



M1:
Components of
a Computer
System

Mr. J. Mishra
MGCUB, INDIA

Objectives

Introduction

Computer
Classification

Anatomy of a
Computer

Input Device
Central Processing
Unit (CPU)
Output Device

Softwares

Booting

Programming

Exercise

References

Introduction to Programming-I

Components of a Computer System

Course: B Tech in CSE
Course Name: Programming for Problem Solving
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Outline

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Objectives

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Objectives

- Study on basic building blocks of a computer
- Study on hardware and software of computer system
- Basic understanding of computer programming and execution



Introduction

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Computer is a an electronic device, which contains some set of instructions and performs certain calculations to be forwarded to output device for corresponding accepted inputs.

Characteristics of a Computer

- Very fast speed of calculation
- Store large amount of information for future purpose in short time
- Great ability to enhance the communication system
- Accuracy of calculation is very high

Based on physical presence, computer components are termed as the hardware and software. The electronic circuit/mechannical component oriented physical objects associated with computer system called as hardware and the soft part which are responsible to perform the calculation and to do any defined task with help of other peripheral or actuation devices are called as software.

Areas of Application

- Computer and communication system
- Manufacturing, construction engineering and project management
- Military, space applications
- Logistic, distribution and supply chain management
- Business process, healthcare management, research in different sector



Computer Classification

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Personal Computer

- A small, single-user computer based on a microprocessor. In addition to the microprocessor, a personal computer has a keyboard for entering data, a monitor for displaying information, and a storage device for saving data.

Workstation

- A powerful, single-user computer. A workstation is like a personal computer, but it has a more powerful microprocessor and a higher-quality monitor.

Mini-computer

- A multi-user computer capable of supporting from 10 to hundreds of users simultaneously.

Mainframe Computer

- A powerful multi-user computer capable of supporting many hundreds or thousands of users simultaneously.

Super Computer

- An extremely fast computer that can perform hundreds of millions of instructions per second.

Personal computers are available in attractive features and could be termed as Laptop and Smartphone Computers. These are Netbook, mobile device, smart phone, tablet computer.



Anatomy of a Computer[1]

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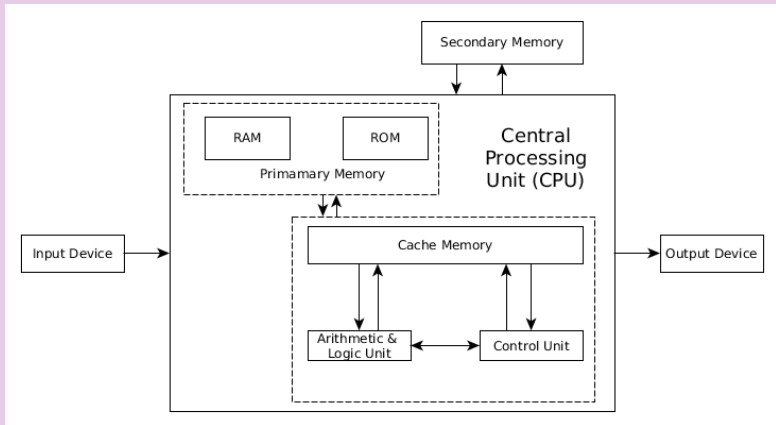


Figure 1: Schematic Diagram of a Digital Computer



Anatomy of a Computer (Contd...)

Input Device

Input devices are the part of hardware to provide human understanding information to a computing system in digital form.

Examples

- 1 Keyboard: Alphanumeric Keyboard, MIDI keyboard (music synthesizer)
- 2 Pointing Devices: Mouse, touchpad, trackball
- 3 Speech Recognition: Microphone(using voice speech recognition or biometric verification)
- 4 Biometric system: Fingerprint scanner
- 5 Smart Card Reader: ATM, employee, business card, Punch card reader
- 6 Digital camera and digital camcorder.
- 7 Medical instruments: ECG, EEG, X-ray, CT scan, and ultrasound images
- 8 Finger (with touch screen or Windows Touch).
- 9 Gamepad, joystick, paddle, yoke, steering wheel, and Microsoft Kinect (gesture recognition),
- 10 Light gun, Light pen, Magnetic ink (like the ink found on checks), Pen or stylus
- 11 Reader: MICR, OMR, OCR, Scanner
- 12 Signalling Device: Remote, GPS
- 13 Sensors (e.g., heat and orientation sensors).
- 14 Eye tracker

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Central Processing Unit (CPU)

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This is the central part of computer which is responsible to produce output for a particular input or sometime automatic system production. It has mainly three parts: control unit, arithmetic logic unit and memory.

Control Unit (CU)

- 1 It controls execution of instruction set between memory to ALU.
- 2 It is part of processor to control connection between hardware and software.

Arithmetic & Logic Unit (ALU)

- 1 It executes arithmetic operation as addition, subtraction, multiplication, division.
- 2 It performs logical operations as comparison, combinational logic (and, or, not, xor, xnor).

