



# Unit I – Part 01 (Computer Basics)



Lecture Slides

AS2023





# Objectives



By the end of this session, students will be able to:

- Define computer, hardware & software
- List some input and output devices
- Identify and explain function of each part of CPU
- Identify categories of memory
- Differentiate between system and application software
- Identify various programming languages
- Explain various language translators



# Introduction



What do you see???



**Desktop Computer**



**Tablet**



**Laptop**



# What is Computer?



- Computer is derived from word '*compute*'
- Does more than Calculate - Applications
- Define Computer?
  - Electronic device that accepts data from the user, processes it, produces results, displays them to the users, and stores the results for future usage.



- Transforms data into information



# Data & Information



- **Data** – raw or unstructured facts and figures
- **Information** – structured or organized and processed meaningful data
- **Examples**

**Data:** Nu. 300, 5.5 years, Nala

**Information (data + meaning):**

Bus fare: Nu. 300

Dorji's working experience: 5.5 Years

Name of the applicant: Nala





# It's Characteristics

Speed

Memory

Accuracy

Automation

Diligence

Reliability

Versatility

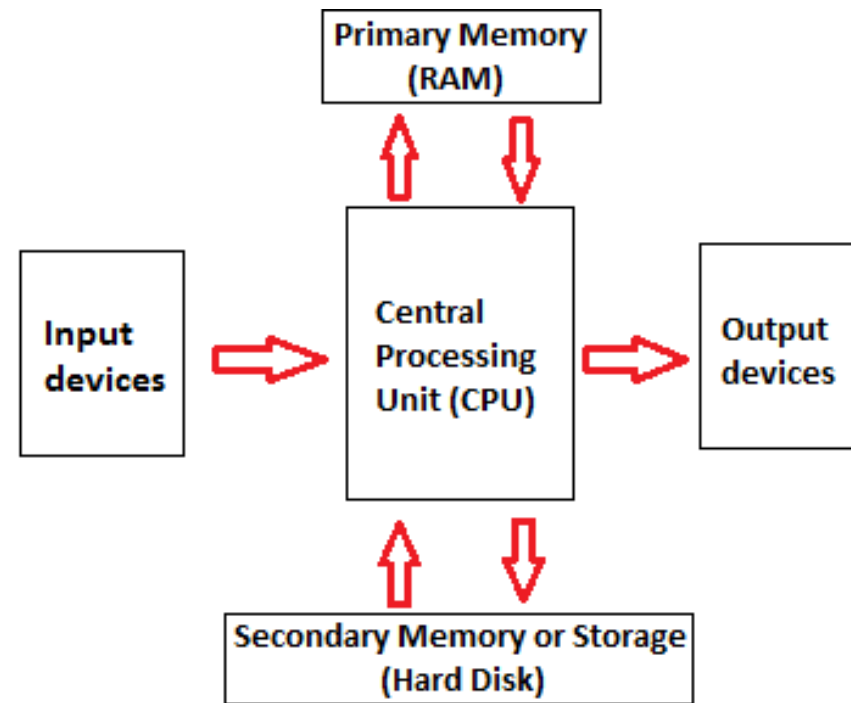




# Computer Components



- Broadly three components
  - Input devices
  - CPU
  - Output devices
- Components → Computer hardware



