

FUNDAMENTALS OF COMPUTERS AND INTRODUCTION TO PROGRAMMING (TCS 101)

Course Outcomes: After completion of the course students will be able to:-

- Learn the concepts of IT and understand the fundamentals of basic building blocks of computer science.
- Understand basic data types and syntax of C programming.
- Propose solution to problem by using tools like algorithm and flowcharts.
- Analyze and select best possible solution for decision-based problems using decision making skills.
- Develop the aptitude to solve iterative problems using different types of looping statements.
- Implement complex problem as a collection of sub problems by applying modularization in applications using functions.

UNIT I

- Generation of computers,
- Computer system memory hierarchy,
- Input/Output, RAM/ROM,
- Software & Hardware,
- Understand bit, byte, KB, MB, GB and their relations to each other,
- Operating System overview,
- Computer Networks Overview
- Algorithms and Flow Charts
- Examples of Flow charts for loops and conditional statements

What is Computer?

- Computer is an **electronic** device that takes **input**, **process** it and gives **output**.



INTRODUCTION TO COMPUTERS

A computer is a machine that takes instructions and performs computations based on those instructions.

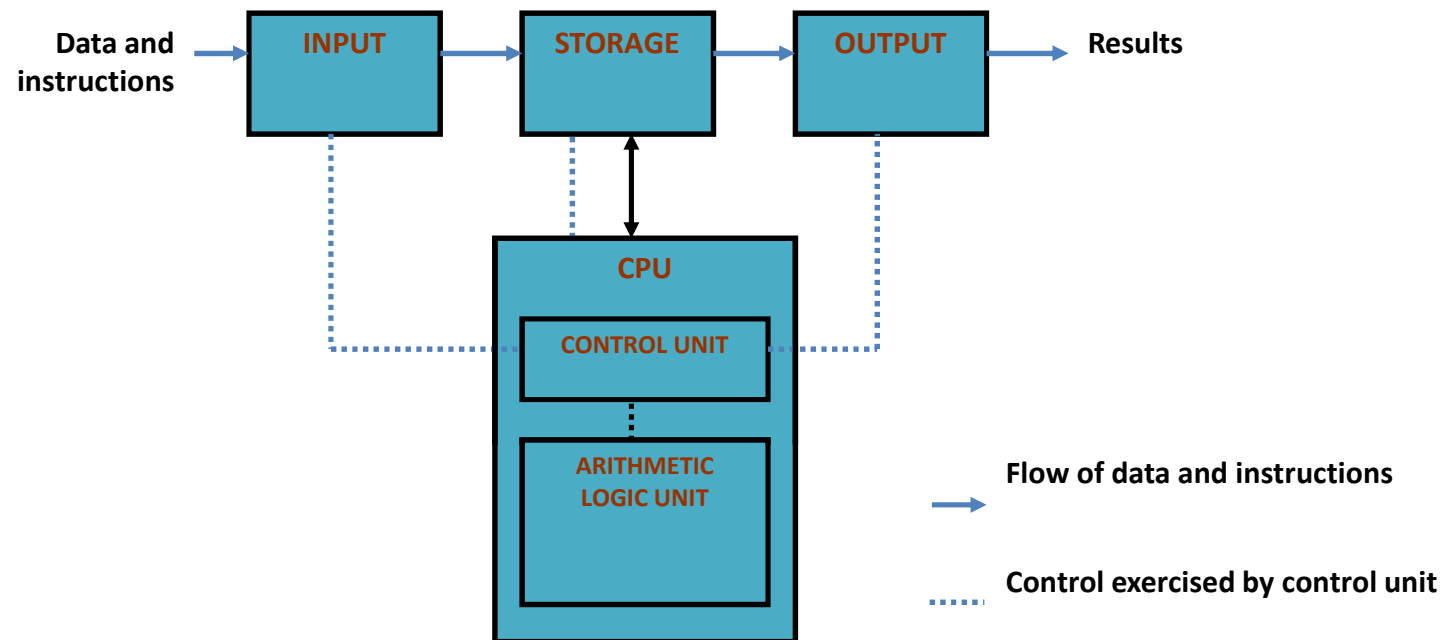
CHARACTERISTICS OF COMPUTERS

- *Speed*
- *Accuracy*
- *Automatic*
- *Diligence*
- *Memory*
- *No I.Q.*
- *Economical*
- *Versatile*

BASIC ORGANIZATION OF A COMPUTER

A computer is an electronic device which basically performs five major operations which includes:

- 1) accepts data or instructions (input)
- 2) stores data
- 3) process data
- 4) displays results (output) and
- 5) controls and co-ordinates all operations inside a computer



GENERATION OF COMPUTERS

The word generation means the state of improvement in the product development process. Similarly, computer generation refers to the different advancements of new computer technology.

