

# Computer Fundamentals

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# Marks Distributions

<b>Attendance</b>	<b>7</b>
<b>Quiz / Class Tests</b>	<b>15</b>
<b>Assignment</b>	<b>5</b>
<b>Presentation</b>	<b>8</b>
<b>Mid-term</b>	<b>25</b>
<b>Final</b>	<b>40</b>
<b>Total</b>	<b>100</b>

## For Obtaining Marks

- **Class Attendance**
- **Class Attention**
- **Assignments**
- **Class Tests**
- **Manner/Behave**

- **Today Full 100 marks are given to all.**
  - **Now it is your time to set your final marks and Grade**

# Syllabus Details

**Introduction to Computer:** Invention, Brief History, Evolution and Generations of Computers, Classification and Different Types of computers.

**Number System:** Introductory concepts of Binary, Octal, Decimal and Hexadecimal number systems & their arithmetic operations, conversion of different number systems.

**Codes:** BCD, ASCII and EBCDIC codes, Data representation.

**Computer Organization:** Details of Basic Organization of computers, Computer Bus System

**Computer Hardware:** Different types of Hardware, Architecture, Motherboards and Micro-processors. Various Registers, Processor Speed.

**Input Devices:** Common Input Devices like Keyboard, Mouse, Touch Screen, Light pen, Joysticks, Trackball, Barcode-Reader, Point-of-sale, Optical Mark Reader, Optical Character Reorganizations, Scanner, Graphics Pads, Video Digitizer, Digital Camera etc

**Output Devices:** Common Output Devices like Monitor, Screen Display Devices, Different types of Printers, Plotters, Sound Systems, etc

**Memory Devices:** Details of Storage Devices; Main memories, Secondary Memory, Cache Memory, Different types of secondary memories like Magnetic Tap, Floppy Disks, Optical Storage Systems, Laser Card, Bubble Memories, CD-ROM, Hard Disk, etc, Memory Types and their purposes, Storage Hierarchies.

**Peripheral Devices:** Peripheral devices for AT, XT, ISA, ESA, PCI Bus Architecture.

**Computer Software:** Software, Relation between hardware and software, classifications, Different types of application software, Operating system, steps to write program, software developing steps, Firmware, humanware, shareware and freeware.

**Internet:** History, Basic Services, Different features and working techniques of Internet, Uses of the Internet, Uses of the World Wide Web and WWW Browser.

**Maintenance of Computer:** (a) Hardware maintenance like Power supply stability, grounding, effect of surge current and its protection. Stabilizer and UPS. Handling of computer cards and chips. (b) Software maintenance like Routine maintenance of the programs, computer virus and protections.

# Referenced Books

1. **Understanding Computer Science for Advance Level – Ray Bradly**
2. **Computer Fundamentals – Pradeep K. Sinha**
3. **Computers and Information Systems – Sarah E. Hutchnisonb and Stacey C. Sawyer**
4. **Computer Fundamentals – Dr. M. Lutfar Rahman, Dr. M. Alamgir Hossain**
5. **Computer Systems Today – S.K. Basandra**
6. **Computer Fundamentals – Subramanium**
7. ***Introduction to Computer Fundamentals – Dr. M. Ismail Jabiullah***

# **Selective Terms We have to Learn**

- 1. Data**
- 2. Types of data**
- 3. Information**
- 4. Relations between data and information**
- 5. Differences between data and information**
- 6. Computer**
- 7. What computers can do**
- 8. Inventor of computer**
- 9. Features of computer**
- 10. Important characteristics of a computer**
- 11. Differences between man and computer**
- 12. System components of a computer system**
- 13. Differences between a computer and an electronic calculator**
- 14. Brief history of early computer**
- 15. Early computers**
- 16. MARK I computer**
- 17. ENIAC computer**
- 18. EDVAC computer**
- 19. EDSAC computer**
- 20. Brief history of modern computers**
- 21. What are the generations of computers**
- 22. Generations of computers' equipment**
- 23. Generations of computers at a glance**
- 24. Key dates in the history of computers**

# Introduction to Computer

## Topics

- **Data**
- **Information**
  - **Relation between Data and Information**
  - **Differences between Data and Information**
- **Metric Units**
- **How large is large?**
- **Computer**
  - **Inventor of Computer**
  - **What computers can do?**
  - **Features of Computer**
- **Differences between Man and Computer**
- **History of Computer**
- **Time line or key dates of computer invention**
- **Generation of Computer Equipments**
- **Generation of Computer**

# Data

- The word **data** is the plural of datum, which means facts.
- Data is a piece of value that we can consider as a single entity.
- Data refers to raw-facts that have been collected from various sources but not as organized form.
- Data can not be used directly to make meaningful decisions.
- But when data are arranged, it may provide useful information.
- *For example, 92338001, 991918005, 910018006*  
*are the data items for students' roll number.*

# Information

- Information may be considered as collection of data that has been organized and that are processed.
- Processed data that are given form of organized collection is referred to as information.
- Information is processed data that is organized and meaningful to the person receiving it.
- Data is thus a raw material that is transformed into information by processing.
- Information increases understanding and helps in taking intelligent decisions.



**Information**

**Field Name**

**Data**

<b>Roll</b>	<b>Name of the student</b>	<b>Marks</b>
31517001	Abdur Rahman	980
31517002	Jamal Ahmed	760
31517003	Jesmin Khondoker	580
31517004	Zerina Zaman	670
31517005	Rahmat Ali	770

**Table: Information Comprising Students Roll, Name and Marks.**

# Relation between Data and Information

- Data is a piece of value
- Data comprises information
- Data convey the meaning of the information

$$f(\text{data}) = \text{information}$$

- Information is a meaningful value
- Information describes all information of a particular entity
- Information composes of related data to convey the meaning of a particular entity

# Differences between Data and Information

<b>Data</b>	<b>Information</b>
(1) Data is a piece of value that we can consider as a single entity.	(1) Information may be considered as a data that has been organized and that are processed.
(2) Data does not increased understanding.	(2) Information increases understanding.
(3) Data can not be used directly to taking intelligent decisions.	(3) Information helps in taking intelligent decisions.
(4) Data is not a collection of information.	(4) Information is an organized collection of data.
(5) Data comprises information.	(5) Information does not comprise any data.

