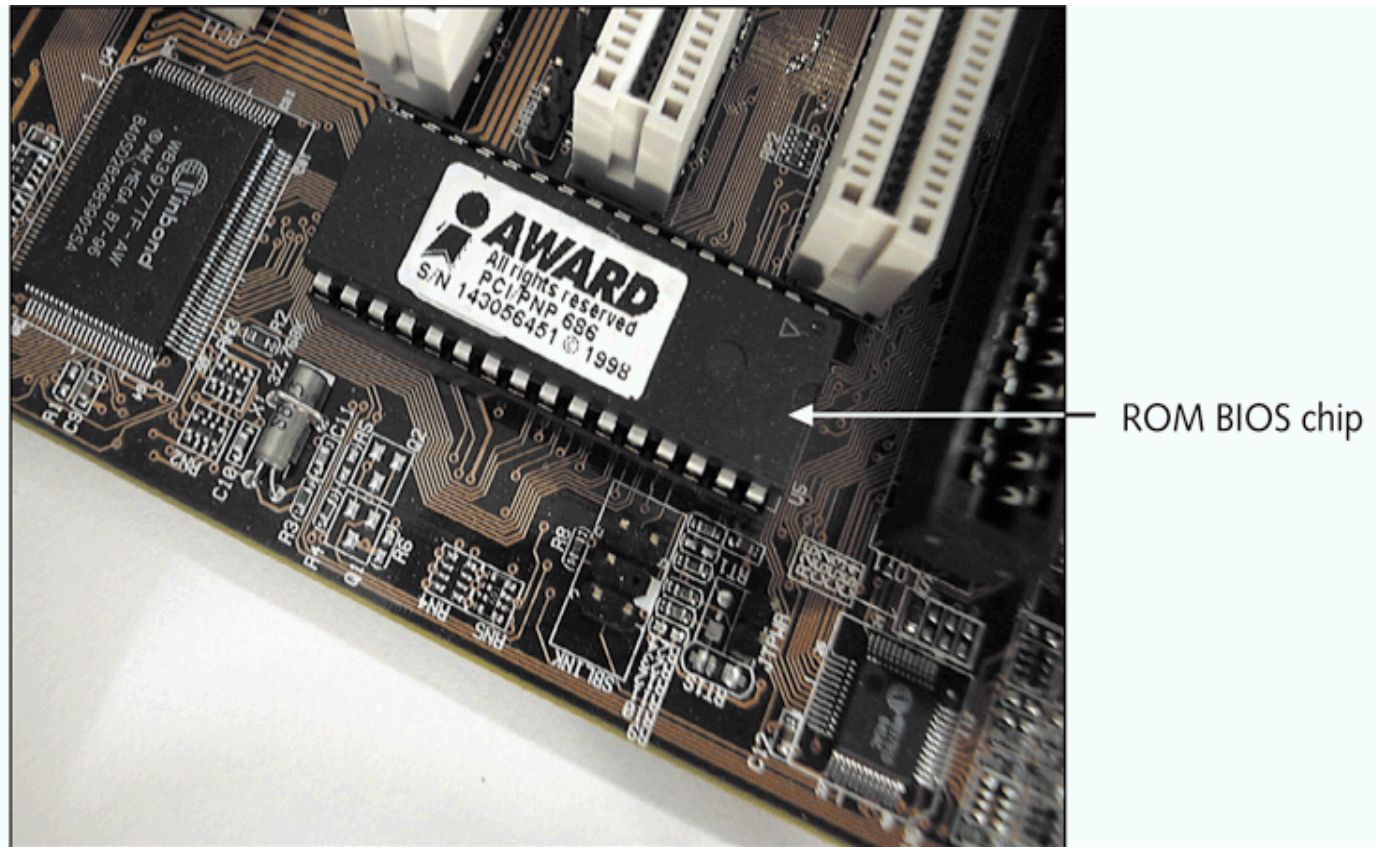
ROM BIOS Chip

Figure 1-34 The ROM BIOS chip on the motherboard contains the programming to start up the PC as well as to perform many other fundamental tasks

Motherboard Configuration Settings

CMOS chip

Stores setup (configuration) information

Powered by a battery on motherboard when power is off

Setup information can also be set by jumpers and DIP switches

CMOS Configuration Chip

Coin battery

Firmware chip

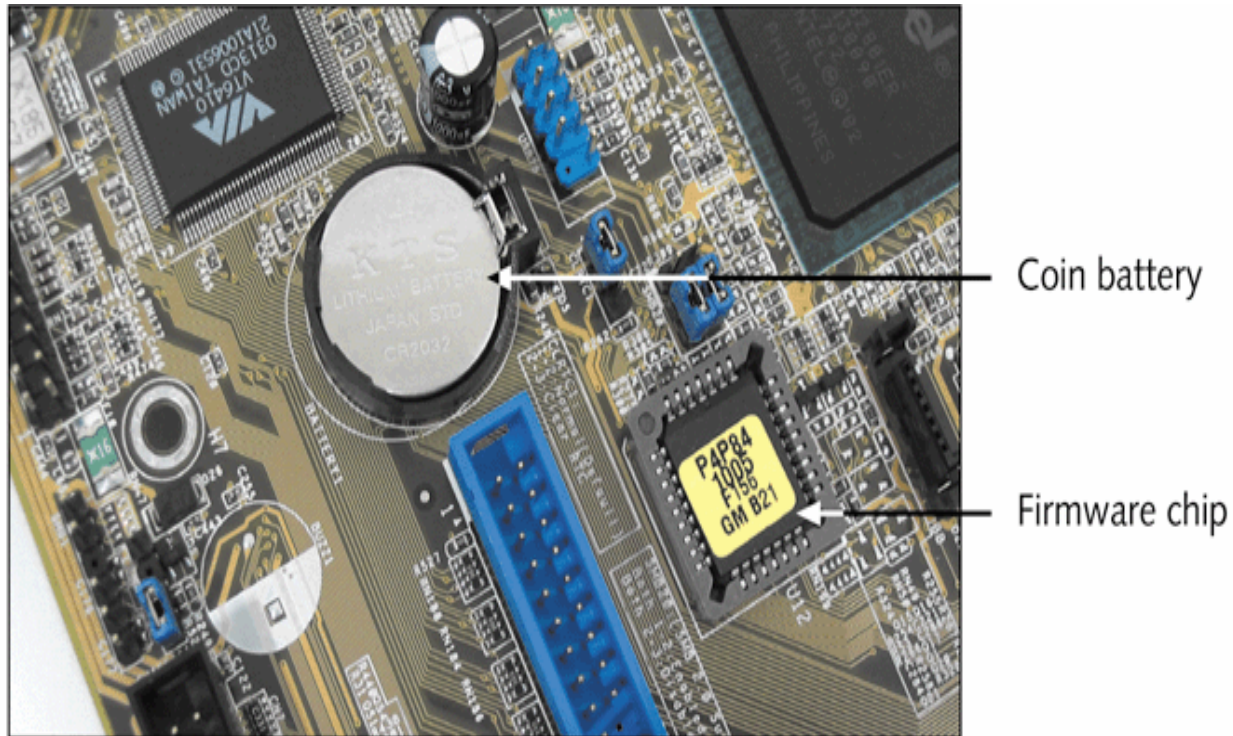**Figure 1-35** This firmware chip contains flash ROM and CMOS RAM; CMOS RAM is powered by the coin battery located near the chip

