

Introduction to Information Technology

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Course Title: Introduction to Information Technology

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Course Contents

Unit 1:Introduction to Computer (3 Hrs.)

Unit 2:The Computer System Hardware (3 Hrs.)

Unit 3:Computer Memory(4 Hrs.)

Unit 4:Input and Output Devices (4 Hrs.)

Unit 5:Data Representation (6 Hrs.)

Unit 6:Computer Software(6 Hrs.)

Unit 7:Data Communication and Comp. Network (5 Hrs.)

Course Contents

Unit 8:The Internet and Internet Services(4 Hrs.)

Unit 9:Fundamentals of Database(4 Hrs.)

Unit 10: Multimedia(3 Hrs.)

Unit 11 Computer Security(3 Hrs.)

Course Contents

Unit 1:Introduction to Computer (4 Hrs.)

- Introduction of Computer
- Characteristics of Computer
- History of Computer
- Generations of Computer
- Digital and Analog Computers
- Classification of Computer based on size
- The Computer System
- Application of Computers

Course Contents

Unit 1:Introduction to Computers(4 Hrs.)

- Introduction of Computer

Questions:

- What is Computer? Draw the block diagram of Digital computer and explain it's components in brief.

Course Contents

Recommended Text books:

- Anita Goel , “Computer Fundamentals”

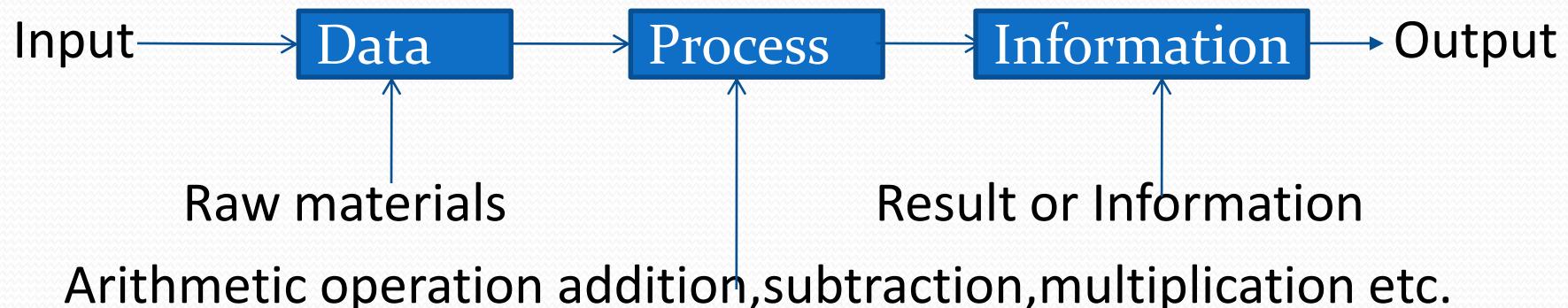
Reference books:

- P.K. Sinha, “Computer Fundamentals”.

Introduction to Computer

The word “Computer” is derived from the Latin word ‘computare or compute’. Compute means just calculate. So, According to this definition, computer is a machine which takes input from the user, process these input and finally provide output.

Working Principle of Computer



Characteristics of Computer

- Word Length
- Speed
- Accuracy
- Storage
- Versatility
- Diligence
- Automatic
- Electronic

Characteristics of Computer

Word Length

- Word length refers to the number of bits that the CPU can manipulate one at a time.
- Word Lengths are various sizes 8 bits, 16 bits, 32 bits, 64 bits, 128 bits etc.
- It measures the computing power of CPU.
- It based on the size of registers and data lines in the data bus.

Characteristics of Computer

Speed

- The time taken to perform a certain task is called the speed of computer.
- The speed of computer is measured in fraction of seconds.
- These fraction of seconds are milli seconds, micro seconds, nano seconds, pico seconds and femto seconds.

Characteristics of Computer

Accuracy

- Computer gives 100% accurate calculations. If any data and instructions are accurate then it will provide accurate result.

Storage

- Storage is the media or device which stores data permanently or temporarily.
- Commonly used storage devices are magnetic (disk, tape), hard disk, pen drive, CD- ROM, memory card etc.

Characteristics of Computer

Versatility

- The capacity of performing two or more work is called versatility of computer. As for example, science & technology, commerce & industry, medicine, printing, word processing, spread sheet, weather forecasting, astronomy etc.

Automatic

- If any data and instructions are given then it performs calculation automatically.

Characteristics of Computer

Diligence

- The capacity of performing the task again and again without getting tired or bored is called diligence.