**Components of computer**

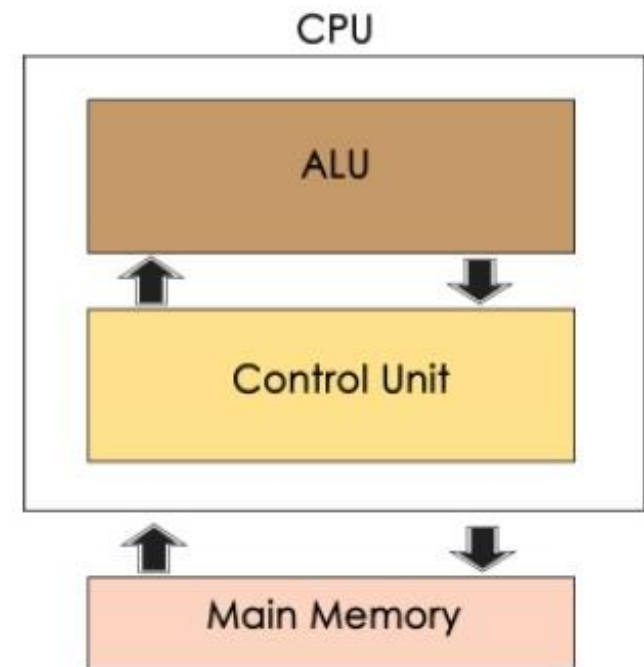




# Central Processing Unit



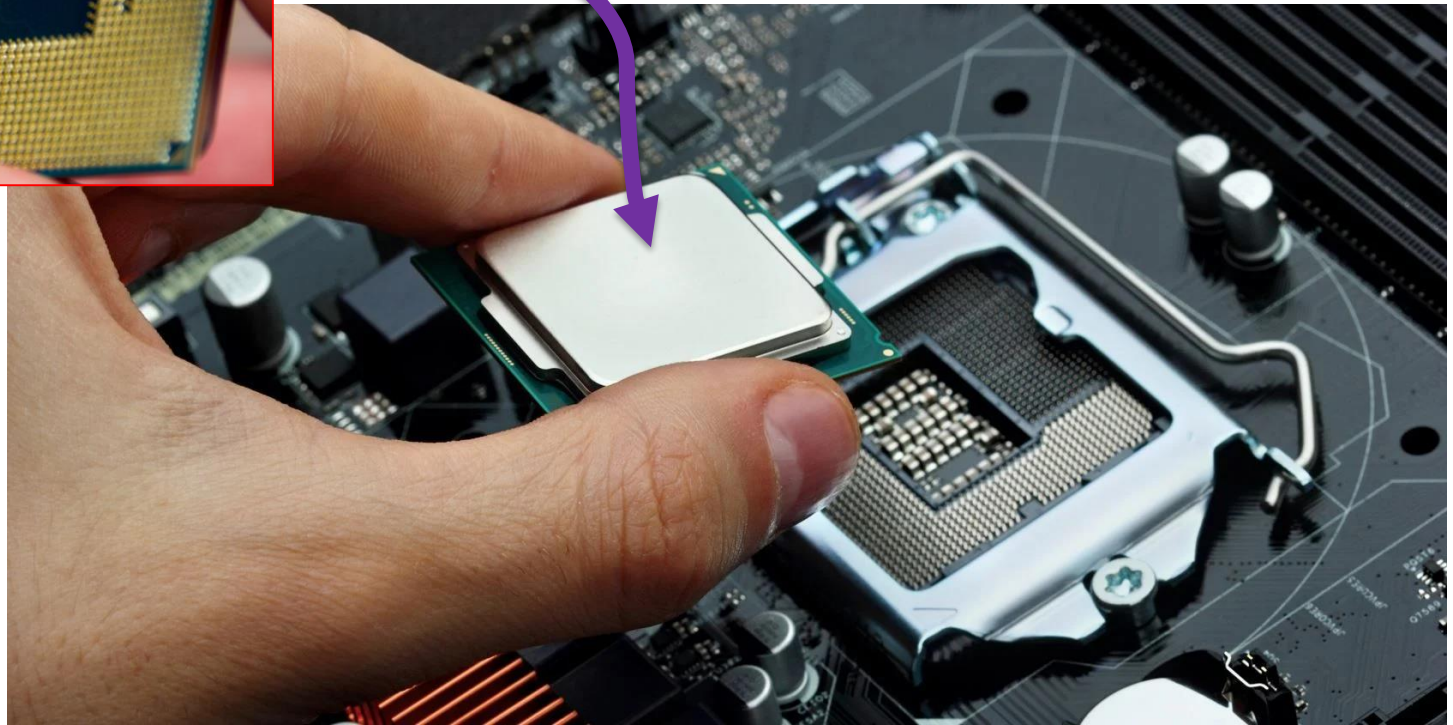
- CPU- brain of the computer
- Performs all types of data processing operations
- Controls the operation of all parts of the computer
- Broadly two components
  - Control Unit
  - Arithmetic Logic Unit







# Central Processing Unit





# Central Processing Unit







# Input Devices



- Any devices that allows users to feed information into the computer for analysis, storage and give commands to the CPU
- Basically two types:
  - Manual Input Devices
    - Eg Keyboard
  - Direct Data Entry (DDE) devices
    - Eg. Barcode reader
- List some commonly used inputs.





