What is a Computer?

An electronic device that has the capability of performing the following tasks:

- Responds to input.
- Processes the input according to the instructions it gets.
- Stores the instructions and results of the processing.
- Provides output in the form of information.
- Transmits data among machines.
A Typical Home/Office Computer System

- Monitor
- Printer
- Computer
- CD
- Mouse
- Keyboard
There are four general classifications of computers:

- Microcomputers
- Minicomputers
- Mainframe computers
- Super computers
Microcomputers

- They are popularly called Personal Computers (PC)
- They can accommodate only one user at a time
- There are three types of PCs:
  - Desktop
  - Laptop
  - Notebook
Minicomputers

- They are mid size computers
- They can service up to about 200 users simultaneously.
Mainframe Computer

They are huge machines that operate as a number of machines.
They are extremely fast
They have huge storage capacities.
They can service thousands of users simultaneously
Supercomputer

• They are physically the largest of all the types of computers.
• They are designed to carry out intensive tasks such as:
  ▪ Weather forecasting
  ▪ Census calculations
Two Broad Divisions of Microcomputers

There are two broad divisions of microcomputer architecture, namely:

- IBM-compatible, popularly called PC

- Apple Mac, popularly called Mac

- These systems are not compatible, due to differences in architectural design
All computers are based on some fundamental design features as shown in the diagram below.
All computers have the following features:

- **Central Processing Unit** – popularly called **CPU**
- **Primary memory** – popularly called **RAM**
- **Peripheral devices that communicate with the outside world:**
  - **Input devices** – such as mouse, keyboard
  - **Output devices** – such as printers, display screen, audio speaker
  - **Secondary/external storage devices**, such as hard drive, CD
  - **Communication devices** such as modem
Central Processing Unit – (CPU)

• The CPU is the heart of the computer
• Its main function is to execute computer programs stored in memory
• Three major components of the CPU are:
  ▪ The Arithmetic Logic Unit (ALU)
    □ The ALU performs arithmetic operations & logic operations.
  ▪ The Control Unit (CU)
    □ Extracts instructions from memory
    □ Decodes the instructions,
    □ Executes the instructions.
  ▪ Registers
Primary Memory

• That part of the computer where programs and data are stored when the program is executing.

• The term primary memory is known by various names:
  ▪ Random Access Memory (RAM)
  ▪ Internal memory
  ▪ Main memory
  ▪ Immediate access storage
  ▪ Immediate memory.
Types of Memory

Read Only Memory (ROM)
- Instructions are physically wired in the electronic circuitry
- Instructions are preserved when the current is off

Random Access Memory (RAM)
- Programs and data are saved when current is on
- Programs and data are lost when the current is turned off
How Data is Encoded

- Computers store & manipulate data, by using the digits 0 and 1.
- These digits are called **binary digits**
- Each binary digit is called a **bit**.
- Computers rarely operate on a single bit
- They operate on series of eight bits
- Each group of 8 bits is called a **byte**.
- For instance the letters of the alphabet, digits, and punctuation symbols are all coded in bytes.

<table>
<thead>
<tr>
<th>Character</th>
<th>Byte value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>01000001</td>
</tr>
<tr>
<td>n</td>
<td>01101110</td>
</tr>
<tr>
<td>3</td>
<td>00110011</td>
</tr>
<tr>
<td>&amp;</td>
<td>00100110</td>
</tr>
</tbody>
</table>
## Units of Measure

<table>
<thead>
<tr>
<th>8 bits</th>
<th>1 Byte</th>
</tr>
</thead>
<tbody>
<tr>
<td>1024 Bytes</td>
<td>1 Kilobyte</td>
</tr>
<tr>
<td>1024 KB</td>
<td>1 Megabyte</td>
</tr>
<tr>
<td>1024 Megabyte</td>
<td>1 Gigabyte</td>
</tr>
<tr>
<td>1024 Gigabyte</td>
<td>1 Terabyte</td>
</tr>
</tbody>
</table>

1024 bytes = 1 Kilobyte (KB)
1024 Kilobytes = 1 Megabyte (MB)
1024 Megabytes = 1 Gigabyte (GB)
1024 Gigabytes = 1 Terabyte (TB)
Output Devices

- Computers communicate with the outside world by means of output devices.
- Computers produce four categories of outputs:
  - Text - alphabetic characters, punctuation symbols, and numbers.
  - Image - graphics and pictures
  - Sound - music and voice imitations
  - Digital data – binary data
Output Devices

Monitor

Printer

Speaker

Floppy Disk

Compact Disk = CD - ROM

Hard Drive
Secondary Storage Devices

- Any storage medium that retains data when the power is turned off.

