

**Course on computer concepts(ccc)**

**INTRODUCTION TO COMPUTER**

# Introduction

Computer :-

- computer is an electronic device that operates (works) under the control of programs stored in its own memory unit.
- A computer is an electronic machine that processes raw data to give information as output.
- An electronic device that accepts data as input ,and transforms it under the influence of a set special instructions called programs, to produce the desired output (referred to as information)

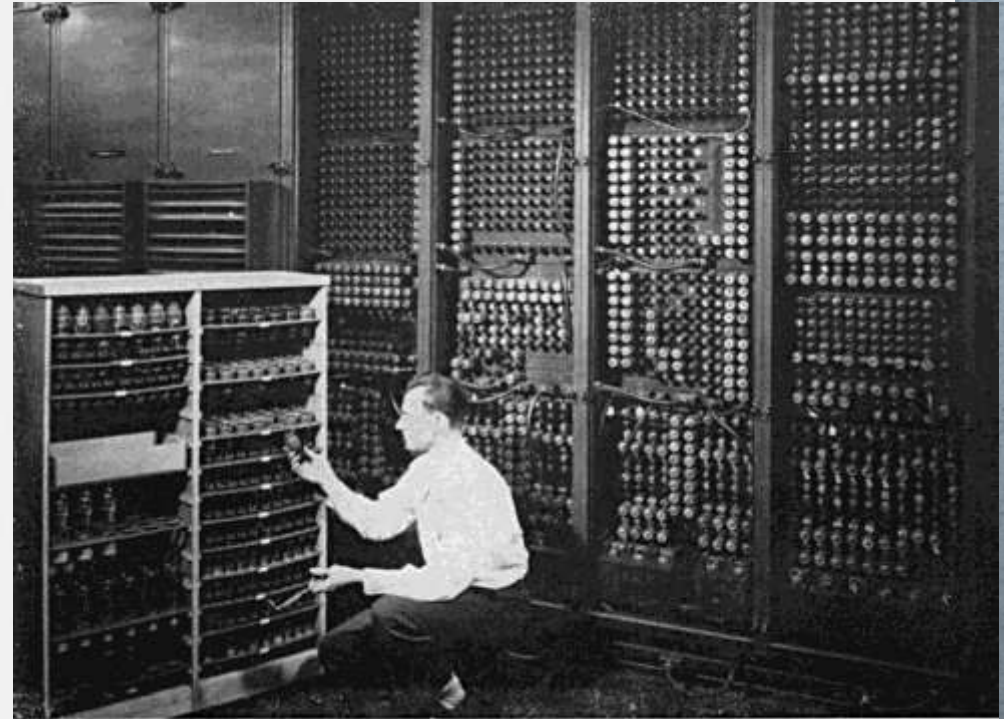


# objectives

- Nature of computers.
- Objectives of using computers
  - Application of computers
    1. text(word) processing
    2. message communication
- Computer applicability to organisations
  - Scope of computers

➤ History :-

Charles Babbage, an English mechanical engineer and polymath, originated the concept of a programmable computer. Considered the "father of the computer", he conceptualized and invented the **first mechanical computer in the early 19th century.**



Replacing a bad tube meant checking among ENIAC's 19,000 possibilities.

## ➤ characteristics of computer system

### 1.Speed

A computer works with much higher speed and accuracy compared to humans while performing mathematical calculations. Computers can process millions (1,000,000) of instructions per second. The time taken by computers for their operations is microseconds and nanoseconds.

### 2.Accuracy

Computers perform calculations with 100% accuracy. Errors may occur due to data inconsistency or inaccuracy.

### 3.Diligence

A computer can perform millions of tasks or calculations with the same consistency and accuracy. It doesn't feel any fatigue or lack of concentration. Its memory also makes it superior to that of human beings.

### 4.Versatility

Versatility refers to the capability of a computer to perform different kinds of works with same accuracy and efficiency.