Setting Jumpers
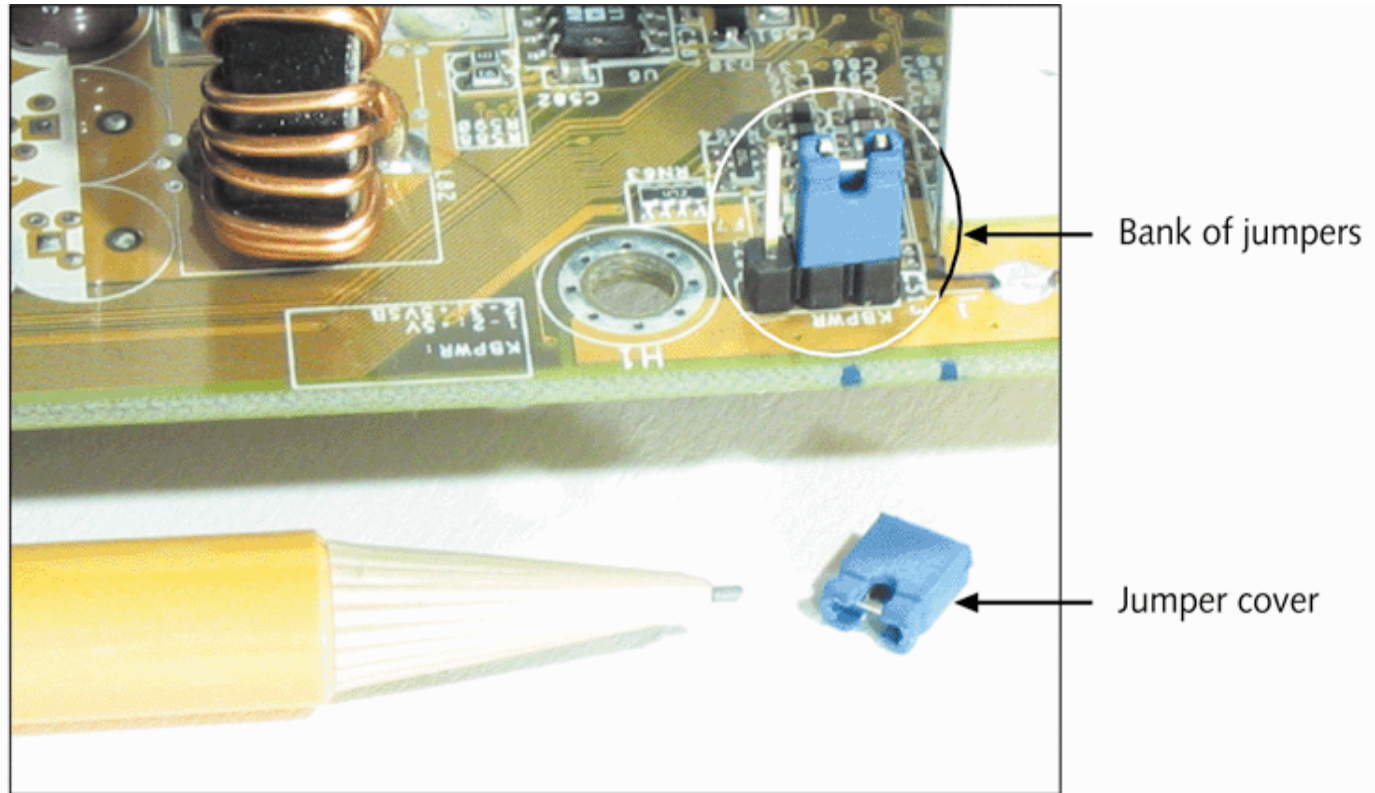
Figure 1-36 Setup information about the motherboard can be stored by setting a jumper on (closed) or off (open). A jumper is closed if the cover is in place, connecting the two pins that make up the jumper; a jumper is open if the cover is not in place.

Using DIP Switches
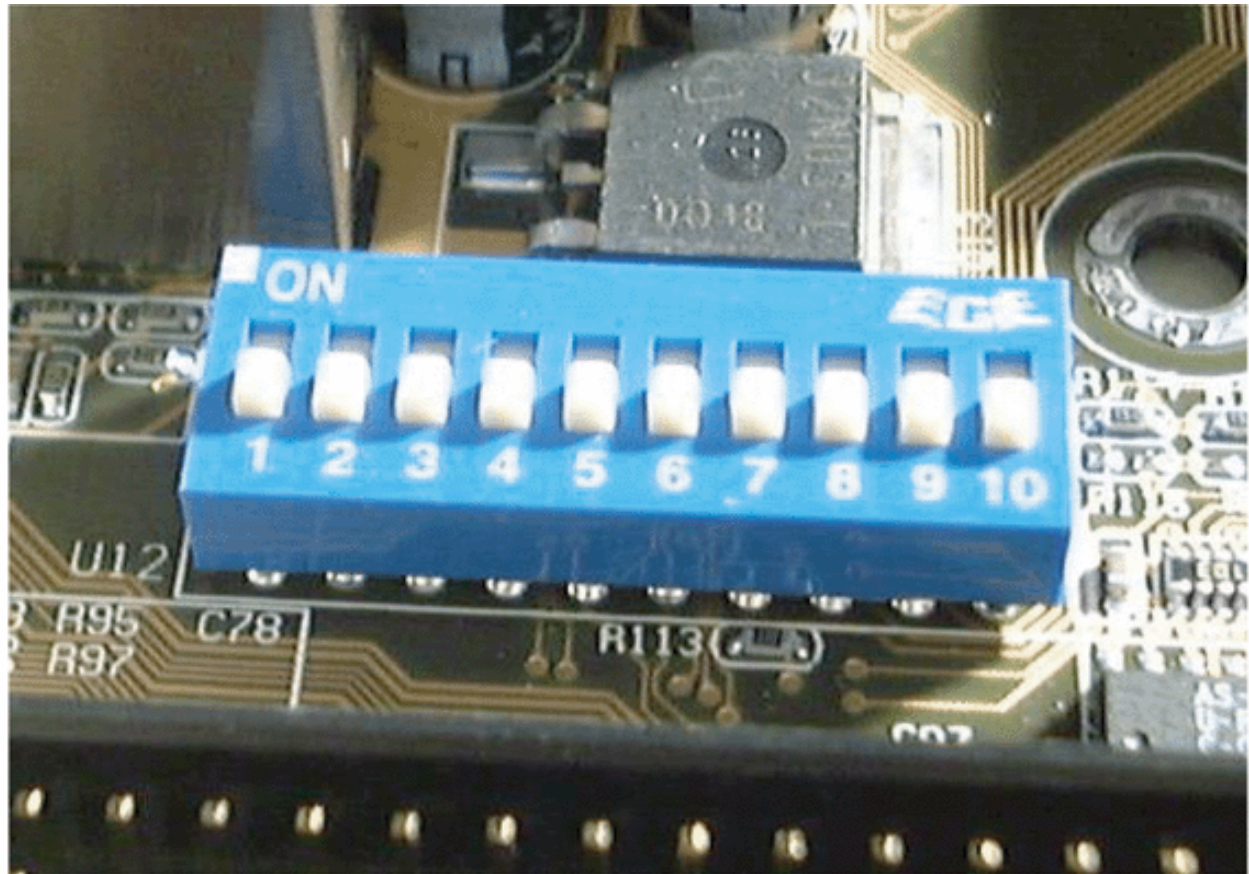
Figure 1-37   A motherboard can use a bank of DIP switches for configuration settings