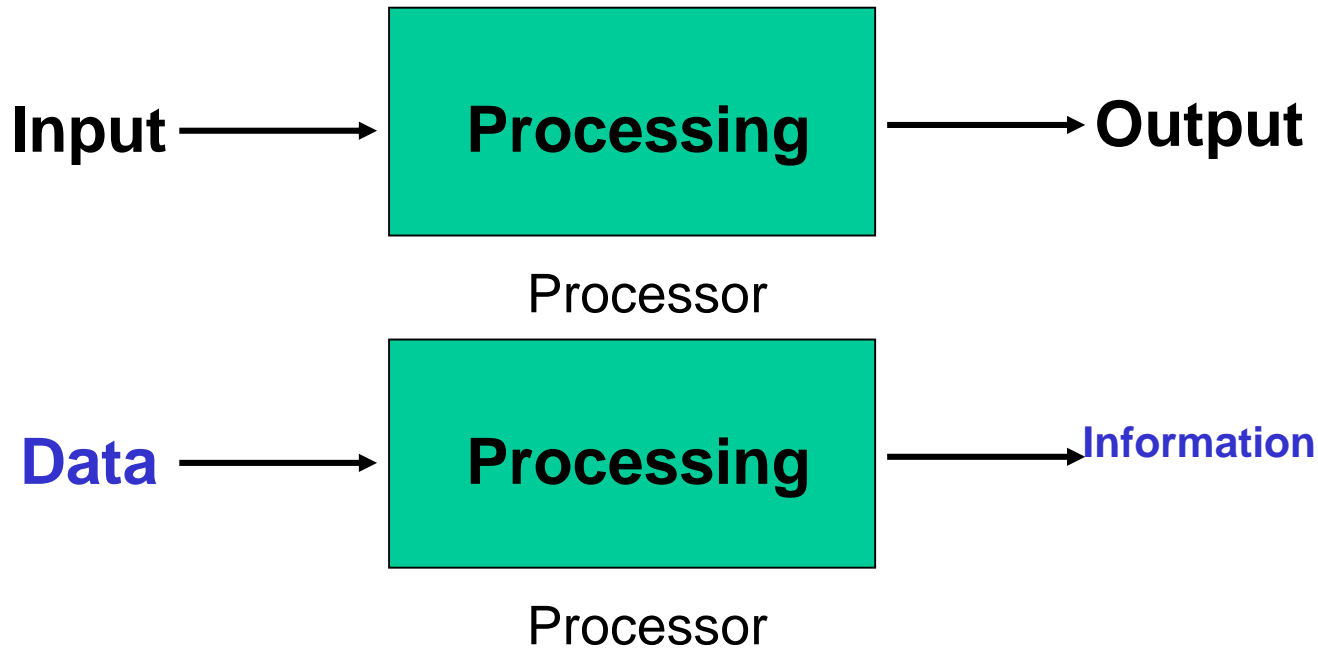
# Metric Units

Exp.	Explicit	Prefix	Exp.	Explicit	Prefix
$10^{-3}$	0.001	milli	$10^3$	1,000	Kilo
$10^{-6}$	0.000001	micro	$10^6$	1,000,000	Mega
$10^{-9}$	0.000000001	nano	$10^9$	1,000,000,000	Giga
$10^{-12}$	0.0000000000001	pico	$10^{12}$	1,000,000,000,000	Tera
$10^{-15}$	0.00000000000000001	femto	$10^{15}$	1,000,000,000,000,000	Peta
$10^{-18}$	0.000000000000000000001	atto	$10^{18}$	1,000,000,000,000,000,000	Exa
$10^{-21}$	0.0000000000000000000000001	zepto	$10^{21}$	1,000,000,000,000,000,000,000	Zetta
$10^{-24}$	0.00000000000000000000000000001	yocto	$10^{24}$	1,000,000,000,000,000,000,000,000	Yotta

# How Large is Large?

Reference	Magnitude
Seconds in a year (365 x 24 x 60 x 60)	$\sim 3 \times 10^7$
Age of our solar system (years)	$\sim 6 \times 10^9$
Seconds since creation of solar system	$\sim 2 \times 10^{17}$
Clock cycles per year, 50 MHz computer	$\sim 1.6 \times 10^{15}$
Binary strings of length 256	$2^{256} \sim 1.2 \times 10^{77}$
Number of 75-digit prime numbers	$\sim 5.2 \times 10^{72}$
Electrons in the Universe	$\sim 8.37 \times 10^{77}$

# Computer



- **Computer is an information-processing machine that performs all of its actions with the help of stored instructions.**
- **A computer is a data processing device made up of electronic and electromechanical components that can perform computations, including arithmetic and logical operations.**
- **More precisely, a computer is a device that works under the control of stored programs, automatically accepting, storing and processing data to produce information that is the result of that processing.**

# Inventor of Computer

- **Charles Babbage**, a brilliant English **mathematician**, is the inventor of computer.
- **Charles Babbage**, a Professor of **Mathematics** at Cambridge University, England,
  - attempted in **1812** to build
    - **a difference engine**, a machine that could
    - **add, subtract, multiply, divide** and perform a sequence of steps automatically.

Charles Babbage (1791 to 1871)



# What computers can do?

Computer can do the following:

- Stores data in vast amounts.
- Processes data quickly and accurately.
- Graphically represents numbers.
- Simulates possible outcomes based on a given set of conditions.
- Recommends or takes action based on output.

## Features of Computer

- ❖ Speed
- ❖ Automatic operation
- ❖ Storage Capability
- ❖ Versatility
- ❖ Diligence
- ❖ Reliability, etc.