### 5.Reliability

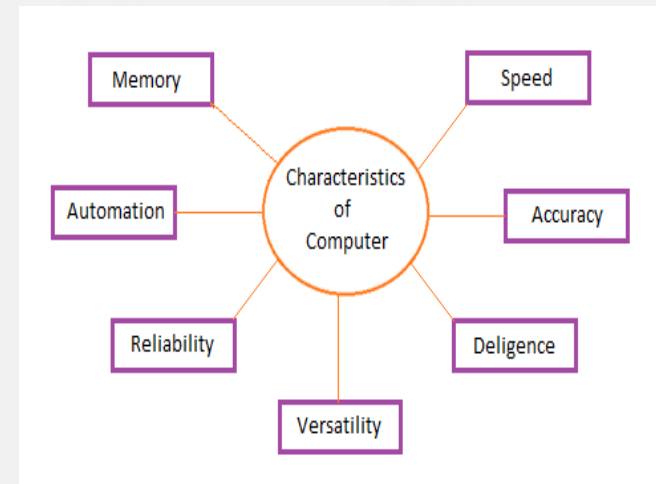
A computer is reliable as it gives consistent result for similar set of data i.e., if we give same set of input any number of times, we will get the same result.

### 6.Automation

Computer performs all the tasks automatically i.e. it performs tasks without manual intervention.

### 7.Memory

A computer has built-in memory called primary memory where it stores data. Secondary storage are removable devices such as CDs, pen drives, etc., which are also used to store data.



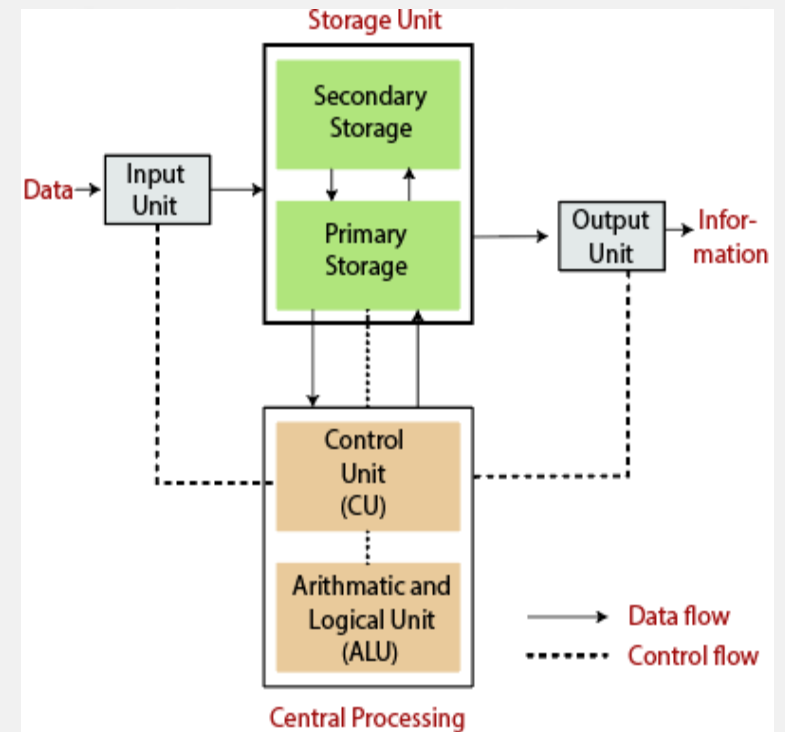
## Basic application of computers :-



Computers play a role in every field of life. They are used in homes, business, educational institutions, research organizations, medical field, government offices, entertainment, etc.

# Components of computer systems

- A computer system is built up of components such as Hardware, software, programs, data, and networking. Without these components, no system can run.
- In addition to these elements, a computer system consists of four major components. And they are: **central processing unit**, **input/output devices** and **Memory** as shown in figure below:



## ◦ **Input Device**

- Input is any data or instruction that a computer collects from the outside world. The input can be in the form of **text, programs, commands, and user responses**.
- The device that collects the input and sends it to the computer is called an input device. Input devices include the **keyboard, mouse, scanners, digital cameras, microphone, etc.**
- The input device is used for entering data or instruction to the **central processing unit**. Some major functions of input devices are:
  - It accepts data from the user or outside the environment.
  - It converts user understandable form of data into binary code that is understandable to the computer.