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Chapter 2

How Hardware and Software Work Together

OS as a Middleman
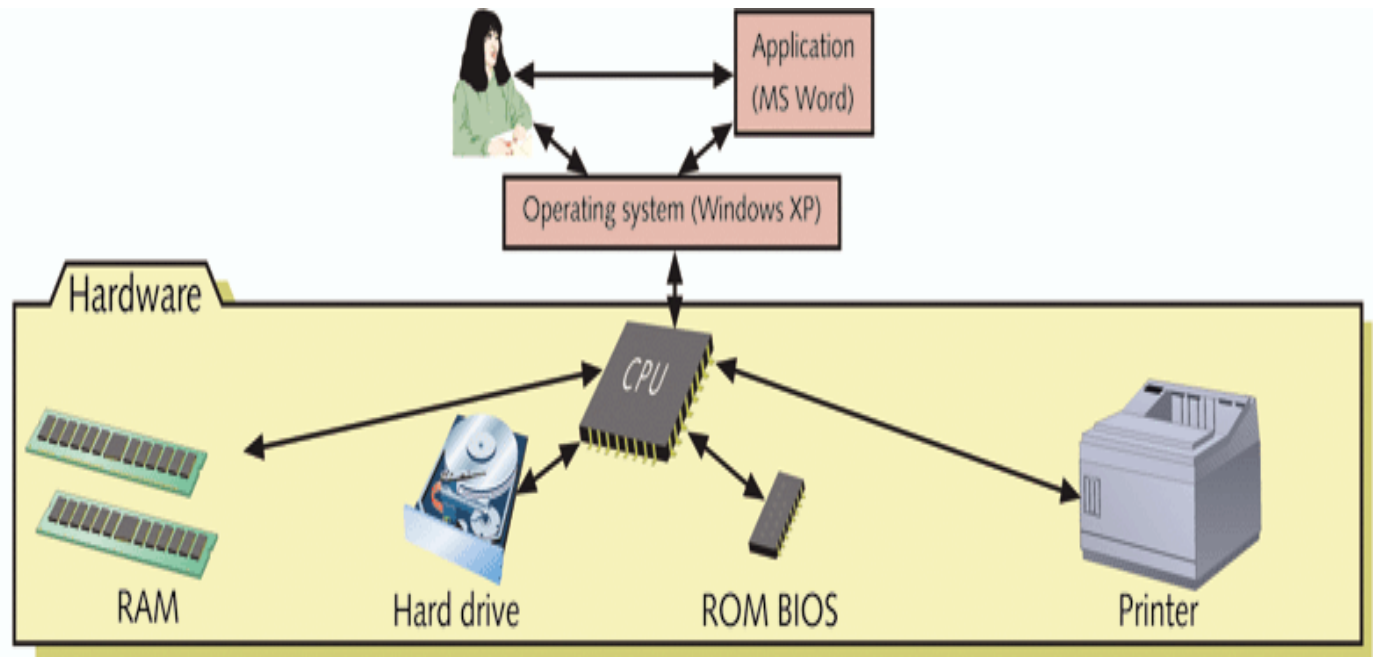
Figure 2-1   Users and applications depend on the OS to relate to all hardware components

The Shell and the Kernel
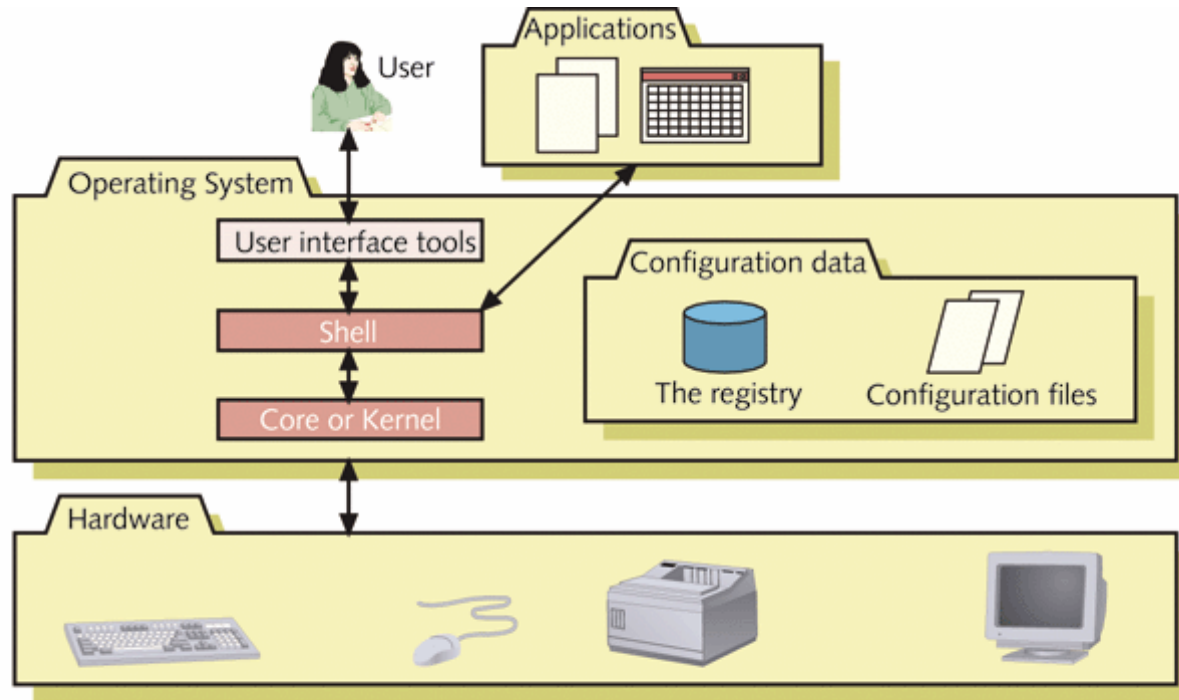
Figure 2-2 Inside an operating system, different components perform various functions