- Floppy Disk
- Hard Drive
- Magnetic Tape
- Compact Disk == CD - ROM
- Flash/Jump/Thumb Drive
- Flash Memory Card
Data Transmission using Modem

- A modem is a device that is used to transmit data between machines.
- How it works:
  1. It converts the bits from the machine sending the data, into voice signal
  2. It transfers the voice signal over the telephone line
  3. It converts the voice signal back to bits in the machine at the other end
Types of Modems

Wireless modem – typically for desktop and laptop computers

Cable modem – typically for desktop computers

Wireless modem – typically for laptop and notebook computers
Software System

• The general term given to the instructions that allow the computer to function.

• The three broad categories of software:
  ▪ Systems Software
  ▪ Processing Programs (Programming languages)
  ▪ Application programs
Systems Software

• **Systems software is the set of programs that determines:**
  - How the hardware is used, and
  - When other programs can get to run

• **There are two broad categories of systems software, namely:**
  - Operating system
  - Utilities programs
Operating System

• It is the most important program that runs on any computer.
• Without an operating system, a computer would be useless
• It enables the hardware components to communicate with one another
• It runs other software such as application software

• Names of operating systems
  ▪ DOS, Microsoft Windows, ME, XP
  ▪ Mac OS X
  ▪ Unix, Linux
Microsoft Windows Desktop

Desktop

- Your on-screen work area, shown below
- Operating system displays user interface objects:
- Elements of the desktop
  - Icons – Symbols for programs
  - Task Bar – Horizontal bar showing task that are currently running
  - System Tray – Horizontal bar showing miniature icons for easy reach
The family of Windows Desktop is similar to this one.
Utility Programs

• Utility programs provide services that are essential for:
  • Disk management, and
  • File management.

• Type of Programs
  ▪ Disk fragmentation programs – rearrange the files on the hard drive so as to make efficient use of the disk.
  ▪ Anti-virus programs – scan for, and eliminate computer viruses
  ▪ Encryption programs – encrypt and decrypt data that are to be transferred over the internet (Example banking information)
### Processing Programs

- Programs that programmers use to write application programs.
- They are also called programming language translator, or simply translators.
- Their main purpose is to convert the programmer’s code into binary form.

<table>
<thead>
<tr>
<th>Category of Processing Programs</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assembler</td>
<td>IBM Assembler</td>
</tr>
<tr>
<td>Interpreter</td>
<td>BASIC</td>
</tr>
<tr>
<td>Compiler</td>
<td>C, C++, Java</td>
</tr>
</tbody>
</table>
Application Programs

- Programs that are written for the user to carry out common tasks:
  - Creating and modifying documents
  - Performing calculations, or
  - Managing volumes of data
- The functions performed by application software are range from:
  - Personal activities
  - Family activities
  - Professional activities
  - Organizational activities, to
  - Business activities
<table>
<thead>
<tr>
<th>Software Types</th>
<th>Purpose</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Processor</td>
<td>Enables users to create and edit documents such as letters and essays</td>
<td>• WordPerfect</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Microsoft Word</td>
</tr>
<tr>
<td>Database Program</td>
<td>Enables the user to collect, organize, and manipulate data.</td>
<td>• Oracle and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Microsoft Access</td>
</tr>
<tr>
<td>Spreadsheet</td>
<td>Simulates accountant worksheets They generate graphs from the data</td>
<td>• Microsoft Excel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lotus 1-2-3.</td>
</tr>
<tr>
<td>Multimedia</td>
<td>Enables user to create, record, and play audio and video media</td>
<td>• Real Player</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Windows Media Player</td>
</tr>
<tr>
<td>Internet</td>
<td>Enables user to communicate with one another</td>
<td>• Internet Explorer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mozilla Firefox</td>
</tr>
</tbody>
</table>