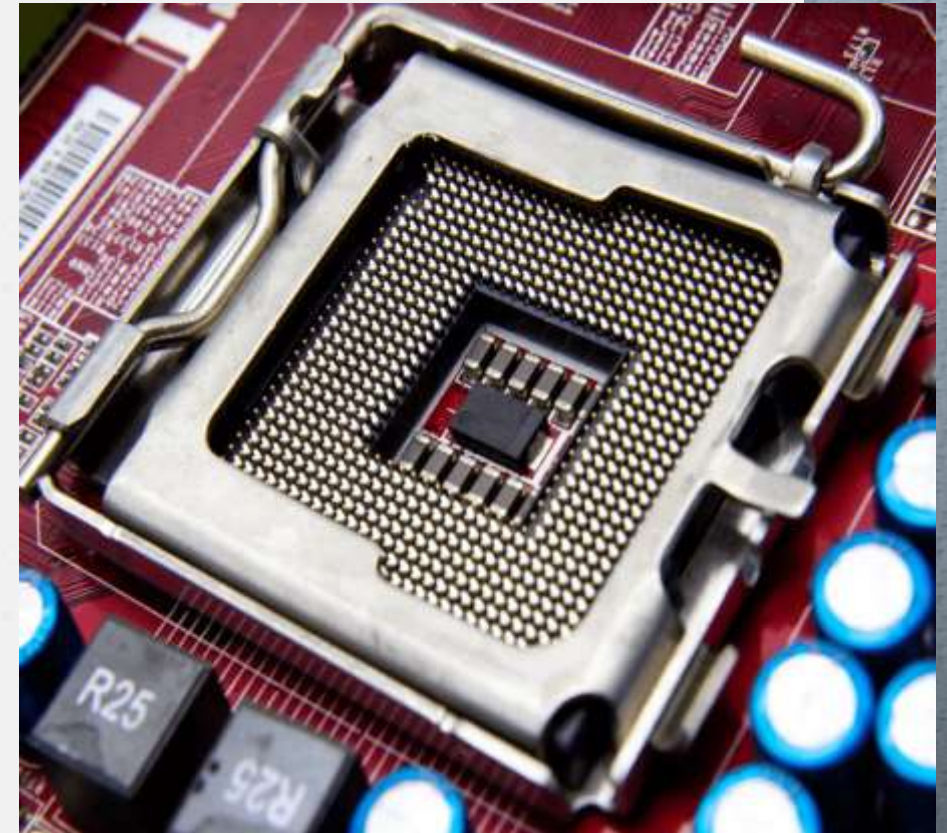




## Central Processing unit (CPU)

The central processing unit(cpu) is the main information processor in a digital computer capable of executing a program. *The manipulation of the raw data based on the instruction is called processing.*

A computer processes data in a device called the central processing unit. It is a very complex integrated circuit, containing millions of **miniaturized electronic**



## Storage/memory

A computer has a huge data storage capacity. Storage is the place where data is held in an electromagnetic or optical form for access by a computer processor.

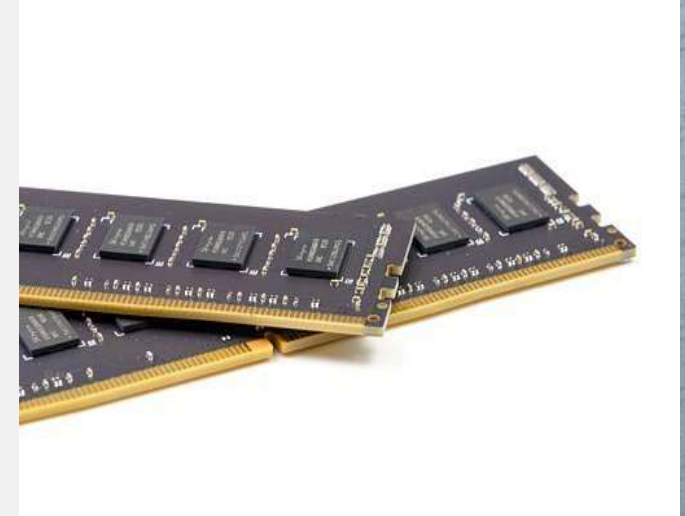
Storage has been divided into:

### 1. Primary storage:-

primary storage holds data in memory. The primary storage (also known as main memory, internal memory, or prime memory), also known as memory, is the only one that is directly accessible to the CPU. ***E.G. Random access memory or RAM*** ***the*** CPU constantly reads instructions **from** memory and executes them as needed.

### 2. Secondary storage:

secondary storage holds data on hard disks, tapes, and other devices requiring input-output operations. Secondary storage (also known as **external memory or auxiliary storage**) differs from primary storage where it is inaccessible to the CPU directly.



The computer's input/output channels are typically used to access secondary storage and transfer data to primary storage

## Output device:-

The output device is any peripheral device that receives or displays output from a computer. Output is any computer-generated information displayed on-screen or printed on paper. It can be in the form of words, numbers, graphics, sound, videos, and animations.

An output device performs the following functions: it accepts results produced by the computer in binary coded form and converts them into human acceptable form.

It supplies converted results to the display unit or outside world.

The **monitor**, **printer**, and **graphic plotter** are some of the popular output devices.