Common Operating Systems

DOS

Windows 9x

Windows NT, Windows 2000, and Windows XP

Unix

Linux

OS/2

Mac OS

Tracks, Sectors, and Clusters

One sector

One track
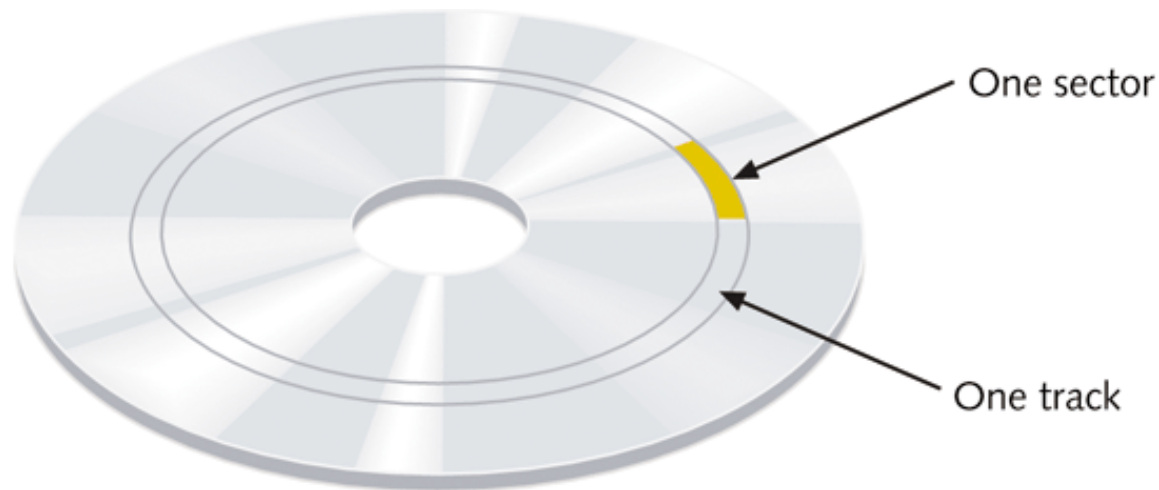
Figure 2-4 A hard drive or floppy disk is divided into tracks and sectors. Several sectors make one cluster.

Files and Directories
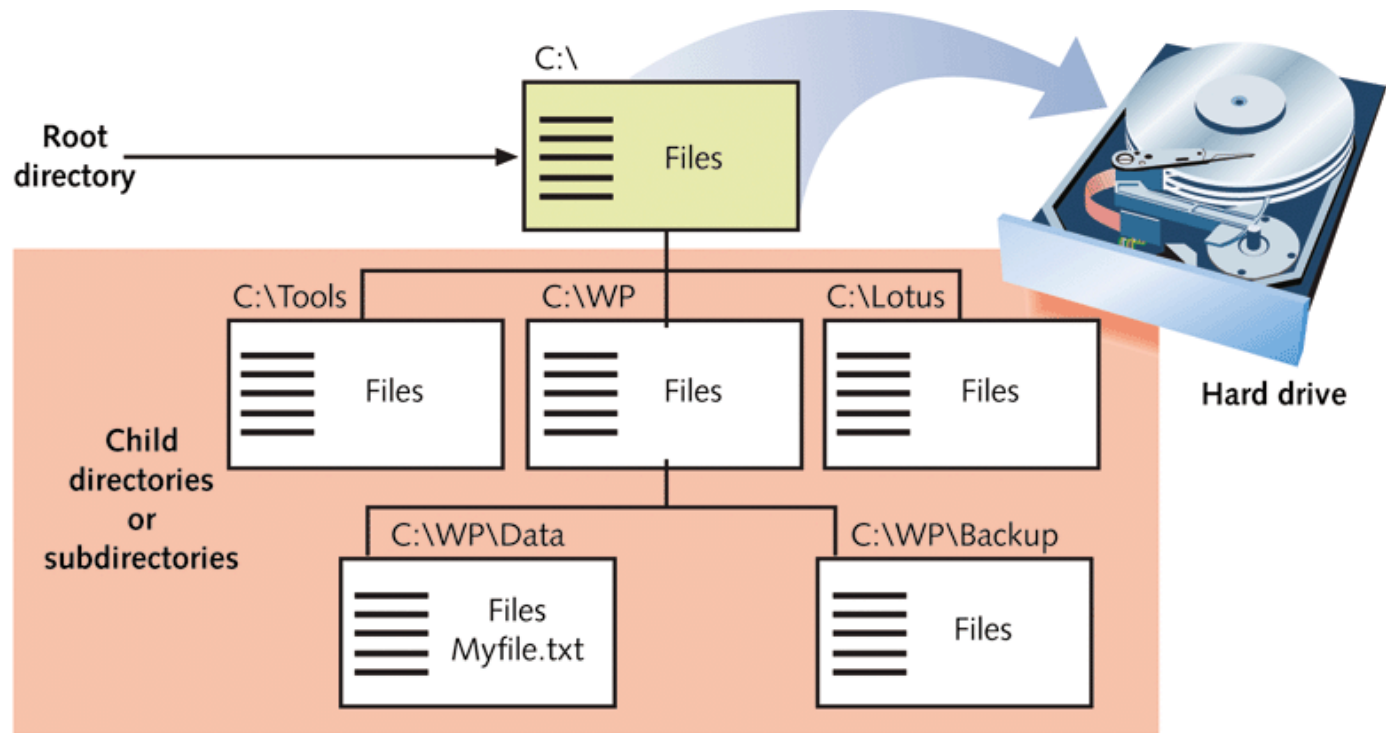
Figure 2-5 A hard drive is organized into groups of files stored in directories. The first directory is called the root directory. All directories can have child directories or subdirectories. Under Windows, a directory is called a folder.