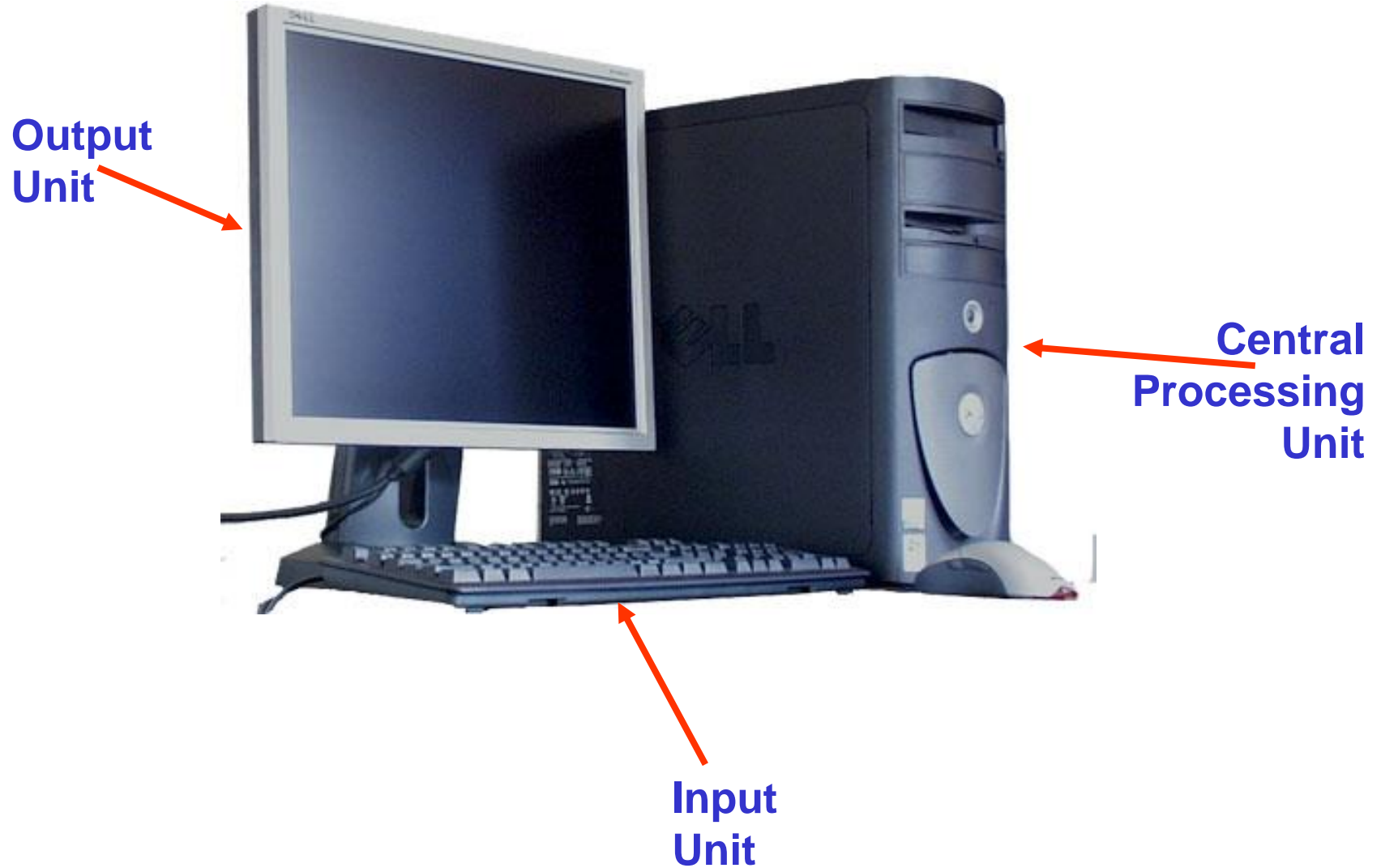


# Characteristics of Computers

**The interesting Characteristics of a computer are:**

- Computers are built to carry out a small variety of instructions.
- It is not necessary to have more than about 100 distinct instructions even for a very powerful machine.
- Instructions are extremely simple; e.g., add, subtract, read a character, write a character, compare numbers, characters, etc.
- Most instructions are carried out in less than a millionth of a second.
- Instructions are carried out obediently with no questions asked.
- Instructions are carried out without any mistakes.

# System Units of Computer



# Differences between Man and Computer

<b>Man</b>	<b>Computer</b>
(1) Man has own intelligence power.	(1) Computer has no intelligent power.
(2) Man has no pre-stored programs.	(2) Computer has pre-stored programs.
(3) Man has power of invention.	(3) Computer has no power of creativity.
(4) Man can not do anything without error.	(4) Computer can do without error.
(5) Man can do the job using his own intelligence.	(5) Computer can not do the job using his own intelligence.



# History of Early Computer

From BC to 1939

Till (Second World War)

# History of Early Computer

From **BC** to **1939** (Second World War)

- **Abacus or Sorrobone**



**Abacus**

# History of Early Computer...

The image shows a 10x10 grid of multiplication tables, known as Naphier's Bone. Each column is headed by a digit from 0 to 9, and each row is headed by a digit from 0 to 9. The grid contains the products of these digits. For example, the first row (multiplier 0) contains 0, 0, 0, 0, 0, 0, 0, 0, 0, 0. The second row (multiplier 1) contains 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. The third row (multiplier 2) contains 0, 2, 4, 6, 8, 10, 12, 14, 16, 18. The grid continues in this pattern, showing the multiplication of each digit by each other digit.

0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9
0	2	4	6	8	10	12	14	16	18
0	3	6	9	12	15	18	21	24	27
0	4	8	12	16	20	24	28	32	36
0	5	10	15	20	25	30	35	40	45
0	6	12	18	24	30	36	42	48	54
0	7	14	21	28	35	42	49	56	63
0	8	16	24	32	40	48	56	64	72
0	9	18	27	36	45	54	63	72	81

**Naphier's Bone**

# History of Early Computer...



**Pascaline**

# History of Early Computer...



**Libnitz's Calculator**



# History of Early Computer...



**Difference Engine**

# History of Early Computer...



**Analytical Engine**

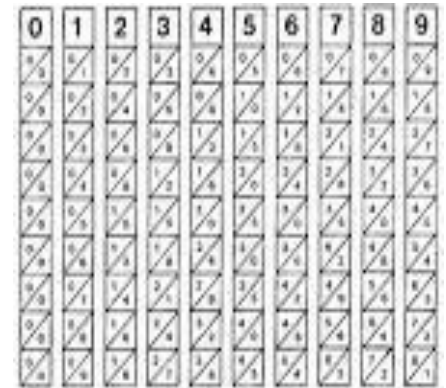
# History of Early Computer...

## From BC to 1939 (Second World War)

- Abacus or Sorrobone
- Nephier's Bone
- Pascaline
- Libnitz's Calculator
- Difference Engine
- Analytical Engine



Abacus



Nephier's Bone



Libnitz's Calculator



Difference Engine



Analytical Engine



Pascaline

# History of Modern Computer

**From 1939 to 1971**

# History of Modern Computer



**MARK I**

# History of Modern Computer...



**ENIAC** Electronic Numerical Integrator And Computer

# History of Modern Computer...



**UNIVAC** **UNI**versal **A**utomatic **C**omputer

# History of Modern Computer...



**EDVAC** Electronic Discrete Variable Automatic Computer



# History of Modern Computer...



**EDSAC** Electronic Delay Storage Automatic Computer

# History of Modern Computer...

From 1939 to 1971

- **Mark I**
- **ENIAC** **E**lectronic **N**umerical **I**ntegrator **A**nd **C**omputer
- **UNIVAC** **U**ni**U**rsal **A**utomatic **C**omputer
- **EDVAC** **E**lectronic **D**iscrete **V**ariable **A**utomatic **C**omputer
- **EDSAC** **E**lectronic **D**elay **S**torage **A**utomatic **C**omputer