Output sent to a monitor is called **softcopy** while output sent to a printer is called **hardcopy**.



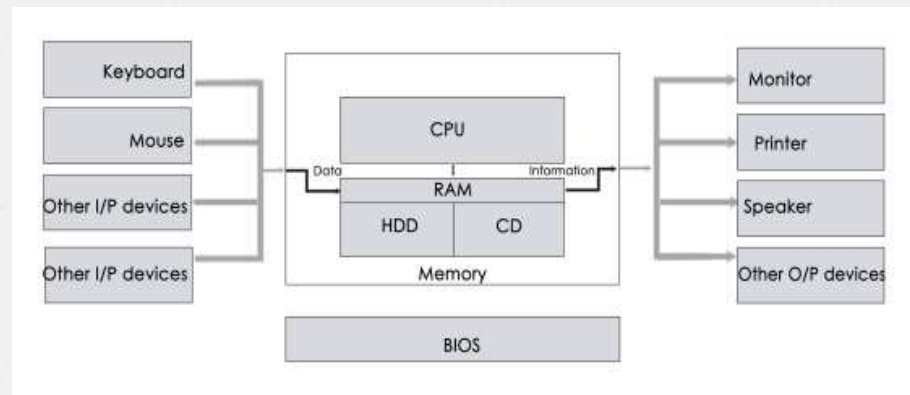
# Concept of hardware and software

## Hardware

The term hardware refers to mechanical device that makes up computer. Computer hardware consists of interconnected electronic devices that we can use to control computer's operation, input and output. Examples of hardware are CPU, keyboard, mouse, hard disk, etc.

## Hardware Components

Computer hardware is a collection of several components working together. Some parts are essential and others are added advantages. Computer hardware is made up of CPU and peripherals as shown in image below.



## Software

A set of instructions that drives computer to do stipulated tasks is called a program. Software instructions are programmed in a computer language, translated into machine language, and executed by computer. Software can be categorized into two types –

- System software
- Application software

### System Software

System software operates directly on hardware devices of computer. It provides a platform to run an application. It provides and supports user functionality. Examples of system software include operating systems such as Windows, Linux, Unix, etc.

### Application Software

An application software is designed for benefit of users to perform one or more tasks. Examples of application software include Microsoft Word, Excel, PowerPoint, Oracle, etc.



## programming language :-

- A **programming language** is a formal language comprising a set of strings that produce various kinds of machine code output. Programming languages are one kind of computer language, and are used in computer programming to implement algorithms.
- Most programming languages consist of instructions for computers. There are programmable machines that use a set of specific instructions, rather than general programming languages. Since the early 1800s, programs have been used to direct the behaviour of machines such as Jacquard looms, music boxes and player pianos.<sup>[1]</sup> The programs for these machines (such as a player piano's scrolls) did not produce different behaviour in response to different inputs or conditions.
- Thousands of different programming languages have been created, and more are being created every year. Many programming languages are written in an imperative form (i.e., as a sequence of operations to perform) while other languages use the declarative form (i.e. the desired result is specified, not how to achieve it).
- The description of a programming language is usually split into the two components of syntax (form) and semantics (meaning). Some languages are defined by a specification document (for example, the C programming language is specified by an ISO Standard) while other languages (such as Perl) have a dominant implementation that is treated as a reference. Some languages have both, with the basic language defined by a standard and extensions taken from the dominant implementation being common.
- Programming language theory is a subfield of computer science that deals with the design, implementation, analysis, characterization, and classification of programming languages.

```
1 /*
2  * This line basically imports the "stdio" header file, part of
3  * the standard library. It provides input and output functionality
4  * to the program.
5  */
6 #include <stdio.h>
7
8 /*
9  * Function (method) declaration. This outputs "Hello, world\n" to
10 * standard output when invoked.
11 */
12 void sayHello(void) {
13     // printf() in C outputs the specified text (with optional
14     // formatting options) when invoked.
15     printf("Hello, world!\n");
16 }
17
18 /*
19 * This is a "main function". The compiled program will run the code
20 * defined here.
21 */
22 int main(void)
23 {
24     // Invoke the sayHello() function.
25     sayHello();
26     return 0;
27 }
```

# Representation of data/information

Computer does not understand human language. Any data, viz., letters, symbols, pictures, audio, videos, etc., fed to computer should be converted to machine language first. Computers represent data in the following three forms –

