Computer Architecture & Networks

CHAPTER 1(a):

Machine Level Representation of Data

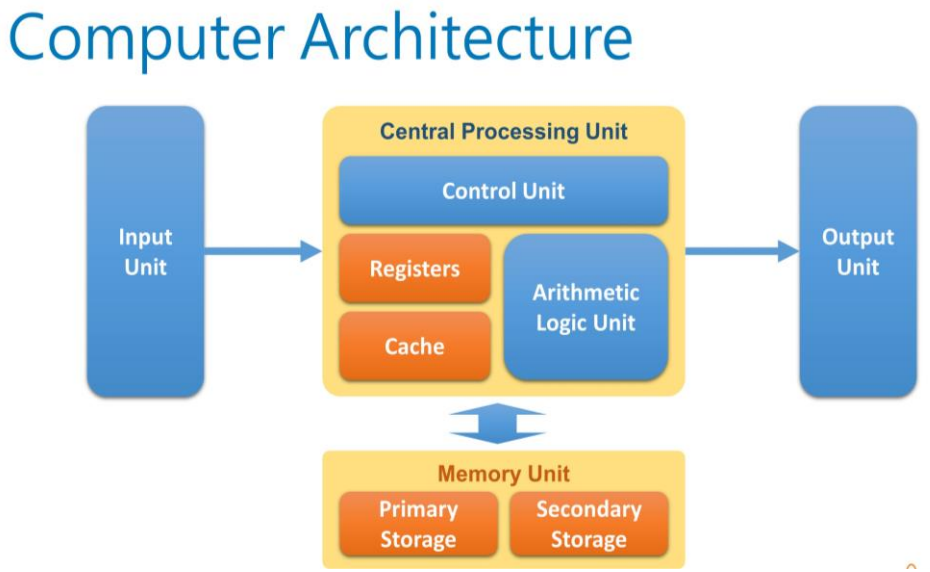
Learning Outcomes

This chapter discusses the computer architecture concept in general;

and

the machine level representation of data, bit, bytes and words.

What is Computer Architecture?



- Computer architecture is a set of rules and methods that describe the functionality, organization, and implementation of computer systems.
- Computer architectures represent the means of interconnectivity for a computer's hardware components as well as the mode of data transfer and processing exhibited.
- Different computer architecture configurations have been developed to speed up the movement of data, allowing for increased data processing.
- The basic architecture has the **CPU** at the core with a **main memory** and **input/output system**

Computer System

Computers have 2 kinds of components:

- **Hardware** consisting of its physical devices (CPU, memory, bus, storage devices, …)
- **Software** consisting of the programs it has (Operating system, applications, utilizes, …)

Data Processing Cycle

- It describes the procedures that a computer performs to process data into information
- **Input** – data entered through input devices
- **Process** – operations or computations performed on the input
- **Output** – results of processed input
- **Storage** – a place to hold the data / information for future use

Data Representation

- **Data** refers to the symbols that represent people, events, things, and ideas. Data can be a name, a number, the colors in a photograph, or the notes in a musical composition.
- ***Data Representation*** refers to the form in which data is stored, processed, and transmitted.
- Devices such as smartphones, iPods, and computers store data in digital formats that can be handled by electronic circuitry.
- In computer, data are stored in Registers.
- Registers are limited in number & size.