# Output Devices



- Any piece of computer hardware equipment which converts information into human-readable form (output)
- Output may be audio, visual, textual, or hard copy such as a printed document.
- List some commonly used output devices.
- What is the key distinction between input and output devices?



# Memory



- Stores data and instructions
- Primarily three types:
  - Cache memory
  - Primary or main memory
  - Secondary memory





# Software



- General Perception- *Intelligently thinking machine*
  - *How far do you agree?*
- Computer functions based on the given *instruction(s)*
  - *Eg. Add  $A+b$*
- Program - collection of instructions that can be executed by a computer to perform a specific task



# Software (Cont..)



- **Software** - generic term for various kind of programs used to operate computers and related devices



- Broadly two categories:
  - Application software
  - System software





# Application Software



- Abbreviated as '*app*'
- Program or group of programs designed for end users



- Used to accomplish specific task rather than just managing a computer system



# System Software

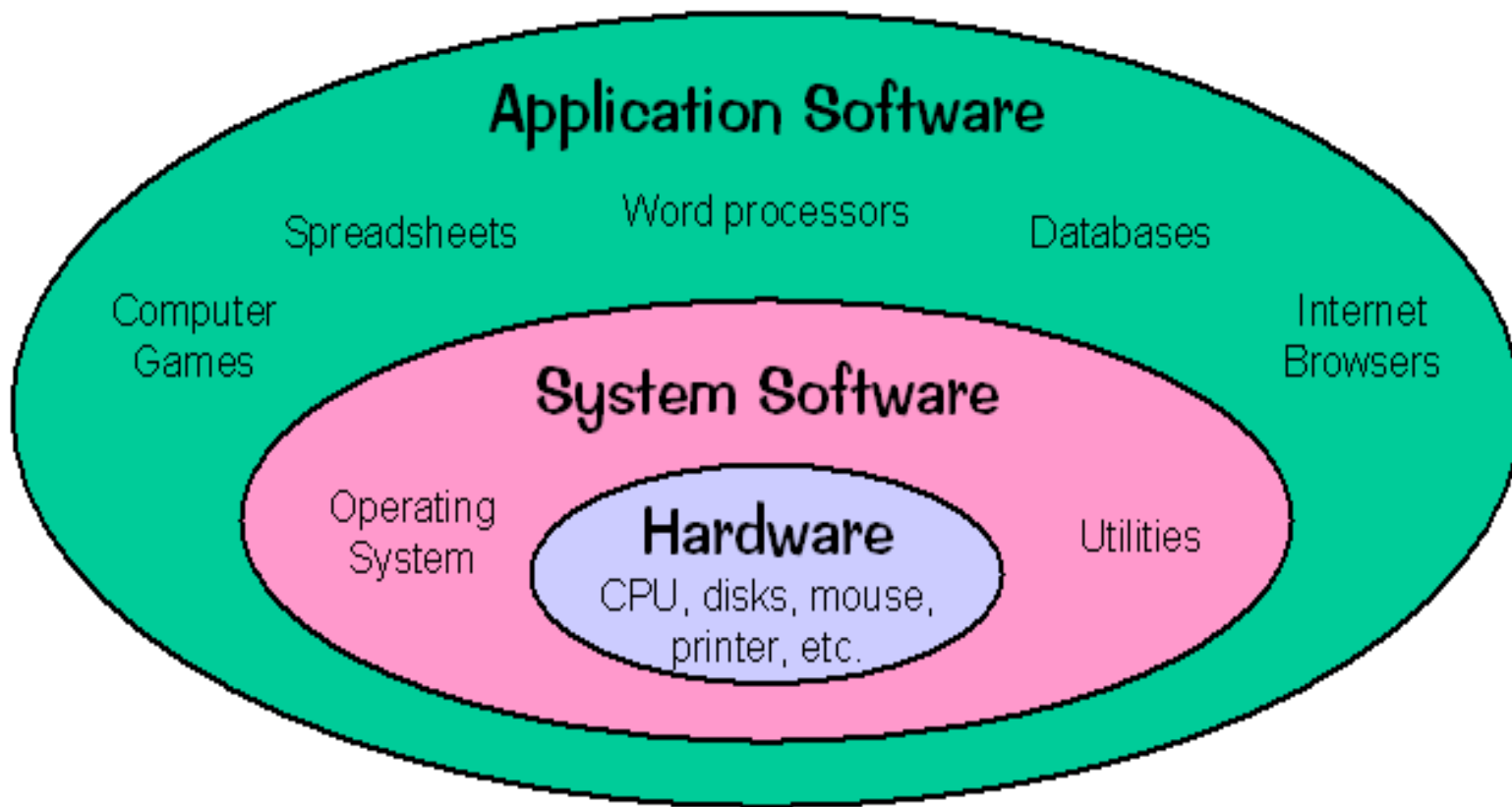


- Program that helps the user to run the computer system or makes computer functional
- Responsible for controlling, integrating and managing the individual hardware components of a computer system
- Acts as a interface between hardware and application software
- Examples: *operating system, device drivers, language translators, and system utilities*





# Differences between App & system software





# Programming Language



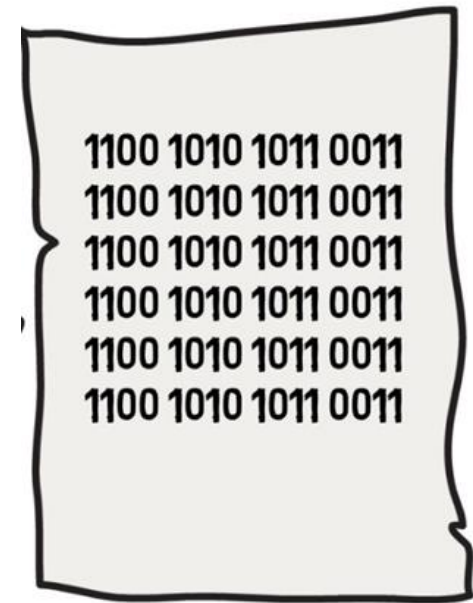