MARK I



ENIAC



UNIVAC



EDVAC



EDSAC

# History of Modern Computer Part II...

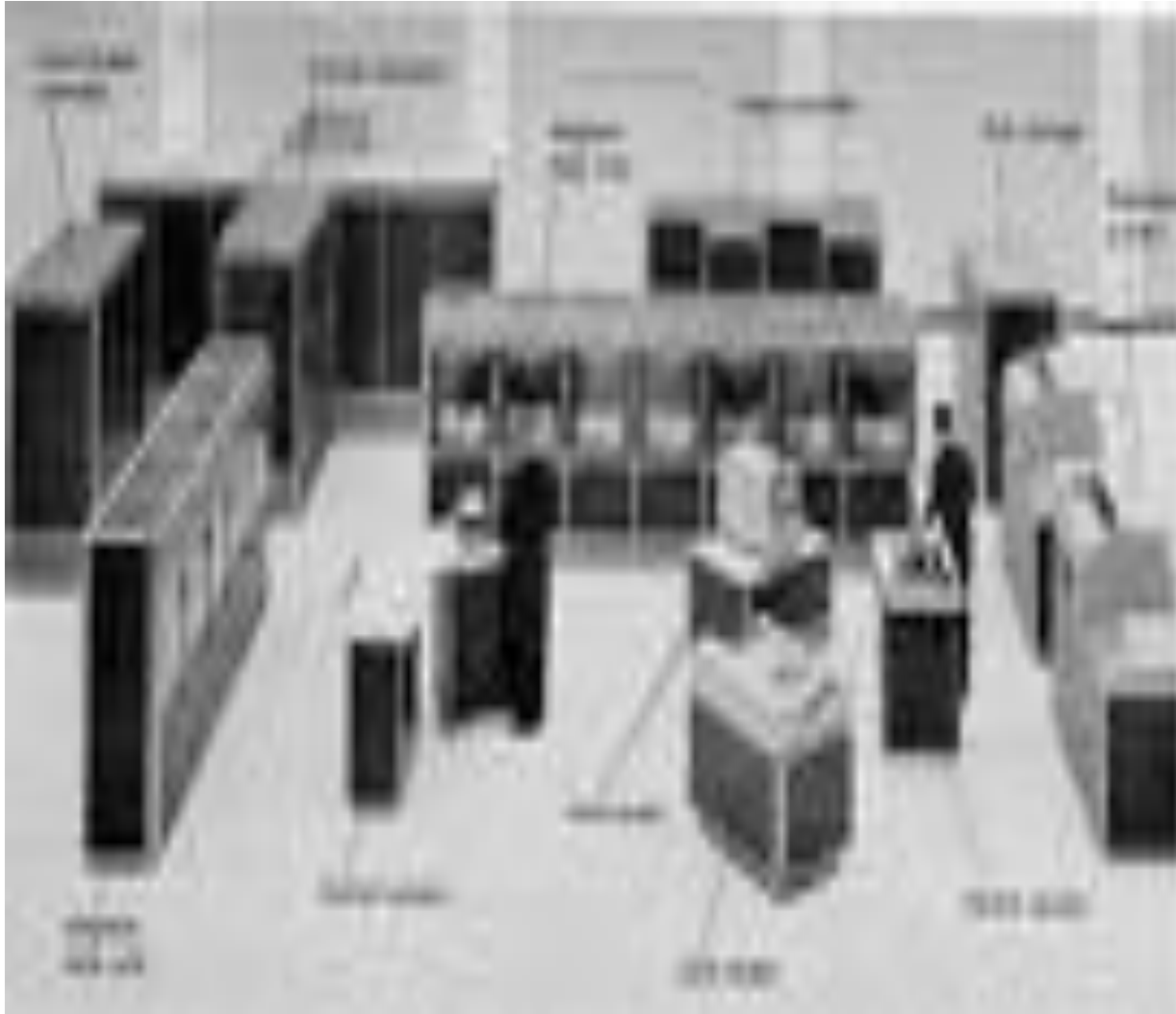
From **1972** to **2010**

# History of Modern Computer II...



**Super Computer**

# History of Modern Computer...



**Mainframe Computer**

# History of Modern Computer...



**Mini Computer**

# History of Modern Computer...

## Microprocessors



Microprocessor

# History of Modern Computer...

## Microcomputer



**PC** Personal Computers



# History of Modern Computer...

From 1972 to 2010

- Super Computer
- Mainframe Computer
- Mini Computer
- Microprocessors
- PC Personal Computers



Microprocessor



Super Computer



Mainframe Computer



Mini Computer



Microprocessor

# History of Computer

## Mark I

- In 1937, **Howard H. Aiken**, eminent physicist of Harvard University designed a machine while his was in doctorate that would automatically perform sequence of arithmetic operations.
- It was completed in **1944** and was named **Mark I**.
- It contained **72 adding accumulators** and **60 sets of switches, buttons, wired plug boards** and **punched tape**.
- Information was represented by patterns of **open** and **closed** mechanical relays.
- It measured **15 meter long, 2.4 meter high** and **0.6 meter wide**.
- Today's **desktop computers** are much faster and efficient than **Mark I**.
- The time taken for average **multiplication** was about **four** seconds and average division was about **eleven** seconds.
- The results were printed at the rate of one result per five seconds.
- The input and output were by punched cards and paper tape.



MARK I

# History of Computer...

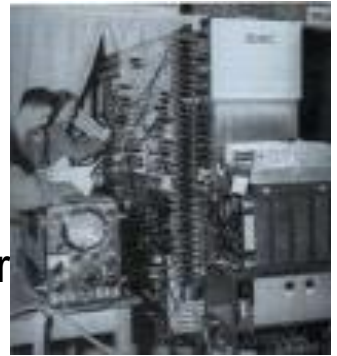
## ENIAC

- **ENIAC** stands for **E**lectronic **N**umerical **I**ntegrator and **C**alculator.
- It was completed in **1946** and was the **first electronic calculator**.
- **John Mauchly** and **Presper Eckert** at the Moore School of Electrical Engineering of the University of Pennsylvania, USA, developed it.
- This had no moving parts except the input and the output.
- It occupied a room measuring **9m x 15m** and contained **18,000 vacuum tubes**, **1500 relays** and weighted **thirty tons**.
- Programs were loaded into the machine by a system of changing **wired plug boards** and using a series of manual **switches**.
- The ENIAC performed **5000 additions per second**, consumed **150 kilowatts of power**, and needed to be water-cooled.



