RAMA UNIVERSITY

www.ramauniversity.ac.in

FACULTY OF ENGINEERING & TECHNOLOGY

CSPS-106 Computer Organization

Lecture-01

Mr. Dilip Kumar J Saini
Assistant Professor
Computer Science & Engineering

OUTLINE

- INTRODUCTION
- FUNCTIONAL UNITS OF A COMPUTER
- INFORMATION IN A COMPUTER -- INSTRUCTION
- INFORMATION IN A COMPUTER – DATA
- INPUT UNIT
- MEMORY UNIT

What is a computer?

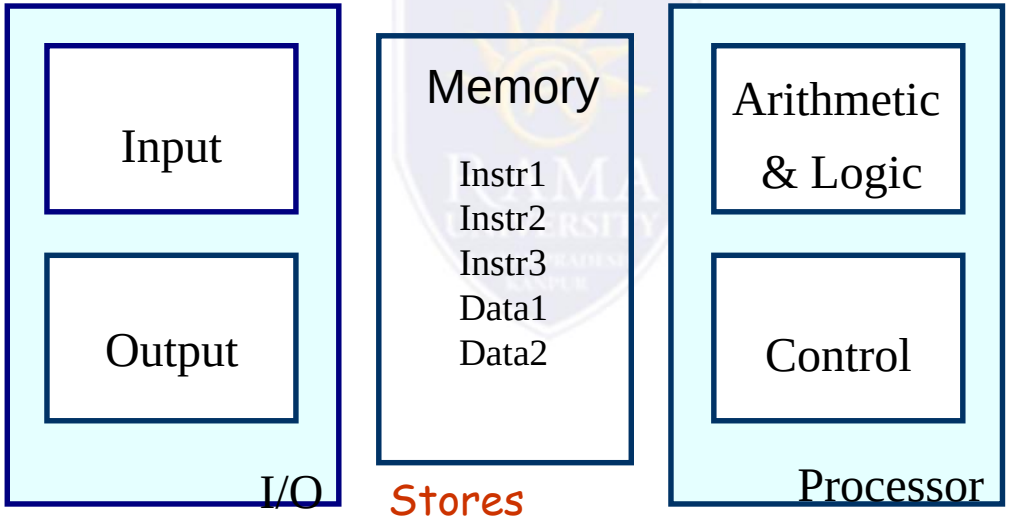
- **Simply put, a computer is a sophisticated electronic calculating machine that**:
  - Accepts input information,
  - Processes the information according to a list of internally stored instructions and
  - Produces the resulting output information.
- **Functions performed by a computer are:**
  - Accepting information to be processed as input.
  - Storing a list of instructions to process the information.
  - Processing the information according to the list of instructions.
  - Providing the results of the processing as output.

- What are the functional units of a computer?

FUNCTIONAL UNITS OF A COMPUTER

Input unit accepts information:
- Human operators,
- Electromechanical devices
- Other computers

Arithmetic and logic unit(ALU):
- Performs the desired operations on the input information as determined by instructions in the memory



Output unit sends results of processing:
- To a monitor display,
- To a printer

Stores information:
- Instructions,
- Data

Control unit coordinates various actions
- Input,
- Output
- Processing

INFORMATION IN A COMPUTER -- INSTRUCTIONS

- **Instructions specify commands to:**
  - Transfer information within a computer (e.g., from memory to ALU)
  - Transfer of information between the computer and I/O devices (e.g., from keyboard to computer, or computer to printer)
  - Perform arithmetic and logic operations (e.g., Add two numbers, Perform a logical AND).
- **A sequence of instructions to perform a task is called a program, which is stored in the memory.**
- Processor fetches instructions that make up a program from the memory and performs the operations stated in those instructions.
- What do the instructions operate upon?