Partitions and Logical Drives
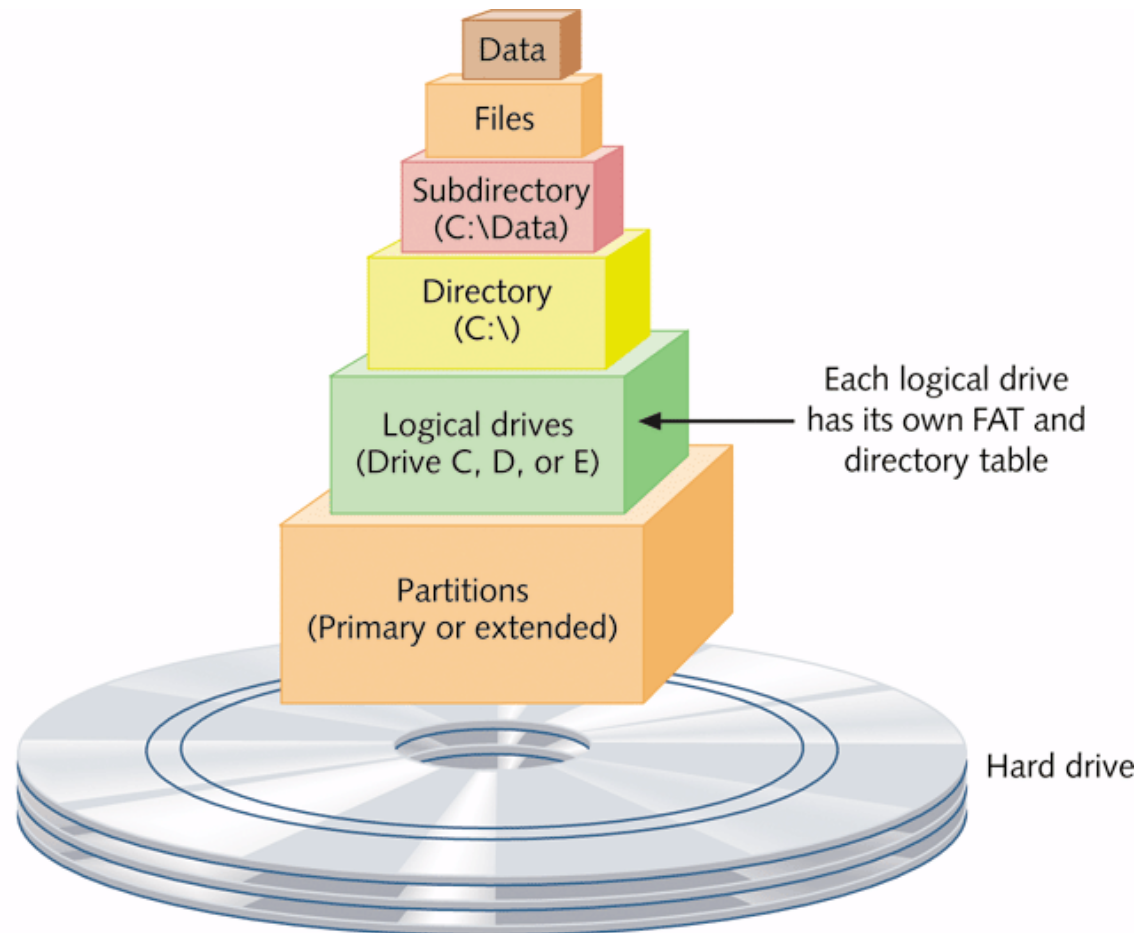
Figure 2-6   A hard drive is divided and organized at several levels

How an OS Uses Device Drivers to Manage Hardware

Device drivers provide OS with software necessary to control devices

16-bit real-mode drivers

Supported by Windows 95/98

32-bit protected-mode drivers

Supported by Windows 95/98, Windows Me, and Windows NT/2000/XP

OS Tools to Examine a System

Device Manager

System Information utility

Microsoft Diagnostic Utility (MSD)

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Chapter 5

The Motherboard
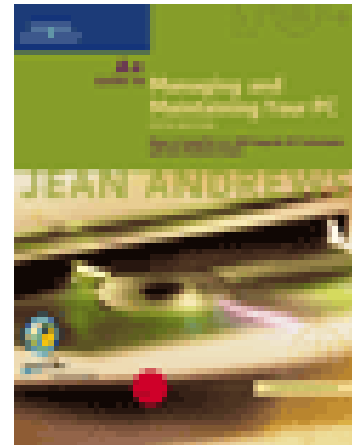
Typical AT Motherboard
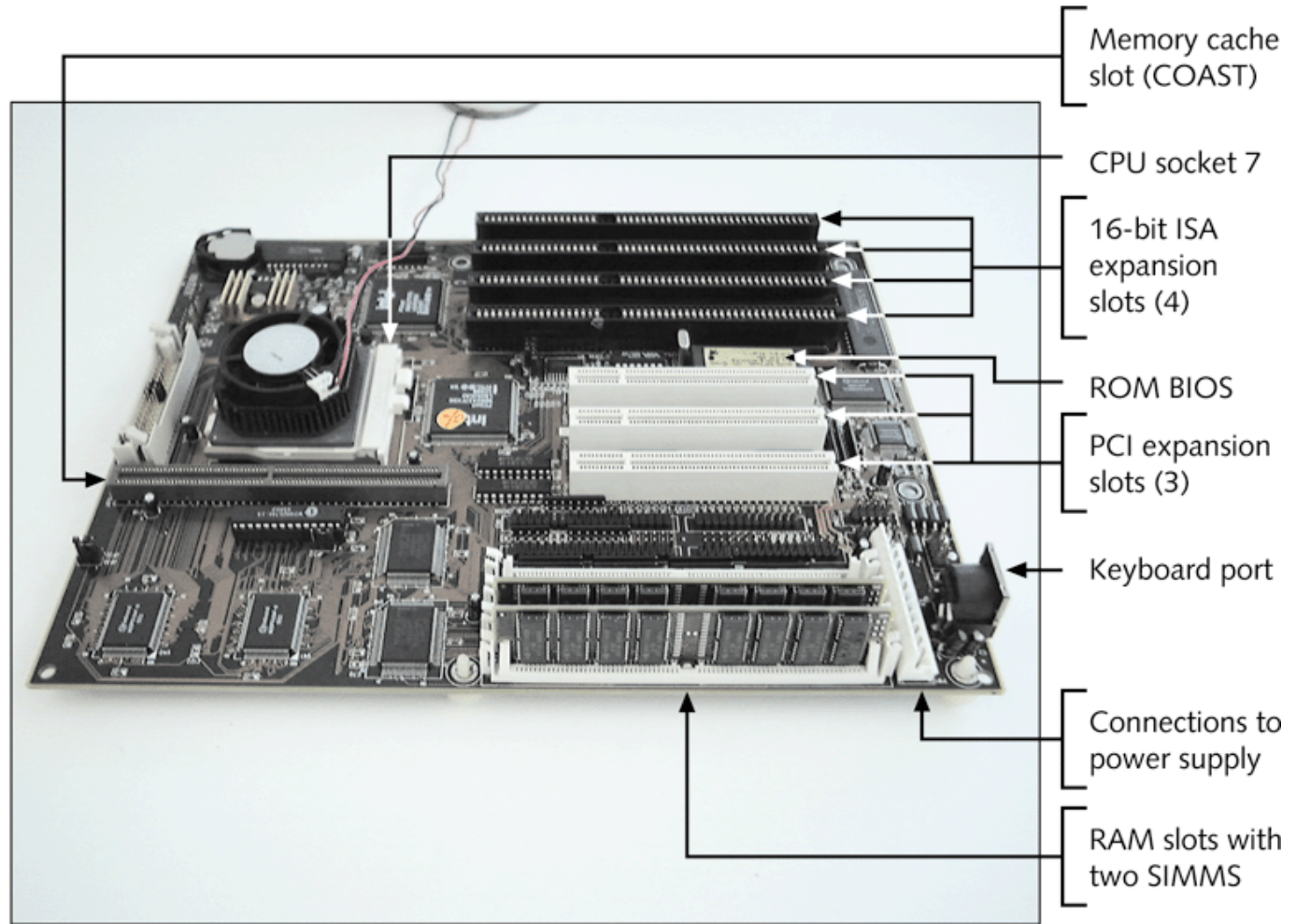
Figure 5-1 A typical AT motherboard with memory cache and socket 7 for the Intel Classic Pentium CPU. The CPU with a fan on top is installed as well as two SIMM memory modules.