**ENIAC**

# History of Computer...



**EDVAC**

## **EDVAC**

- **EDVAC** stands for **Electronic Discrete Variable Automatic Computer**.
- Between **1947** and **1950** the Moore School personnel and the Ballistics Research Laboratory of US Army built the computer **EDVAC**.
- It was based on **John Von Neumann's** ideas.
- **John Von Neumann** frequently referred to as the **father of the modern computers**.
- He was the first to introduce the stored program concept in a computer.
- The **EDVAC's** storage capacity was **1024 words of 44 bits** each.
- It also had an **auxiliary storage of 20,000 words**.
- The access time of primary storage varied between **0.48** to **384.0** microseconds.
- In the **EDVAC**, the computer program was fed into the storage unit by means of a punched paper tape.
- **Dr. Neumann wrote the first program of EDVAC**.
- It was routined to arrange numbers in ascending order.
- Thus he showed that computers could be used for non-scientific computations.

# History of Computer...

## EDSAC

- **EDSAC** stands for **E**lectronic **D**elay **S**torage **A**utomatic **C**omputer.
- It was completed in **1949** at the University of Manchester, England.
- Internal storage was used in **EDSAC**.
- It was of some significance since it was the first computer to contain a changeable program of instructions within its own memory.



**EDSAC**

# **Time Line of Computer System**

# Time Line of Computer System

Year	Event
3000 BC	<b>Abacus</b> , used for arithmetic calculation, developed Orient.
200 BC	Chinese artisans develop an entire mechanical <b>orchestra</b>
1642 AD	First automatic adding machine ( <b>Blaise Pascal</b> )
1832	Babbage's analytical engine (first computer)
<b>1843</b>	<b>World's first computer programmer, Lady Ada Augusta Lovelace, publishes her notes.</b>
1890	Electricity used for first time in a data-processing project ( <b>Punched-cards</b> ).
1900	Hollerith's automatic <b>census-tabulating machine</b> (used punched cards).
1930	General theory of electronic computers
1946	First electronic computer in the United States ( <b>ENIAC</b> ).
1952	<b>UNIVAC</b> computer correctly predicts election of <b>Eisenhower</b> as U.S. President.
1964	IBM ( <b>International Business Machine</b> ) introduces 360 series of computers.
1970	<b>Microprocessor chips</b> come into use; <b>floppy disk</b> introduced for storing data.
1971	First <b>pocket calculator</b>

# Time Line of Computer System...

Year	Event
1977	<b>Apple II</b> computer (first personal computer sold in assembled form)
1981	IBM introduces personal computer <b>PC</b>
1982	Portable computers
1984	<b>Apple Macintosh</b> ; first personal <b>laser printer</b> ; desktop publishing takes hold.
1993	Multimedia desktop computers; personal digital assistants <b>PDA</b> .
1994	Apple and IBM introduces PCs with <b>full- motion video</b> built-in; <b>wireless data transmission</b> for small portable computers.
1996	<b>Home video computers</b> .
2000	<b>Teleconferencing</b> replaces the majority of business travels.
2009	<b>Half of US workers</b> work at home using computer system.
2012	<b>US citizens</b> vote for president at home, on line.
Future	.....



# Generation of Computer Equipments

Duration of Time	Names of devices
Before 1940	Switches and Relays
1941 - 1960	Valves and vacuum Tubes
1961 - 1964	Transistors and Diodes
Around 1965	Logical Functions or Logical gates
Around 1970	IC- Integrated Circuits
1971 - 1985	LSI-Large Scale Integrated Circuits, Microprocessors
1985 - 1990	VLSI- Very Large Scale Integrated Circuits, One million instructions or functions per second
1990 -	VVLSI- Very Very Large Scale Integrated Circuits, Several millions instructions or functions per second

# Selective Terms

1. **Data**
2. **Types of data**
3. **Information**
4. **Relations between data and information**
5. **Differences between data and information**
6. **Computer**
7. **What computers can do**
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# Systems

**System**

**System Components**

**Classification of computers**

**Classification of Digital Computers**

**Anatomy of computers**

**Computer Components**

**Basic organization of computers**

**Computer Generations**

**Comparison Table for Different Digital Computers**

**Characteristics of Mainframe computers**

**Characteristics of Mini computers**

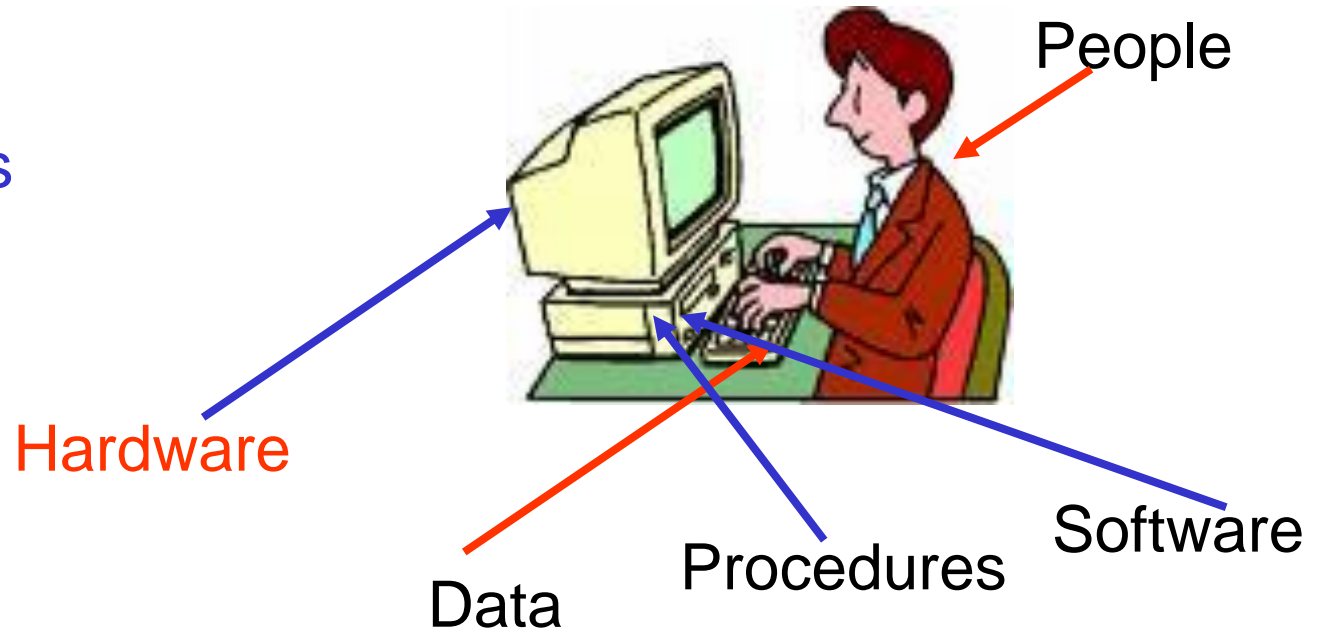
**Characteristics of Micro computers**

# Computer System

- **A system** is a collection of elements that works together to solve a specific problem.
- Regardless of size, every computer needs other components to produce results.