Electronic

- All of its parts are made up of an electronic circuits These electronic circuits are formed by semi-conductor materials like diode ,triode ,transistors etc. So, it is also known as electronic machine.

Types of computer

Computer can be classified into four categories.

- On the basis of its size or capacity
- On the basis of its work or operation
- On the basis of its brand
- On the basis of its model

Types of computer

On the basis of its size or capacity

- Mainframe computer
- Mini computer
- Micro computer
- Super computer

Types of Computer

Types of Computer



Micro Computer



Mini Computer



Personal Computer



Laptop



Super Computer



Tablet

Types of computer

Mainframe computer

- They are large computer. They used in big organizations such as banks, hospitals, railways etc. for processing large amount of data. They are also used in such environments where large number of users need to share a common computing facility such as in research groups, engineering firms etc.
- Mainframe systems are much bigger and more expensive than PC.
- Mainframe computers are IBM and DEC. As for example IBM s/390, Control data cyber 176, CDC 6600, IBM 4300 series, IBM 308X series, HP 9000 etc.

Mainframe Computer



Types of computer

Mini computer

- They are like small mainframes.
- Mini computers are large and more powerful than most micro computers.
- It is used in universities and large business organization to process complex data.
- It is also used in research and scientific analysis etc.
- As for example PDP-11,VAX, Prime 9755 etc.

Mini Computer



Types of computer

Micro computer(Personal computer)

- Micro computer is general purpose computer.
- It is also known as PC or desktop computer.
- It is less expensive than any other computers.
- Its hardware and software are easily available in the market.
- As for example Desktop, laptop, notebook computers etc.

Micro Computer



Types of computer

Super computer:

- Super computer are most powerful and expensive computers.
- They are used for processing complex scientific applications.
- They have extremely large storage capacities and high speed.
- They are also used in petroleum industry, automobile industry, weather forecasting, military research, aircraft, structural engineering.
- As for example Cray ,cyber-205,Anurag,Param.

Super Computer



Types of computer

On the basis of its work or operation

- Digital computer
- Analog computer
- Hybrid computer

Types of computer

Digital computer

- The word digital means discrete or discontinuous. So, it works upon discontinuous data.
- It consists of digits i.e. 0 or 1.
0 means OFF(low), 1 means ON(high)
- Digital computers are much faster & far more accurate than the analog computers.
- They can be used both purpose general as well as specific.
- E.g. Calculators ,Personal computers(PC) & digital watches etc.

Digital Computer



Types of computer

Analog computer

- Analog computer works upon continuous data.
- Analog computer only measures physical values like temperature, pressure, voltage, current etc.
- It was slow & low accuracy than the digital computer.
- It was only used for specific purpose.
- E.g. speedometer ,voltmeter, ammeter, odometer & analog watch, Presley etc.
- Analog computers are mainly used in scientific & engineering applications.

