

# Chapter 1: Emerging Technology in Information Communication Technology(ICT)

1. Computer: A programmable electronic device that
  - Takes data through input devices
  - Processes data according to a sequence of instructions (program)
  - Outputs results through output devices
2. ICT is essential for modern technological advancements
  - relies on a combination of hardware, software, and data to deliver efficient efficient communication.
3. Ages of Basic Information Technology:
  - 3.1 Pre-Mechanical(3000 B.C.-1450 A.D.)
  - 3.2 Mechanical(1450 - 1840)
  - 3.3 Electromechanical(1840 - 1940)
  - 3.4 Electronic(1940 - Present): Development of computers through various generations

## Generations of Computers

### *First Generation(Vacuum Tubes)*

- Sent information **by using electric current** (speed is close to light velocity 300,000km/second)
- Was **programmed with 6000 multiposition electric switches** [ early computers were programmed manually by setting thousands of switches in precise positions, a stark contrast to modern programming methods that use code and user-friendly interfaces ]
- Programs and data were **stored in separate memories**

### *Second Generation: Transistor(1955-1965)*

- Was marked by **hardware innovation**
- **Introduced high-level programming languages** (such as ALGOL, COBOL, and FORTRAN)

### *Prominent Computer Systems / Brands*



IBM (International Business Machines)-Computer



*PDP (Programmed Data Processor)-Company*



*CDC (Control Data Corporation)-Company*

#### *Third Generation: Integrated Circuits (1965-1980)*

- Use of integrated circuits **reduced size**
- Introduction of **operating systems**
- Introduction of **parallel processing**(so counting was faster)
- Some types of third generation computer from IBM (Mainframe):
  1. IBM System/360
  2. IBM System/370
  3. IBM System/3900
  4. IBM System/4300

#### *Fourth Generation: VLSI (1980 - Present)*

- **Allows millions of transistors on a single chip**( enables the **creation of CPU, memory and other components in a single chip** which can be produced massively in a cheap price )
- **Starts** the era of Personal Computer (**PC**)

#### *Fifth Generation*

- Development involves **artificial intelligence, expert system, and natural programming language**
- Focus on connectivity among computers( to form parallel computation )

## **Six Eras of IT**

### *(i) 1960s: Mainframe*

- Introduction of IBM 1401 and 7090 in 1959
- **IBM 360 series marked the commercial use of mainframe computers**

### *(ii) 1970-1980s: PC+Networks*

- **Proliferation of PCs** Personal computers became common in the 1980s and 1990s
- **Development of desktop productivity software** Tools like word processors, spreadsheets, and presentation software
- **Networking capabilities emerged** in the 1990s.

#### (iii)1990s:Web+Servers

##### Web

- **World Wide Web(WWW)** is a subset of the internet / also known as W3 or web which **includes all web pages and online content formatted in HTML**
- WWW is created by Tim Berners-Lee at CERN in 1989

##### **The World Wide Web:**

##### World's First Website Goes Online

- The **first URL** was established on **December 20, 1990**, leading to the first website.
- Initial web content was simple, **weighing only 2.7KB**

##### **Netscape's Navigator**

- Developed in 1994 by Netscape Communications
- Introduced **incorporated graphics and text**, changing internet experiences

##### **Google Smart Search Algorithm**

- Launched in 1998
- **First search engine that used PageRank algorithm**
- Simple interface, making it has faster search result

#### (iv)2000s:Visualization

- Allows a single computer's hardware resources to be divided into multiple virtual machines (VMs) [allow one physical computer to do the job of many]

#### (v) 2010s:Mobile+Cloud

##### Mobile Computing

- Technology for **transmitting voice and data through portable devices over wireless networks**
- Mobile Computing System: A distributed system enabling communication anytime, anywhere.

#### (v) 2020s:AI+Robotics+IoT+Edge

##### Edge Computing

- A **decentralized infrastructure** that reduces latency and increases efficiency [ speeds up data processing and improves efficiency by handling data closer to where it's generated ]

## Cloud Computing and Emerging Technologies

1. Cloud computing

2. Artificial Intelligence

3. Mobile Computing

4. Internet of Things (IoT)

- Refers to **interconnected devices that exchange data via the internet**

- **Applications of IoT:**

- Smart Homes: Devices communicate with each other to make a home more convenient, efficient, and automated
- Smart Cities: Optimizing urban planning for efficiency
- Industry 4.0: Enhancing manufacturing through automation and predictive maintenance ( )

5. Virtualization

6. Edge Computing