The components of a computer system are:

- People
- Data
- Procedures
- Hardware
- Software



# Classification of Computer

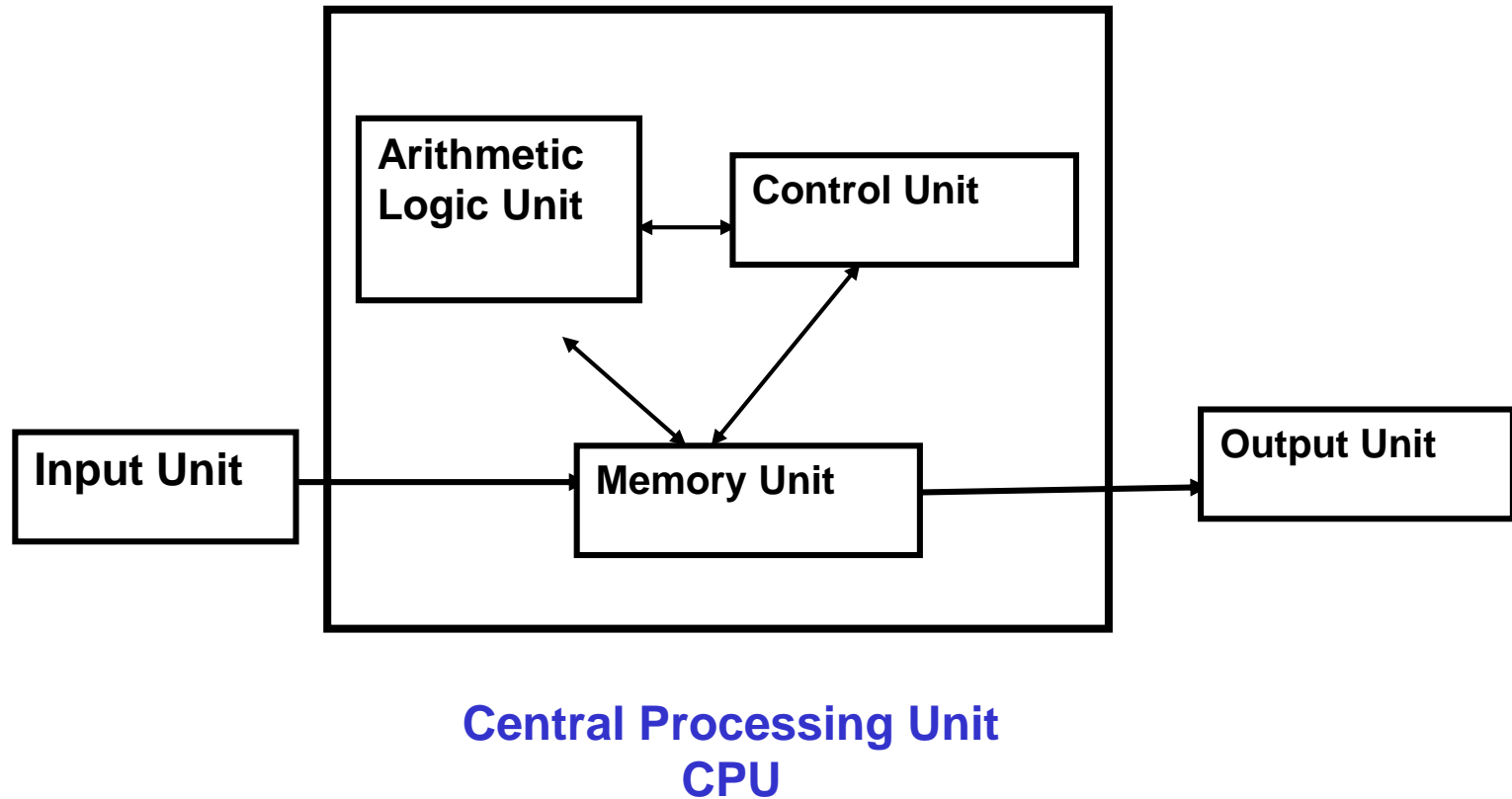
- According to **uses of the computer**, computers are classified into two categories:
  - (i) General-purpose computers
  - (ii) Special-purpose Computer
  
- According to the **structures** and the **working principles** of computer, computers are classified into three categories:
  - (i) Analogue Computer
  - (ii) Digital Computer
  - (iii) Hybrid Computer

# Classification of Digital Computers

According to the **working purpose, used components, size** and **number of users**, digital computers are classified into four groups:

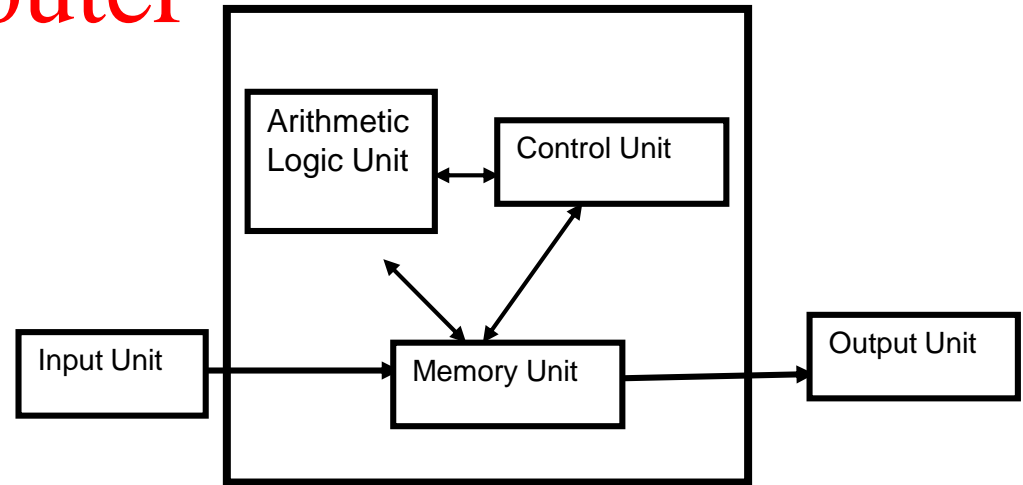
- (i) Super computer
  - (ii) Mainframe computer
  - (iii) Mini computer
  - (iv) Micro computer
- or
- Personal Computer

# Anatomy of Computer



# Anatomy of Computer

- IU**      **Input Unit**
- ALU**    **Arithmetic Logic Unit**
- CU**      **Control Unit**
- MU**      **Memory Unit**
- OU**      **Output Unit**



Computer elements	Purposes
(1) Input Unit	(1) To receive data and instruction in a form that can be understood by the computer.
(2) Output Unit	(2) To give out information via a suitable device, i.e., a printer or a monitor. The output information is obtained from main storage.
(3) Arithmetic Logic Unit	(3) To carry out calculations and comparisons based on the instructions.
(4) Control Unit	(4) To take stored instructions in sequence one at a time. To interpret each instruction and prompt its, execution by one of the units like input, output storage or ALU.
(5) Memory Unit	(5) To hold data and instructions after input unit until needed. Also to hold information waiting output. The instructions provided by programmers will specify the action to be taken on the data.