Typical ATX Motherboard
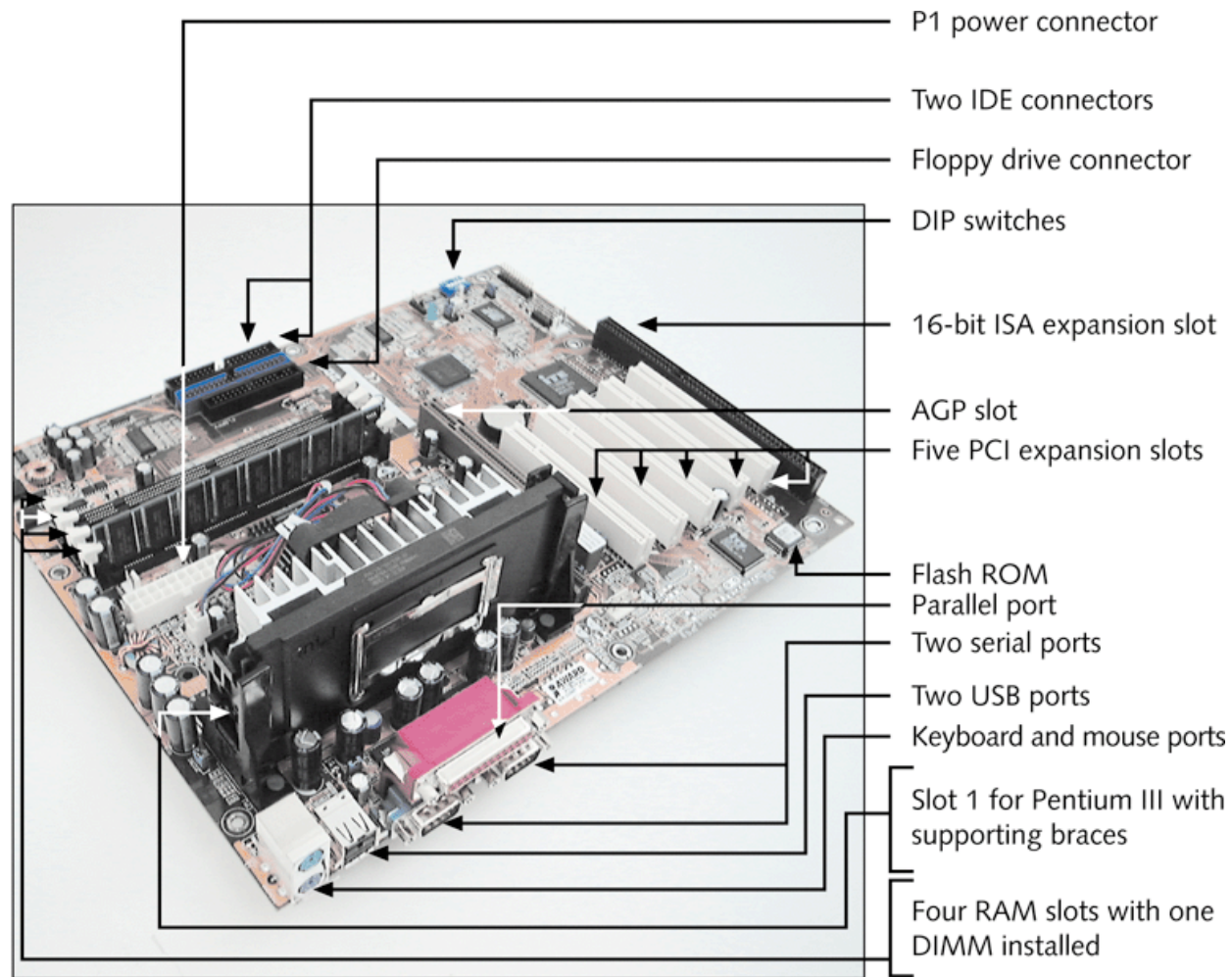
Figure 5-2   An ATX motherboard with a Pentium III and one DIMM module installed

CPU Heat Sinks and Cooling Fans
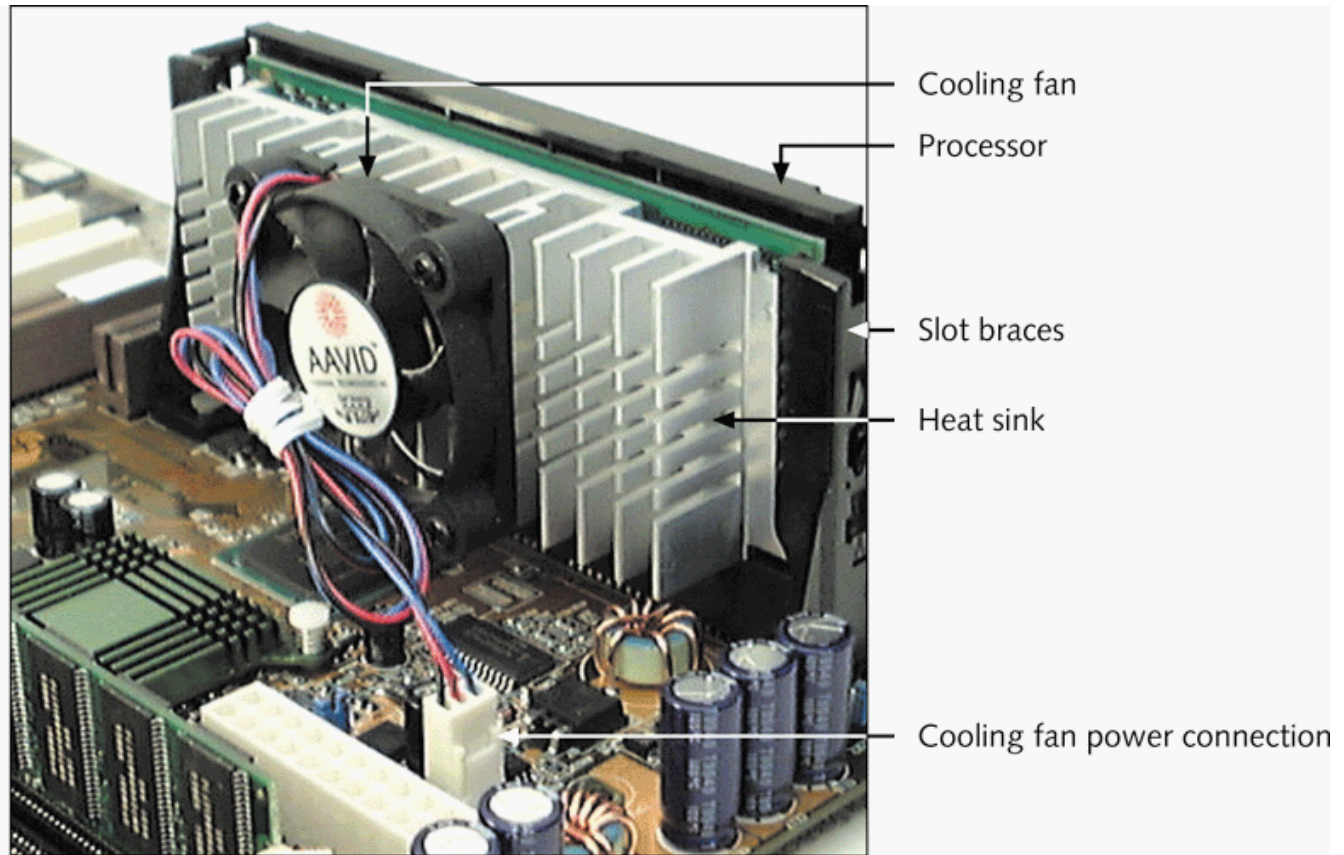
Figure 5-11   A CPU cooling fan mounts on the top or side of the CPU housing and is powered by an electrical connection to the motherboard