First Generation (1942-1955) - Vacuum Tubes

The first generation computers used very large number of vacuum tubes for circuitry and magnetic drums for memory.

UNIVAC and ENIAC computers are prime examples of first-generation computing devices.

Advantages: Fastest calculating device of their time

Disadvantages:

1. Dissipate a lot of heat
2. Consume a lot of electricity
3. Very bulky in size
4. Frequently down due to hardware failures.
5. Needed constant maintenance because of low mean time between failures
6. Limited commercial use because these computers were difficult to program
7. Very expensive

Second Generation (1955-1964) Transistors

- The second generation computers were manufactured using transistors.
- While first generation computers were programmed using machine language, second generation computers moved towards symbolic, or assembly languages, which allowed programmers to specify instructions in words.
- At this time, high-level programming languages like COBOL, FORTRAN, ALGOL and SNOBOL were also being developed.
- Second generation computers were first to store instructions in memory, which moved from a magnetic drum to magnetic core technology.
- Second generation computers were first developed for the atomic energy industry.

Advantages:

1. Consumed less electricity and thus dissipated less heat as compared to first generation computers
2. Faster, cheaper smaller and more reliable than first generation computers
3. Could be programmed using assembly language and high level languages
4. Had faster primary memory and a larger secondary memory

Disadvantages:

1. Second generation computers were manufactured using transistors that had to be assembled manually. This made commercial production of computers difficult and expensive.

Third Generation (1964-1975) Integrated Circuits

- The development of the integrated circuit was the hallmark of the third generation of computers.
- These computers had few megabytes of main memory and magnetic disks which could store few tens of megabytes of data per disk drive.
- High level programming languages like COBOL and FORTRAN were standardized by ANSI
- Some more high level programming languages like PL/I PASCAL and BASIC were introduced at this time.
- Third generation computers were the first to implement time sharing operating systems.
- Input to these computers could now be provided using keyboards and mouse.

Advantages:

1. Faster than second generation computers and could perform 1 million transactions per second.
2. Smaller, cheaper and more reliable than their predecessors
3. These computers had faster and larger primary memory and secondary storage
4. Widely used for scientific as well as business applications
5. During this generation of computers, standardization of existing high level languages and invention of new high level languages was done
6. Had time sharing operating system which allowed interactive use of computer by one or more users simultaneously thereby improving the productivity of the users.

Fourth Generation (1975-1989) Microprocessors

- The microprocessor started the fourth generation of computers with thousands of integrated circuits built onto a single silicon chip.
- Semi-conductor memories were used which were very fast, even the hard disks became cheaper, smaller in size and larger in capacity.
- For input, floppy disks (in addition to magnetic tapes) were used to port data and programs from one computer to another.
- During this period many new operating systems were developed like MS-DOS MS-Windows UNIX and Apple's proprietary operating system.
- Development of GUIs, the mouse and handheld devices.
- In this period, several word processing packages, spreadsheet packages and graphics packages were introduced.

Advantages:

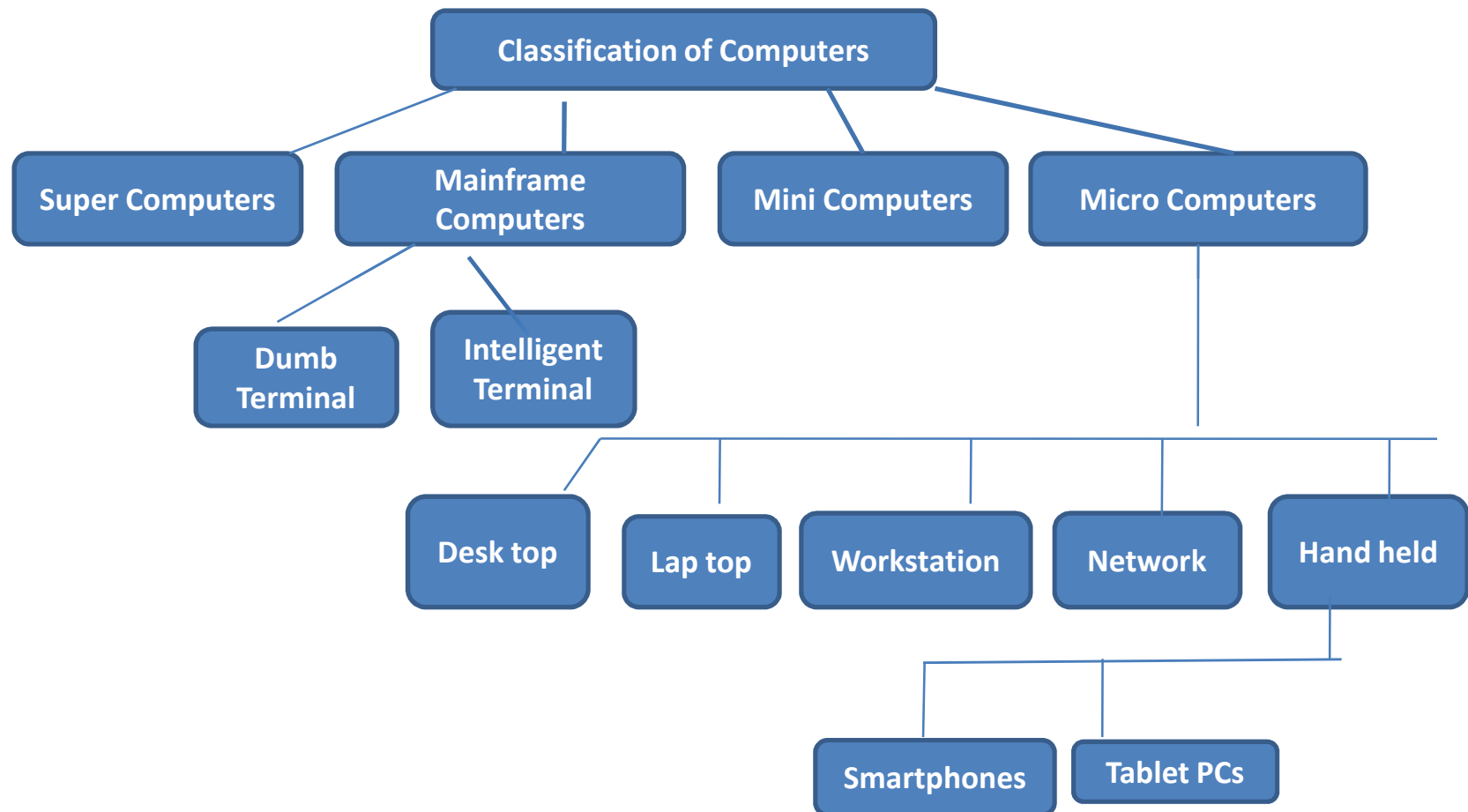
1. Smaller, cheaper, faster and more reliable
2. Consumed less electricity and therefore dissipated less heat
3. Had faster and larger primary memory and secondary storage
4. Could be used as general purpose computers.
5. GUIs enabled people to learn to work with computers very easily. So the use of computers in both office and home became widespread.
6. Networks allowed sharing of resources thereby efficient utilization of computer hardware and software

Fifth Generation (1989-Present)

- The fifth generation computers are completely based on a new concept of artificial intelligence.
- Although such computers are still in development, there are certain applications like voice recognition which is widely being used today.
- In the fifth generation of computers the aim is to develop devices that respond to natural language input and are capable of learning and self-organization.
- The two most common are LISP and Prolog.

CLASSIFICATION OF COMPUTERS

Computers can be broadly classified into four categories based on their speed, amount of data that they can hold, and price.



APPLICATIONS OF COMPUTERS

- Word Processing
- Internet
- Digital Audio or Video Composition
- Desktop Publishing
- e-Business
- Bioinformatics
- Health care
- GIS and Remote Sensing
- Meteorology
- Multimedia and Animation
- Legal System
- Retail Business

- Sports
- Travel and Tourism Simulation
- Astronomy
- Education
- Industry and Engineering
- Robotics
- Decision Support Systems
- Expert Systems