- Special languages to write instruction for the computer system
  - It can be of three categories
    - Machine language
    - Assembly language
    - High-level language
- Low level language**



# Machine Language



- Native language of computer system
- Use only 0's and 1's to represent data and instruction
- Advantages:
  - Computer directly starts executing
- Disadvantages:
  - Difficult to program and write
  - Machine dependent
  - Error prone
  - Difficult to debug and modify



MACHINE CODE



# Assembly Language



- Symbolic instructions and executable machine codes
- Was created to use letters instead of 0's and 1's to run a machine
- Advantages:
  - Easy to understand and use
  - Easy to locate and correct errors
  - Easier to modify
- Disadvantages:
  - Machine dependent

```
// I = 15;  
MOV R3, #15  
STR R3, [R11, #-8]  
  
// J = 25;  
MOV R3, #25  
STR R3, [R11, #-12]  
  
// I = I + J;  
LDR R2, [R11, #-8]  
LDR R3, [R11, #-12]  
ADD R3, R2, R3  
STR R3, [R11, #-8]
```

ASSEMBLY LANGUAGE



# Assembly Language



```
; Accepts a number in register AX;  
; subtracts 32 if it is in the range 97-122;  
; otherwise leaves it unchanged.
```

```
SUB32  PROC           ; procedure begins here  
      CMP  AX,97       ; compare AX to 97  
      JL   DONE        ; if less, jump to DONE  
      CMP  AX,122      ; compare AX to 122  
      JG   DONE        ; if greater, jump to DONE  
      SUB  AX,32       ; subtract 32 from AX  
DONE:  RET            ; return to main program  
SUB32  ENDP          ; procedure ends here
```