DATA REPRESENTATION

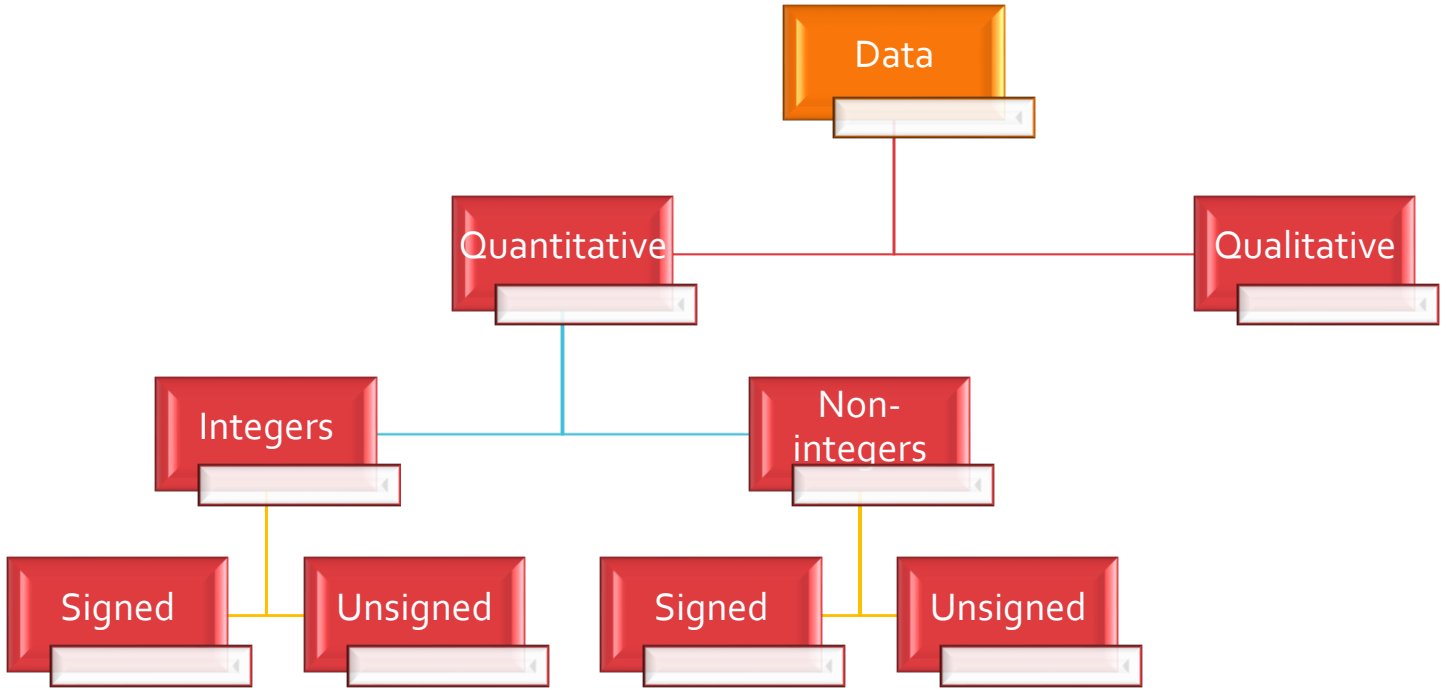
Qualitative

- Represents quality or characteristics
- Not proportional to a value
- Name, Address

Quantitative

- Quantifiable
- Proportional to value a
- No of students, marks, CGPA

DATA REPRESENTATION



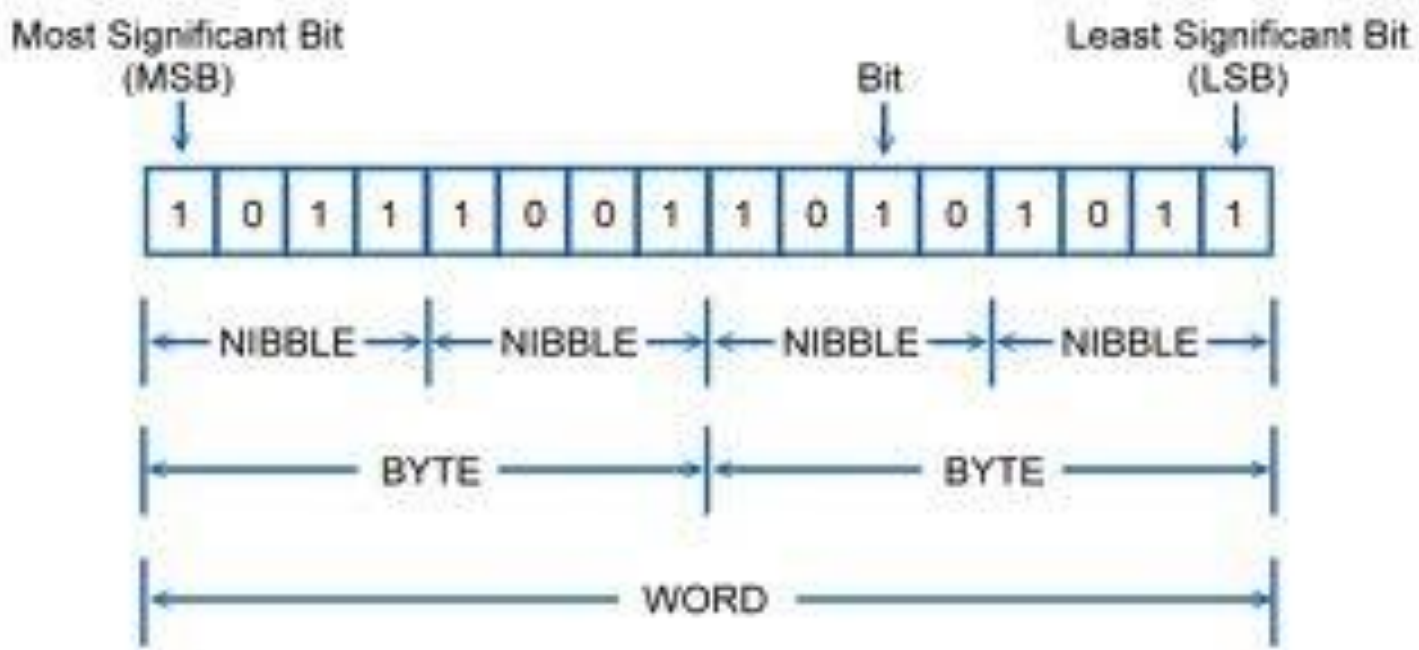
Data Representation

- **Digitization** is the process of converting information, such as text, numbers, photo, or music, into digital data that can be manipulated by electronic devices.

- The **Digital Revolution** has evolved through four phases, beginning with big, expensive, standalone computers, and progressing to today's digital world in which small, inexpensive digital devices are everywhere.

Data Representation

- The o's and 1's used to represent digital data are referred to as binary digits. From this term we get the word *bit* that stands for *bi*nary digi*t.*
- A **bit** is a **0 or 1** used in the digital representation of data.
- A digital file, usually referred to simply as a file, is a named collection of data that exits on a storage medium, such as a hard disk, cloud, memory, or flash drive.
- **Byte** is **a** unit of digital information that most commonly consists of **eight bits**.
- Four **bytes** constitute a **word** = 32 bits



RECAP

1. What are the basic components in computer architecture?
2. Give 2 examples or hardware and software
3. What are the procedures that a computer performs to process data into information
4. What is data?
5. What is data representation?
6. What are the example of qualitative data?
7. What are the example of quantitative data?
8. What is bit stand for?
9. How many bit in 1 byte?
10. How many byte in 1 word?
11. How many bit in 1 word?