## Number System

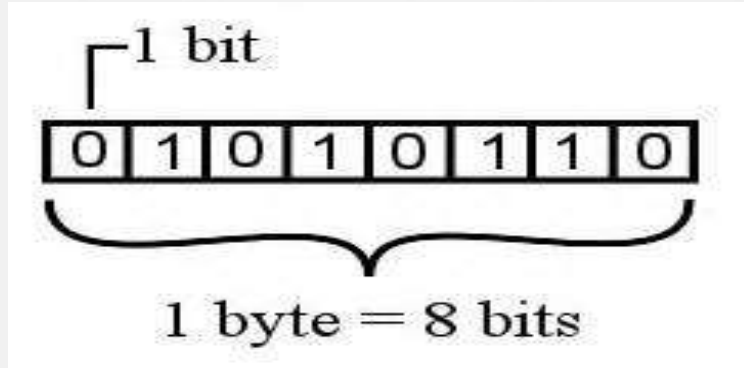
We are introduced to concept of numbers from a very early age. To a computer, everything is a number, i.e., alphabets, pictures, sounds, etc., are numbers. Number system is categorized into four types –

- Binary number system consists of only two values, either 0 or 1
- Octal number system represents values in 8 digits.
- Decimal number system represents values in 10 digits.
- Hexadecimal number system represents values in 16 digits.

Number System		
System	Base	Digits
Binary	2	0 1
Octal	8	0 1 2 3 4 5 6 7
Decimal	10	0 1 2 3 4 5 6 7 8 9
Hexadecimal	16	0 1 2 3 4 5 6 7 8 9 A B C D E F

## Bits and bytes:

**bits** – A bit is a smallest possible unit of data that a computer can recognize or use. Computer usually uses bits in groups.



**Bytes** – group of eight bits is called a byte. Half a byte is called a nibble.

Byte Value	Bit Value
1 Byte	8 Bits
1024 Bytes	1 Kilobyte
1024 Kilobytes	1 Megabyte
1024 Megabytes	1 Gigabyte
1024 Gigabytes	1 Terabyte
1024 Terabytes	1 Petabyte
1024 Petabytes	1 Exabyte
1024 Exabytes	1 Zettabyte
1024 Zettabytes	1 Yottabyte
1024 Yottabytes	1 Brontobyte
1024 Brontobytes	1 Geopbytes



## Text code

text code is format used commonly to represent alphabets, punctuation marks and other symbols.

Four most popular text code systems are –

- 1.EBCDIC
- 2.ASCII
- 3.extended ASCII
- 4.unicode

## EBCDIC

Extended Binary Coded Decimal Interchange Code is an 8-bit code that defines 256 symbols. Given below is the EBCDIC **Tabular column**

Special characters	EBCDIC	Alphabetic	EBCDIC
<	01001011	A	11000001
(	01001100	B	11000010
+	01001101	C	11000011
/	01001110	D	11000100
&	01010000	E	11000101
:	01111011	F	11000110
#	01111011	G	11000111
@	01111100	H	11001000
'	01111101	I	11001001
=	01111110	J	11010001
"	01111111	K	11010010
+	01101011	L	11010011
%	01101100	M	11010100
-	01101101	N	11010101
>	01101110	O	11010110
		P	11010111

## ASCII

American standard code for information interchange is an 8-bit code that specifies character values from 0 to 127.

### ASCII Tabular column

ASCII Code	Decimal Value	Character
0000 0000	0	Null prompt
0000 0001	1	Start of heading
0000 0010	2	Start of text
0000 0011	3	End of text
0000 0100	4	End of transmit
0000 0101	5	Enquiry
0000 0110	6	Acknowledge
0000 0111	7	Audible bell
0000 1000	8	Backspace
0000 1001	9	Horizontal tab
0000 1010	10	Line Feed

## Extended ASCII

extended AMERICAN standard code for information interchange is an 8-bit code that specifies character values from 128 to 255.

Extended ASCII tabular column

Char	Code	Char	Code	Char	Code	Char
À	161	˘	162	Ł	163	◻
Š	169	Ş	170	Ť	171	Ž
ą	177	˙	178	ı	179	ˆ
š	185	ş	186	ı'	187	ž
-	193	Â	194	Ă	195	Ă

## Unicode

Unicode worldwide character standard uses 4 to 32 bits to represent letters, numbers and symbol.

Char	UTF-16	UTF-8
A	0041	41
c	0063	63
ö	00F6	C3 86
€	4E9C	E4 BA 9C
£	D834 DD1E	F0 9D 84 9E

# Concept of Data processing

## What is data processing?

Data processing occurs when data is collected and translated into usable information. Usually performed by a data scientist or team of data scientists, it is important for data processing to be done correctly as not to negatively affect the end product, or data output.