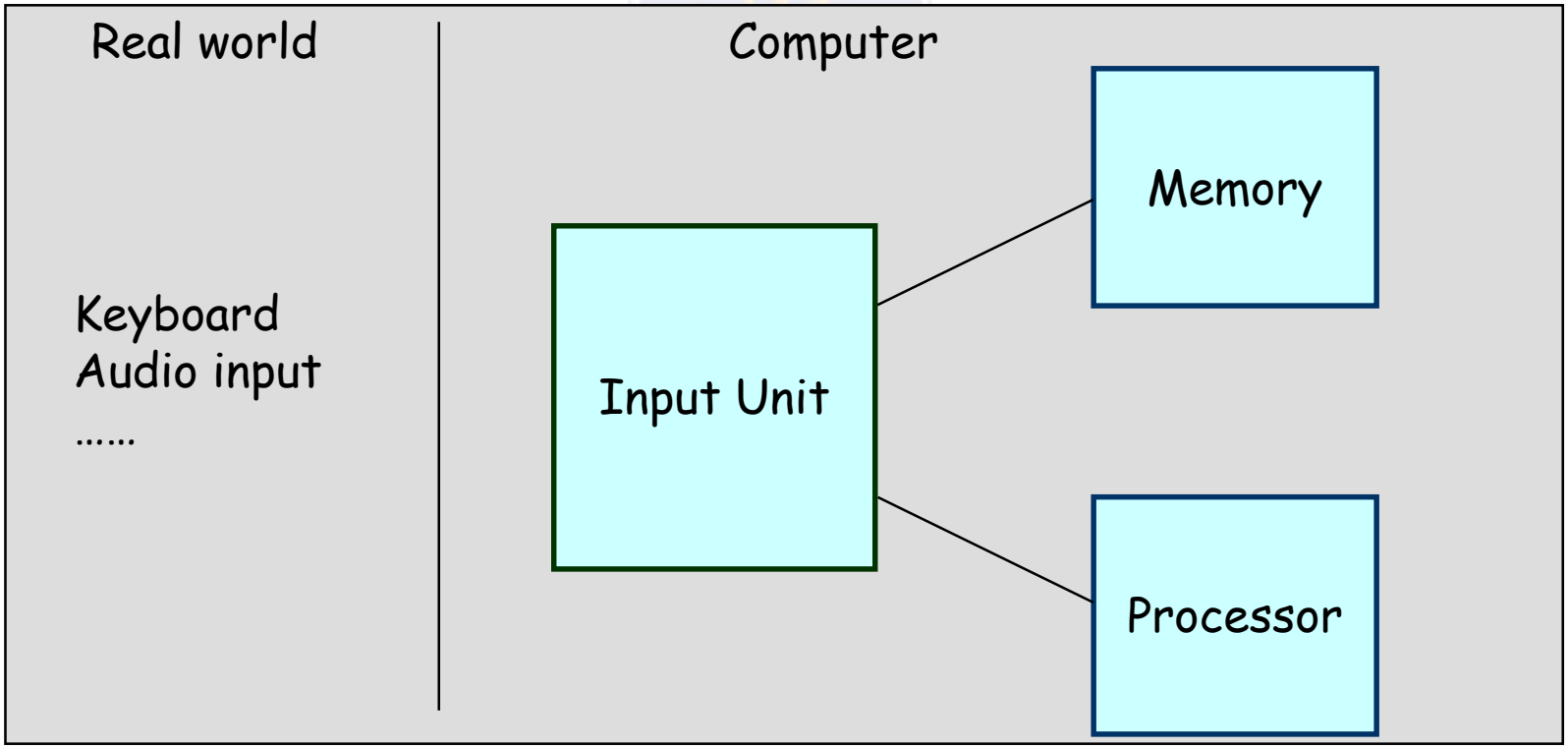
INFORMATION IN A COMPUTER -- DATA

- Data are the “operands” upon which instructions operate.
- Data could be:
  - Numbers,
  - Encoded characters.
- Data, in a broad sense means any digital information.
- Computers use data that is encoded as a string of binary digits called bits.

INPUT UNIT

Binary information must be presented to a computer in a specific format. This task is performed by the input unit:

- Interfaces with input devices.
- Accepts binary information from the input devices.
- Presents this binary information in a format expected by the computer.
- Transfers this information to the memory or processor.



MEMORY UNIT

- **Memory unit stores instructions and data.**
  - Recall, data is represented as a series of bits.
  - To store data, memory unit thus stores bits.
- **Processor reads instructions and reads/writes data from/to the memory during the execution of a program.**
  - In theory, instructions and data could be fetched one bit at a time.
  - In practice, a group of bits is fetched at a time.
  - Group of bits stored or retrieved at a time is termed as “word”
  - Number of bits in a word is termed as the “word length” of a computer.
- In order to read/write to and from memory, a processor should know where to look:
  - “Address” is associated with each word location.

MEMORY UNIT

- Processor reads/writes to/from memory based on the memory address:
  - Access any word location in a short and fixed amount of time based on the address.
  - Random Access Memory (RAM) provides fixed access time independent of the location of the word.
  - Access time is known as “Memory Access Time”.
- Memory and processor have to “communicate” with each other in order to read/write information.
  - In order to reduce “communication time”, a small amount of RAM (known as Cache) is tightly coupled with the processor.
- Modern computers have three to four levels of RAM units with different speeds and sizes:
  - Fastest, smallest known as Cache
  - Slowest, largest known as Main memory.

MEMORY UNIT

- Primary storage of the computer consists of RAM units.
  - Fastest, smallest unit is Cache.
  - Slowest, largest unit is Main Memory.
- Primary storage is insufficient to store large amounts of data and programs.
  - Primary storage can be added, but it is expensive.
- Store large amounts of data on secondary storage devices:
  - Magnetic disks and tapes,
  - Optical disks (CD-ROMS).
  - Access to the data stored in secondary storage in slower, but take advantage of the fact that some information may be accessed infrequently.
- Cost of a memory unit depends on its access time, lesser access time implies higher cost.

Multiple Choice Question

MUTIPLE CHOICE QUESTIONS:

Sr no	Question	Option A	Option B	OptionC	OptionD
1	The _____ format is usually used to store data.	BCD	Decimal	Hexadecimal	Octal
2	A source program is usually in _____	Assembly language	Machine level language	High-level language	Natural language
3	Which memory device is generally made of semiconductors?	RAM	Hard-disk	Floppy disk	cd disk
4	The small extremely fast, RAM's are called as _____	Cache	Heaps	Accumulators	Stacks
5	The ALU makes use of _____ to store the intermediate results.	accumlators	heaps	cpu	stacks

REFERENCES

- http://www.engppt.com/search/label/Computer%20Organization%20and%20Architecture
- http://www.engppt.com/search/label/Computer%20Architecture%20ppt