Combination Heat Sink and Cooling Fan

Figure 5-12   Volcano 11+ by Thermaltake is a copper PC cooler

Hardware Configuration

Setup data stored by DIP switches

Setup data stored by jumpers

Setup data stored in CMOS memory

Setup Data Stored by DIP Switches
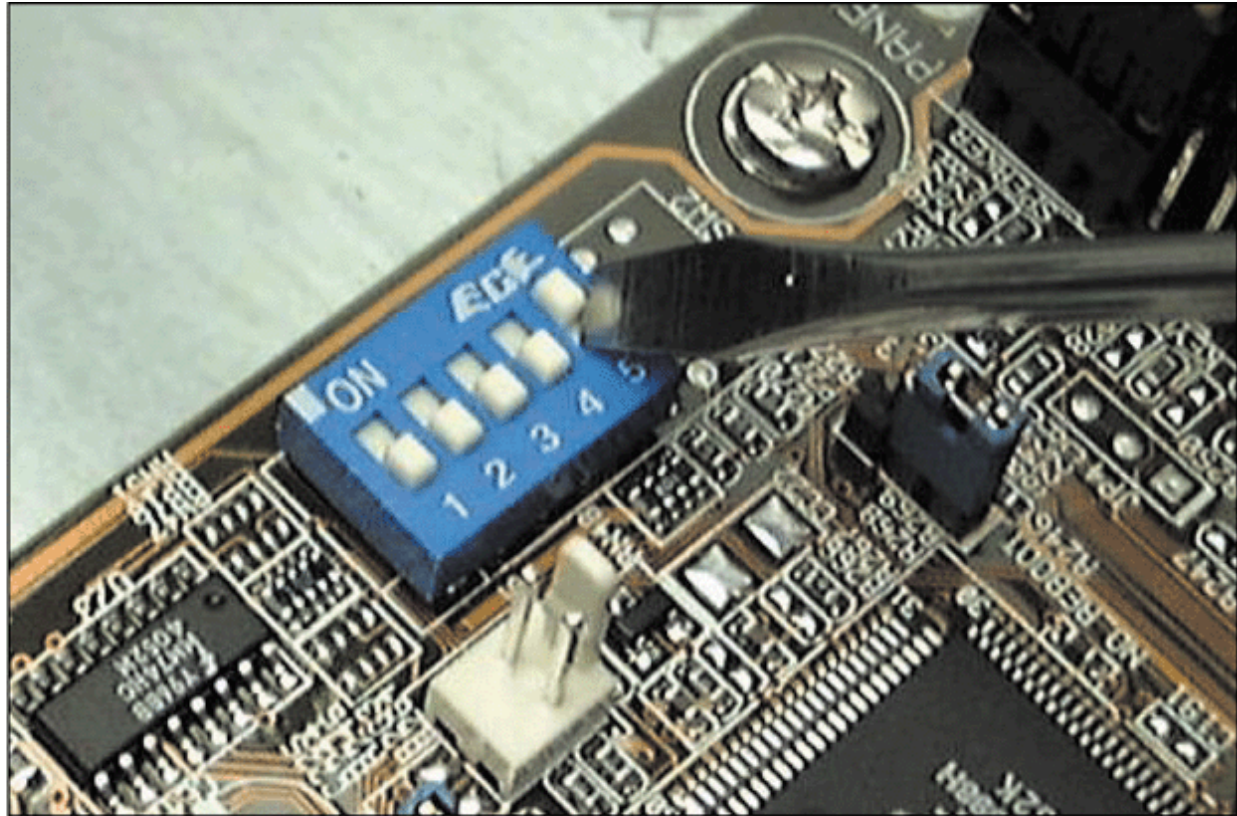
Figure 5-22   DIP switches are sometimes used to store setup data on motherboards

CMOS Setup Main Menu


```
                        AwardBIOS Setup Utility

    Main        Advanced    Power     Boot     Exit

                                                          Item Specific Help
    System Time              [11:42:09]
    System Date             [04/04/2000]
    Legacy Diskette A       [1.44M, 3.5 in.]          <Enter> to select field;
    Legacy Diskette B       [None]                    <+>, <-> to change value
    Floppy 3 Mode Support   [Disabled]

  ▶ Primary Master          [Auto]
  ▶ Primary Slave           [Auto]
  ▶ Secondary Master        [Auto]
  ▶ Secondary Slave         [Auto]
  ▶ Keyboard Features

    Language                [English]
    Supervisor Password     [Disabled]
    User Password           [Disabled]
    Halt On                 [All Errors]
    Installed Memory        128MB


  F1   Help  ↑↓ Select Item  -/+    Change Values   F5    Setup~Defaults
  ESC  Exit  ←→ Select Menu  Enter  Select▶Sub-Menu F10   Save~and Exit
```