Data processing starts with data in its raw form and converts it into a more readable format (graphs, documents, etc.), giving it the form and context necessary to be interpreted by computers and utilized by employees throughout an organization.

## Six stages of data processing :-

1. Data collection
2. Data preparation
3. Data input
4. Processing
5. Data output/interpretation
6. Data storage



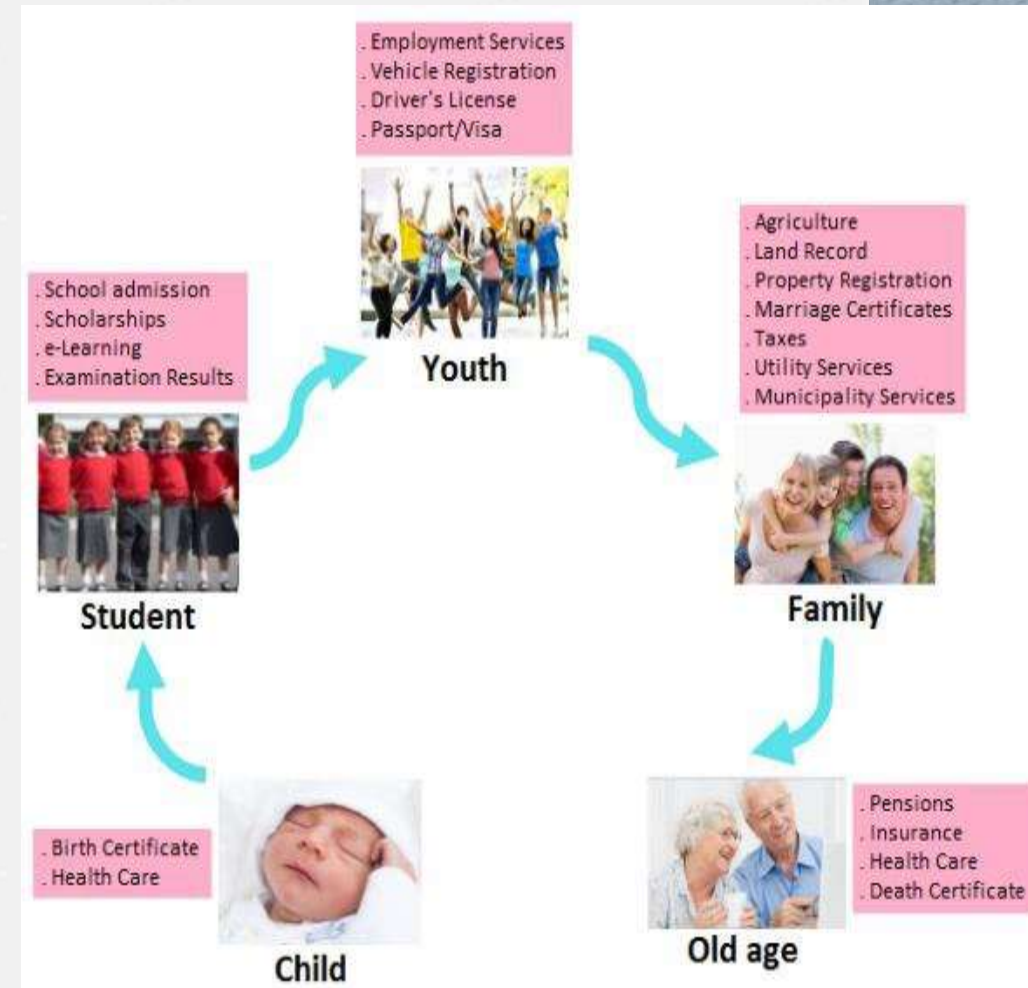
# Applications of IECT

IECT stands for Information Electronics and Communication Technology. The applications of IECT are as follows –

- E-governance
- Multimedia and Entertainment

## 1. E-governance

Electronic governance is application of Information Electronics and Communication Technology in running an effective governance system for people. Communication refers to sharing of information between parties like common people, government, business, etc. Almost every government sector has changed to IECT like rail reservation system, gas subsidy disbursement, etc.



## 2. Multimedia and Entertainment

multimedia refers to combination of text, audio, video, graphics, animation, etc. It is one of applications of IECT. Multimedia is used to improve quality of presentation by incorporating information sharing, usage of graphics and animation, motion capture, etc.