# Computer Components

Essentially, a computer performs three functions:

- (i) It accepts data (Input);
- (ii) It processes data by performing desired arithmetic and logical operations (Processing); and
- (iii) It generates data in the desired form (Output).

## Basic components (organization) of a computer system

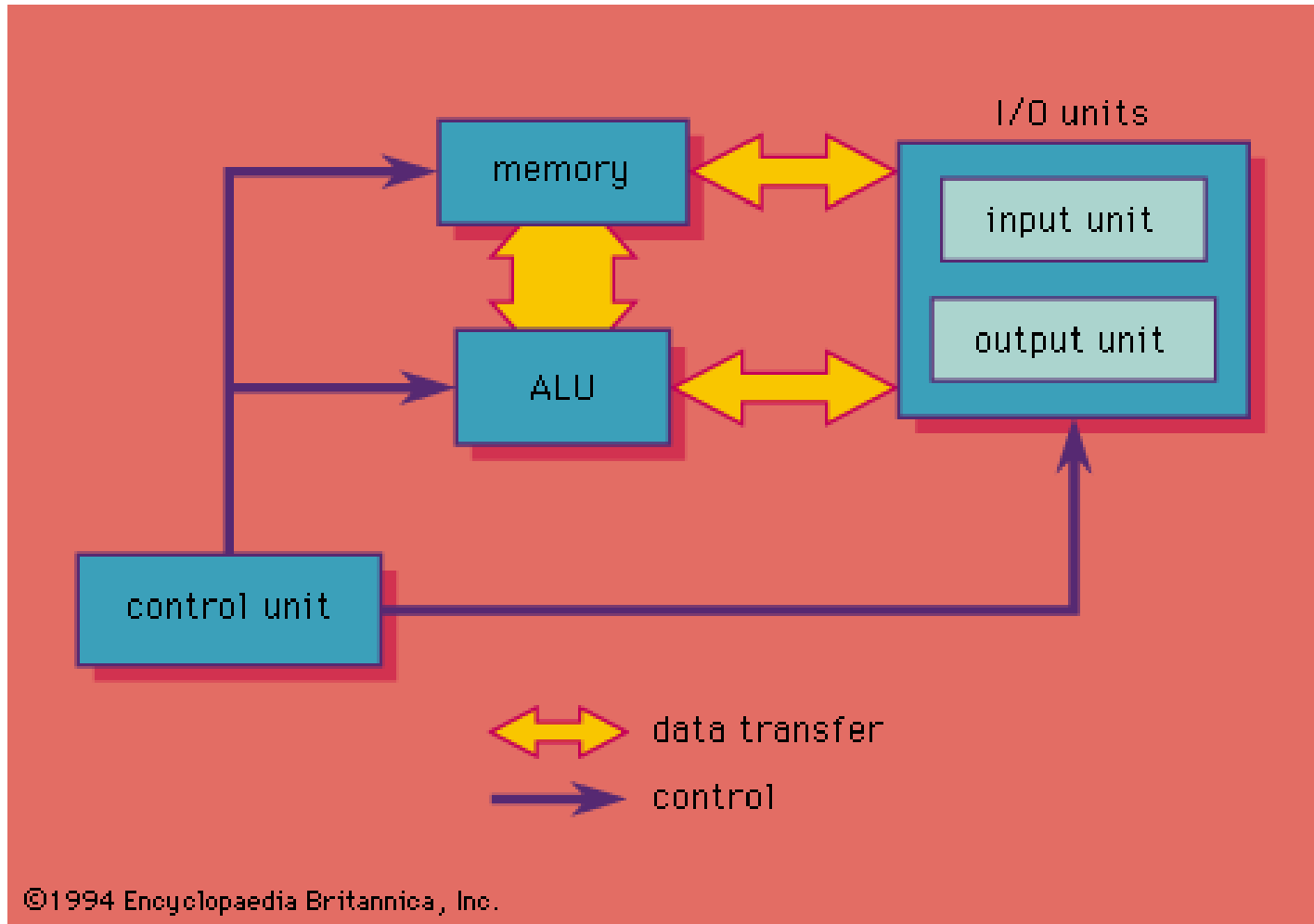
Computer system consists of five basic components. They are:

- (1) Input Unit : Input data re fed into computer.
- (2) Memory Unit : Both program and data are stored for processing.
- (3) Arithmetic Logic Unit (ALU) : Data are actually processed.
- (4) Output Unit : Output data are presented to the user.
- (5) Control Unit : Controls all the operations of the computer.

The control unit, together with the ALU and memory units, constitutes the Central Processing Unit (CPU).

# Organization of Computer

- Basic Organization of Computer



# Basic Organization of Computer

## Purposes of the elements of Computer

<b>Computer elements</b>	<b>Purposes</b>
(1) Input Unit	(1) To receive data and instruction in a form that can be understood by the computer.
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# Computer Generations

- **1<sup>st</sup> Generation (1945 -1960)**
- **2<sup>nd</sup> Generation (1960 - 1965)**
- **3<sup>rd</sup> Generation (1965 - 1970)**
- **4<sup>th</sup> Generation (1970 - 1980)**
- **5<sup>th</sup> Generation (1980 – till today)**

# Computer Generations

<b>Period</b>	<b>Computer System characteristics</b>
(1) First Generation (1945-1960)	<ul style="list-style-type: none"><li>(a) Use of vacuum tubes in electronic circuits</li><li>(b) Magnetic drum as primary internal storage medium</li><li>(c) Limited main storage capacity and slow operating speed (<math>10^{-3}</math> sec)</li><li>(d) Slow input/output; punched card and tape-oriented.</li><li>(e) Low level machine as well as symbolic language programming.</li><li>(f) Heat and maintenance problems.</li><li>(g) Mainly batch processing.</li><li>(h) Payroll processing and record keeping are the some of the application areas of this generation of computers.</li><li>(i) IBM 650, UNIVAC I, IBM 710 are some of the examples of this generation of computers.</li></ul>
(2) Second Generation (1960-1965)	<ul style="list-style-type: none"><li>(a) Use of transistors and diodes for internal operations</li><li>(b) Magnetic core as primary internal-storage medium</li><li>(c) Increased main-storage capacity</li><li>(d) Increased speed and reliability(typical operating speed <math>10^{-6}</math> sec)</li><li>(e) Faster input/output; Introduction of VDU, OCR and MICR readers.</li><li>(f) Low level machine as well as symbolic language programming.</li><li>(g) Great reduction in size and heat generation.</li><li>(h) Mainly batch processing, multi-programming, time-sharing and real-time.</li><li>(i) Payroll processing, billing, updating inventory files and record keeping are the some of the application areas of this generation of computers.</li><li>(j) IBM 1401, Honeywell 400, CDC1604, Burroughs 200 and IBM 1602 are some of the examples of this generation of computers.</li></ul>