Figure 5-25   CMOS Setup Main menu

CMOS Setup Boot Menu


```
                    AwardBIOS Setup Utility

     Main      Advanced    Power      Boot     Exit

                                              │  Item Specific Help
1.  Removable~Device    [Legacy~Floppy]      │
2.  IDE~Hard~Drive      [None]               │  Boot~Sequence:
3.  ATPI~CD-ROM         [ASUS~CD-S400]       │  <Enter>~to~select~the
4.  ~Other~Bot~Device   [INT18~Device~(Networ]│ device.

Plug~&~Play~O/S          [No]                │  To~select~the~boot
Reset~Configuration~Data [No]                │  sequence,~use~the~up~or
Boot~Virus~Detection     [Enabled]           │  down~arrow,~Press~<+>~to
Quick~Power~On~Self~Test [Enabled]           │  move~the~device~up~the
Boot~Up~Floppy~Seek      [Enabled]           │  list,~or~<=>~to~move~it
Full~Screen~Logo         [Enabled]           │  down~the~list.


F1   Help  ↑↓ Select Item  −/+    Change Values   F5   Setup~Defaults
ESC  Exit  ←→ Select Menu   Enter  Select▶Sub-Menu  F10  Save~and Exit
```
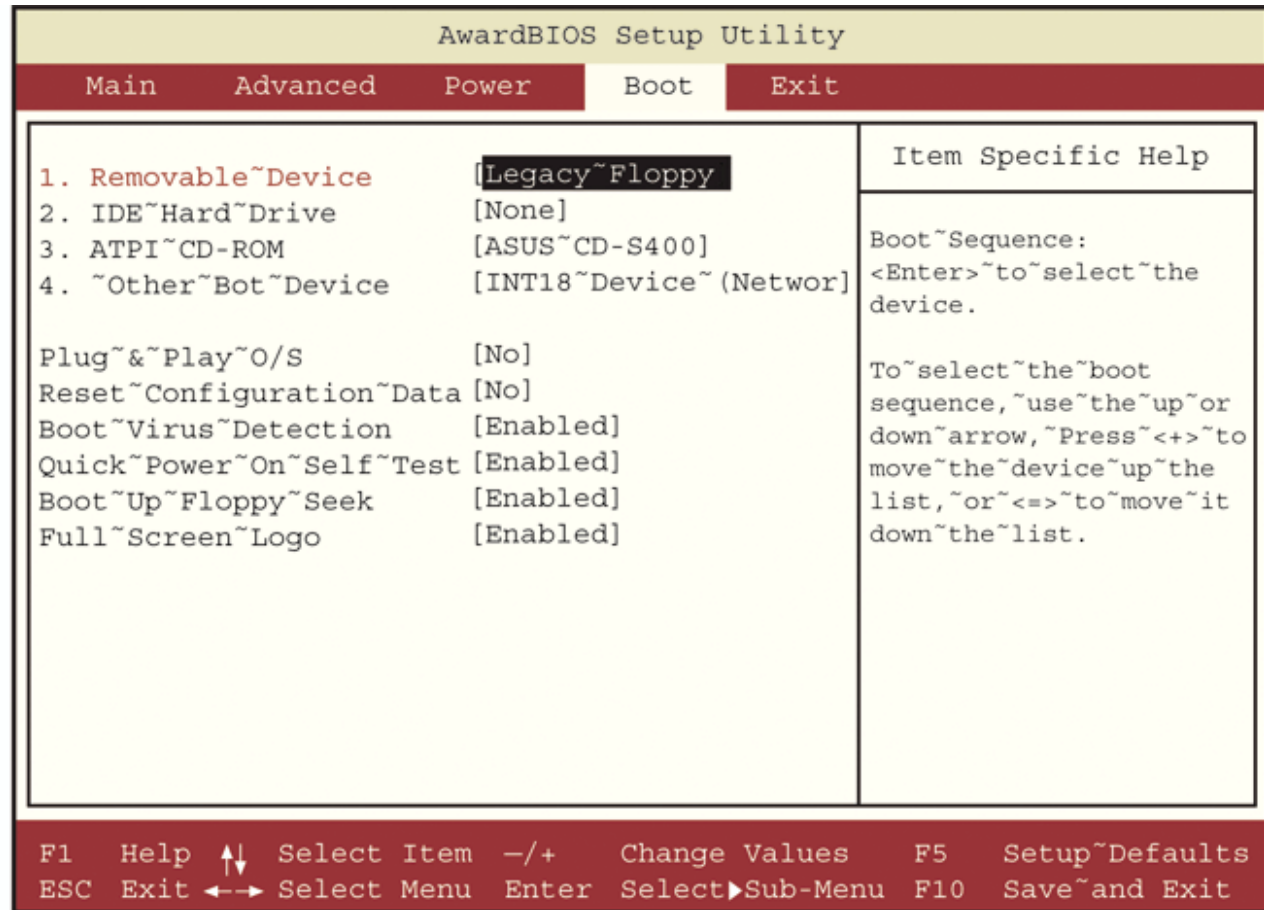
Figure 5-27   CMOS Setup Boot menu

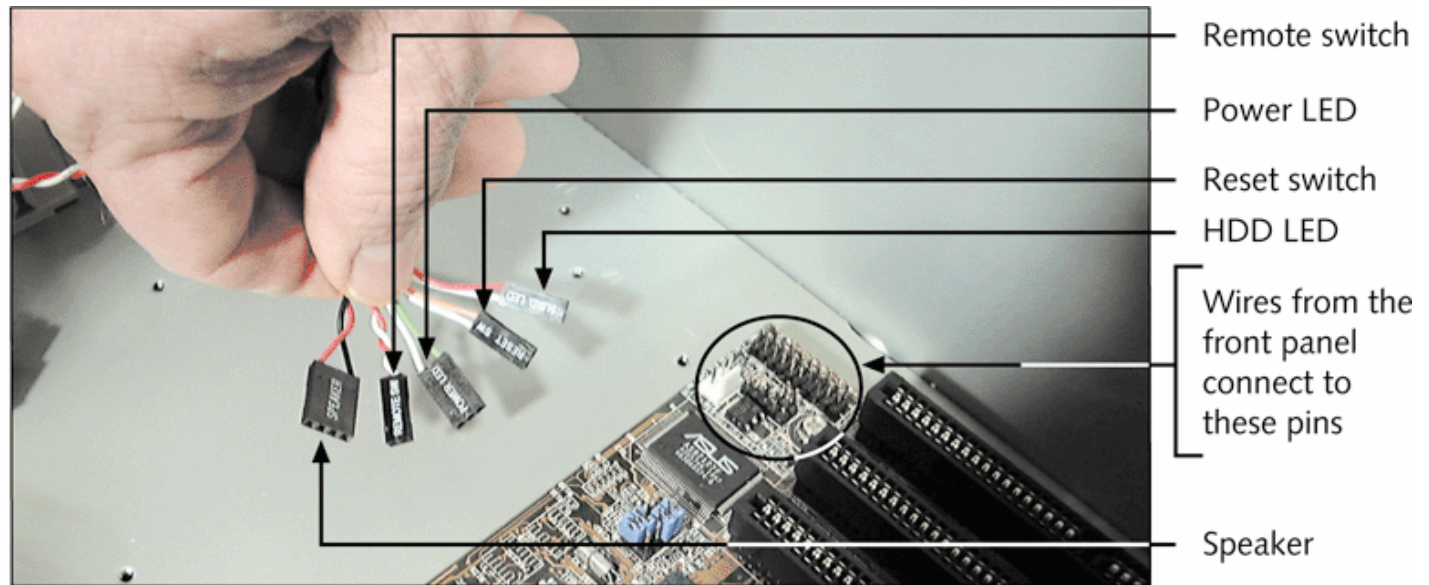# Wire Connectors

Figure 5-41 Five wires from the front panel connect to the motherboard

Troubleshooting the Motherboard and CPU

Look for clues from POST

    Reports errors as beep codes

<u>Cautiously</u> substitute good hardware components for those you suspect are bad.

Make Sure Power Supply is not bad!!!