# High Level Language



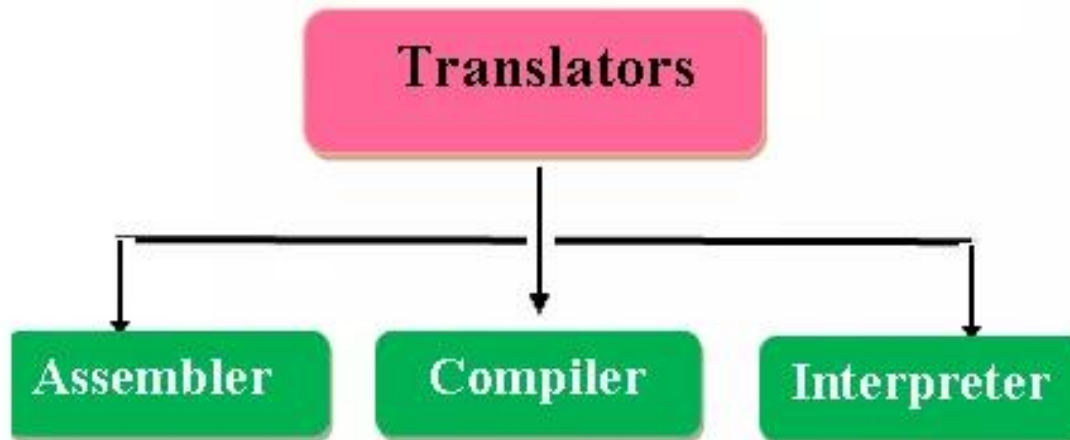
- Written using set of words and symbols following some rules similar to **natural language**
- Program written with it are called *Source program*
- Advantages:
  - Machine independent
  - Easier to learn and use
  - Easier to maintain and gives few error
- Disadvantages:
  - Lower efficiency



# Language Translators



- Converts programming source code into machine code
- Computer understand only machine code

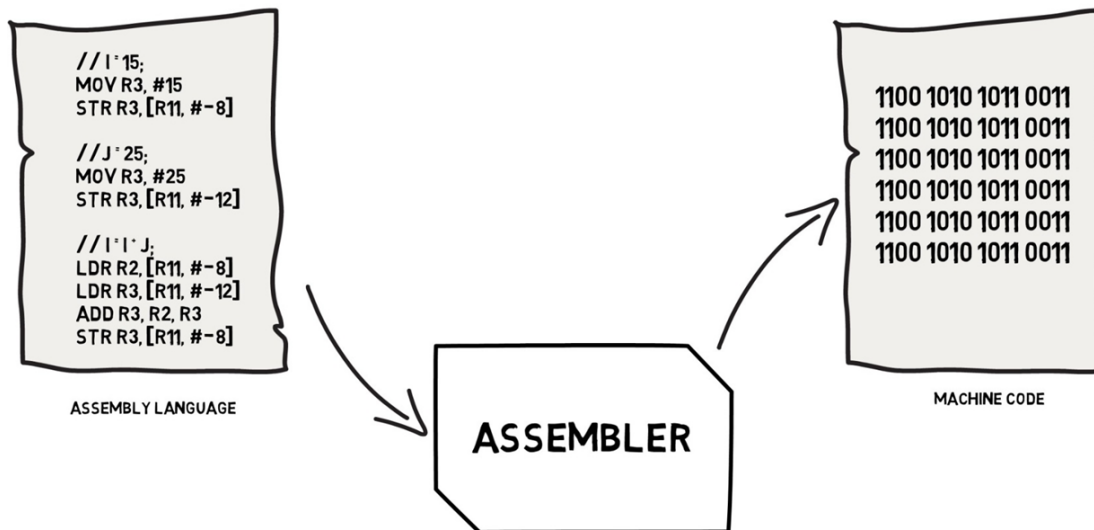




# Assembler



- **Assembler**
  - Converts assembly language into machine language





# Compiler



- Translates high-level language into machine language
- Reads the program statement-wise and checks Syntax errors
- Once compiled then, resulting machine code is saved in a executable file



# Interpreter



- **Interpreter**

- Translates statements in a program and executes the statement immediately without looking at the entire program
- Can execute a program spontaneously



# Home Assignment



1. Write short notes on generation of computers.
2. Write differences between translators.
3. What are the applications of computers?
4. List any five examples of application and system software?



# Any Questions?





# Thank you