# Computer Generations...

Period	Computer System characteristics
<p>(3) Third Generation (1965-1970)</p>	<p>(a)Use of IC-Integrated circuits.            (b)Magnetic core and solid state main storage medium            (c)Smaller size and better performance and reliability.            (d)Increased operating speed (typical operating speed <math>10^{-9}</math> to <math>10^{-12}</math> sec)            (e)More flexibility with faster input/output; key-to-tape, disk oriented.            (f)Extensive use of High Level programming languages.            (g)Emergence of Mini-computers.            (h)Great reduction in size and heat generation.            (i)Remote processing and time-sharing through communication.            (j)Availability of Operating System programs (software) to control input/output and do many tasks.            (k)Payroll processing, billing, updating inventory files, Airline systems, market forecasting, credit card billing and record keeping are the some of the application areas of this generation of computers.            (l)IBM System 360, IBM System 370, NCR 395, Burroughs B5500, ICL 1900, ICL 2900 series and CDC 6600 are some of the examples of this generation of computers.</p>
<p>(4) Fourth Generation (1971-1980)</p>	<p>(a)Use of LSI - Large Scale Integrated circuits and VLSI - Very Large Scale Integrated circuits.            (b)Increased storage capacity.            (c)Increased operating speed (typical operating speed <math>10^{-9}</math> to <math>10^{-12}</math> sec)            (d)Modular design and compatibility between equipment or hardware provided by different manufacturers. Customer no longer tied to one vendor.            (e)Greater versatility of input/output devices, audio response terminals, graphics display terminals.            (f)Availability of sophisticated programs for special applications.            (g)Increased use of Microcomputers.            (h)Introduction to microprocessors and microcomputers, networking, Bubble memory and home computers.            (i)Mathematical modeling, simulation, electronic fund transfer and computer aided instructions are the some of the application areas of this generation of computers.            (j)IBM 3033, Burroughs B7700, HP 3000(Minicomputer), ICL, DCM, IDM (microcomputers), Apple II are some of the examples of this generation of computers.</p>

# Computer Generations...

<b>Period</b>	<b>Computer System characteristics</b>
(5) Fifth Generation (1980- till today)	<p>(a)The fifth generation computers are under development.</p> <p>(b)Japan and USA have undertaken to design and develop such computers.</p> <p>(c)It appears that the fifth generation computers will have at least three important characteristics: (i)mega-chip memories, (ii) the ability to extensive use of parallel processing, and (iii) artificial intelligence.</p> <p>(d)The design approach of the CPU of these computers will be conceptually different from that of the earlier four generations of computers of Von Neuman architecture in which processor executes simple instructions in sequence.</p> <p>(e)In new design, processing units may not be centralized but distributed in the computer system. AU data may not be stored in the main memory.</p> <p>(f)The data may flow through the processing units activating each of them as needed.</p> <p>(g)These computers will be knowledge-based and will be used for Information management, Natural Language Processing, Speech, Character and Image Recognition and such other artificial intelligence applications.</p>

# **Different Types of Micro Computer**

- **Laptop Computer**
- **Desktop Computer**
- **PumpTop**
- **ThighTop**



## Comparison Table for Different Digital Computers

<b>Compared Item</b>	<b>Super computer</b>	<b>Mainframe computer</b>	<b>Mini computer</b>	<b>Micro computer</b>
<b>Word length</b>		32 - 64	16 - 32	8 - 16
<b>Memory capacity</b>		8.4 million	256 - 512 KB	32 - 64 KB
<b>Peripherals</b>		All types	Wide Variety	Visual display, floppy disk, magnetic tape, dot matrix printer
<b>Languages</b>		All levels of programming languages	All levels of programming languages	FORTRAN, COBOL, BASIC, PASCAL, C, JAVA, etc.
<b>Software</b>		All types	Wide variety	Limited
<b>Examples</b>		IBM 370 IBM 168	PDP-11 PDP- 45	IBM, DELL, Packard Bell

# Characteristics of Mainframe computer

- **Based on the principle that computing power should be concentrated. Many people make use of the same machine resulting in organizational software complexity.**
- **Sensitive to variations in temperature, humidity, dust, etc, and hence should be kept in controlled environment e.g. air-conditioned rooms.**
- **Special and qualified operators and programmers are required for their operations.**
- **Support wide-range of peripherals.**
- **Have large data-storage capacities.**
- **Can make use of wide variety of software.**
- **Incorporate high-speed data channels to facilitate high throughput rates.**

# Characteristics of Mini computer

1. Have limited data channel capacity.
2. Limited range of peripherals.
3. Limited software is available.
4. Limited support offered by the manufacturers.
5. Facility for direct operation of the machine by the end user.
6. Favorable cost/performance ratio.
7. Air-conditioning is not necessary and is provided in many cases only for dust control.

# Characteristics of Micro computer

The characteristics of a microcomputer are:

1. Computers are built to carry out a small variety of instructions. It is not necessary to have more than about 100 distinct instructions even for a very powerful machine.
2. Instructions are extremely simple; e.g., add, subtract, read a character, write a character, compare numbers, characters, etc.
3. Most instructions are carried out in less than a millionth of a second.
4. Instructions are carried out obediently with no questions asked.
5. Instructions are carried out without any mistakes.

# **We have Discussed**

- 1. Data**
- 2. Types of data**
- 3. Information**
- 4. Relations between data and information**
- 5. Differences between data and information**
- 6. Computer**
- 7. What computers can do**
- 8. Inventor of computer**
- 9. Features of computer**
- 10. Important characteristics of a computer**
- 11. Differences between man and computer**
- 12. System components of a computer system**
- 13. Differences between a computer and an electronic calculator**
- 14. Brief history of early computer**
- 15. Early computers**
- 16. MARK I computer**
- 17. ENIAC computer**
- 18. EDVAC computer**
- 19. EDSAC computer**
- 20. Brief history of modern computers**
- 21. What are the generations of computers**
- 22. Generations of computers' equipment**
- 23. Generations of computers at a glance**
- 24. Key dates in the history of computers**

**Thanks**