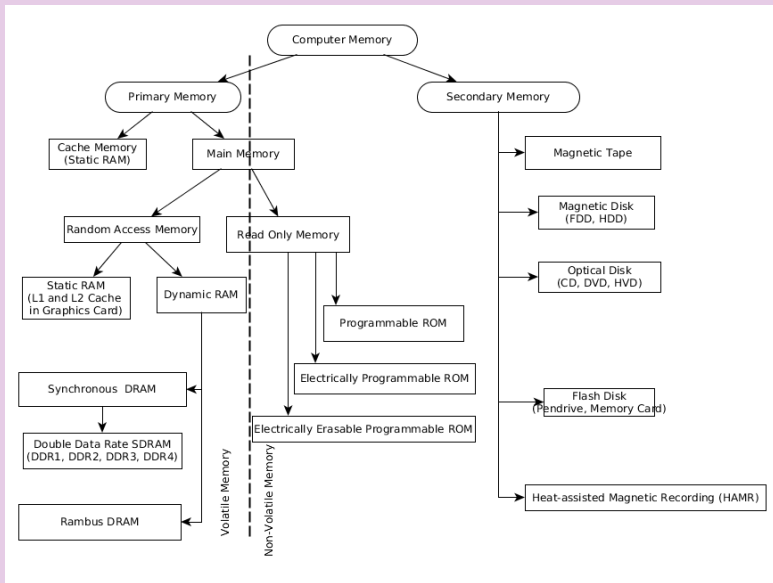
Memory

- 1 Executable data are stored in primary memory.
- 2 Access of primary memory is very fast and volatile in nature (except ROM).



Anatomy of a Computer (Contd...)

Computer Memory



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Ouput Device

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Ouput Device

- ① Visual Display Unit: Monitor, TV
- ② 3D Printer
- ③ COM (Computer Output Microfilm)
- ④ Audio output device: Speaker, Headphones
- ⑤ Plotter
- ⑥ Printer (dot matrix printer, inkjet printer, and laser printer)
- ⑦ Projector
- ⑧ Sound card
- ⑨ SGD (Speech-generating device)
- ⑩ Video card



Computer Softwares[2]

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Computer softwares are the set of instructions to perform any specific task with help of peripheral devices, any calculation and its own management.

System Softwares

These software creates an environment or platform for the other software to easily work on it. These softwares are the main part to execute some certain type of application softwares and computer management.

- 1 Operating System: Microsoft Windows, macOS, LINUX, Android
- 2 Device driver: BIOS, Motherboard, Display, ROM, Printer, USB, Sound Card, VGA Drivers
- 3 Firmware: BIOS, UEFI, Embedded System
- 4 Utility Software: WinRAR, WinZip, CCleaner, Disc Clean, Defragment

Application Softwares

This type of software is popularly known as end-user programs. These softwares assist the end users to create their own task in a standard platform. These are installed over the system softwares.

- 1 Word Processors: MS Word, Apple iWork-Pages, Google Docs, LibreOffice
- 2 Database Software: MS Access, FileMaker, dBase, Clipper, MySQL
- 3 Multimedia Software: Adobe Photoshop, Picasa, VLC Media Player, Windows Movie Maker
- 4 Web Browsers: Google Chrome, Mozilla Firefox, Internet Explorer, Opera



Computer Booting

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Bootling is the process to loading of necessary files into main memory. The hardware and software informations are loaded into main memory and end user get operating system platform to work on application software.

Cold Booting

- A cold boot is performed by pressing the power button on the computer for first time to start the system.
- It is performed by restart button on CPU.
- It takes comparatively large time.

Warm Booting

- Warm booting is a process to re-initiate system without full loading of operating system.
- Generally, it is demanded on system hang and performed by pressing key combination "Ctrl+Alt+Del".
- It takes comparatively less time.
- Sometimes, it is called as soft booting.

Peripheral device indicates the additional devices which are not necessary to start any operation on computer.



Computer Programming

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Assembler

- It is related to low level language programming.
- It transforms low level assembly language into machine code.

Compiler

- Converts the whole source code into machine language through object code conversion method.
- Demands comparatively higher memory for conversion and works faster.

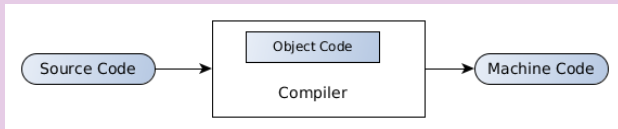


Figure 3: Source code to machine code (binary code) conversion

Interpreter

- Converts the source code directly into machine language.
- Demands comparatively low memory (as line-by-line conversion) for conversion and works slower.



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Source Code (C Language)

```
1 #include "stdio.h"
2 int main()
3 {
4     printf("Welcome to C Language World!!!");
5 }
```

Execution (LINUX Terminal)

Compile: "cc example.c -o example"

View Machine Code(not necessary): "xxd example"

Execute: "./example"

Status (return from last execution): "echo \$?"

Output

Welcome to C Language World!!!



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- What do you mean by peripheral devices in computer system?
- Describe the block diagram of a computer system.
- What are the different types of a computer softwares?
- Describe about the coding/programming and its execution on computer system.



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Thank You...