Analog Computer



Types of computer

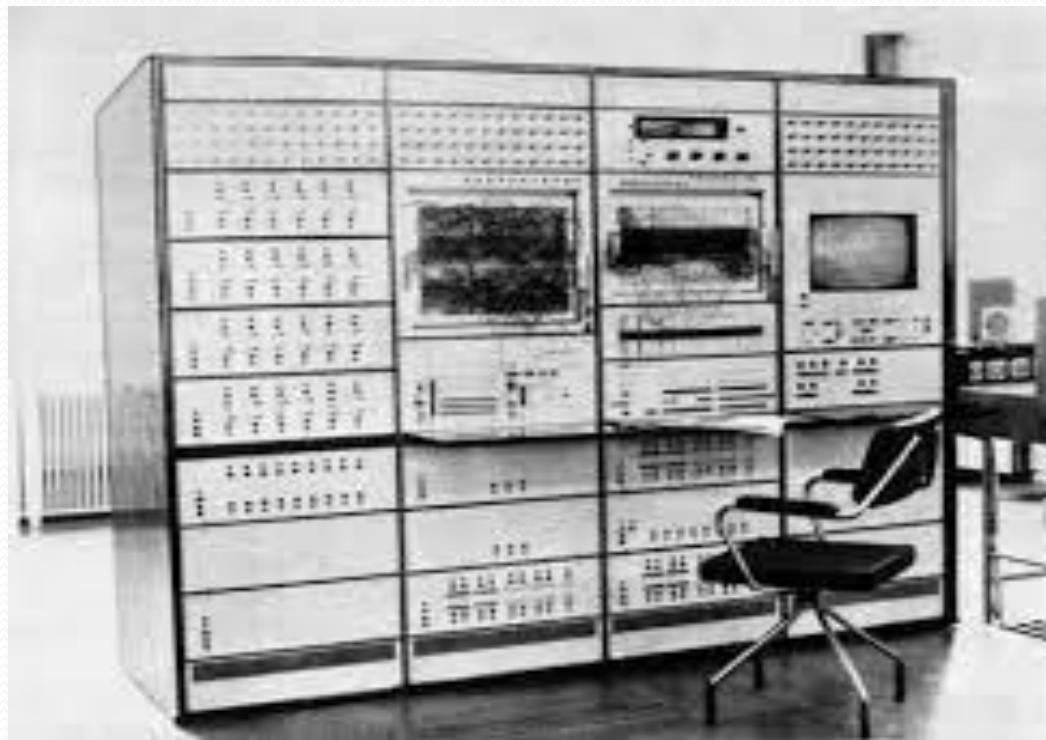
Hybrid computer

- It is both the combination of digital & analog computer.
- It consists of both features of analog and digital.
- It measures the heart beat functions, weather forecasting.
- They can be also used in jet planes, computer simulation, complex mathematical calculations etc.
- An example was the HYDAC 2400, a hybrid computer released by EAI in 1963. Another example of a computer which might be considered a hybrid, in a slightly different sense, might be the LINC-8 from Digital Equipment Corporation (DEC), first manufactured in 1966, hybrid watch etc.

Hybrid Computer

- Examples: Computer used in hospitals to measure the heart beat of the patient. Devices used in petrol pump.
- In scientific applications or in controlling industrial processes.
- The first desktop hybrid computing system was the Hycomp 250, released by Packard Bell in 1961.

Hybrid Computer



Types of computer

On the basis of Brand

- IBM PC
- IBM Compatible
- Apple/Macintosh

Types of Computer

IBM PC

- IBM is the one of the most leading companies of the world which manufacturing computers.
- The computers manufactured by IBM is called IBM PC.
- It is more reliable, durable and have better quality.
- It is branded computer & expensive than IBM compatible.
- Its hardware and software's are not easily available in the market.

Types of Computer

IBM PC



Types of Computer

IBM Compatible

- A computer that has the same functional characteristics & principles of IBM computers are called as IBM compatibles.
- Architecture is similar to IBM PC.
- It is assembled computer which is also known as duplicate PC.
- All software & programs are equally run in IBM compatibles.
- Its hardware and software's are easily available in the market.

Types of Computer

IBM Compatible



Types of Computer

Apple/Macintosh

- The computers manufactured by Apple company is called Apple/Macintosh computers.
- Apple computers have their own software & hardware.
- It is also known as branded computer.
- It is expensive than any other computers.

Types of Computer

Apple/Macintosh



Types of Computer

On the basis of Model

- XT(Extended Technology) computer
- AT (Advanced Technology) computer
- PS/2(Personal System/2) computer

Types of Computer

XT(Extended Technology) Computer

- The computers which have microprocessor 8085,8086,8088 is called XT computer.
- Its processing speed is 4.77 MHz
- It is slower than AT computers.

Types of Computer

XT Computer



Types of Computer

AT(Advanced Technology) Computer

- The computers which have microprocessor 80286, 80386, 80486, 80586, 80686, Pentium I, II, III & IV, I3, I5, I7.
- Its processing speed is 4.77 GHZ.
- It is faster than XT computers.

Types of Computer

AT Computer



Types of Computer

PS/2 Computer

- Personal System/2(PS/2) was IBM's second generation of PCs introduced in 1987.
- The PS/2 was an advanced proprietary computer architecture launched by IBM in an attempt to regain control of the PC market.
- However, many innovations derived from PS/2 architecture were successful for many years; these included the 16550 UART, 1440 KB, 3.5-inch floppy disk format, 72-pin SIMMs, the PS/2 keyboard and mouse ports, and the VGA etc.

Types of Computer

PS/2 Computer



Generation of computer

Generation means step in technology. It provides a framework for the growth of computer industry. There are five computer generations known till today.

- First generation(1940-1956): Vacuum tubes
- Second generation(1956-1963): Transistors
- Third generation(1964-1971):Integrated Circuits
- Fourth generation(1971- present or 1989 or 1990): Microprocessor
- Fifth generation(Beyond & Present or 1989– Present):Bio chips or AI

Generation of computers

First Generation of computers

- They were very large in size.
- They were very slow.
- They used vacuum tubes as memory device or processing unit.
- They consumed a lot of electrical power & generated lot of heat.
- Storage capacity were too much small.
- Punched cards were used as input and output devices.
- ENIAC,UNIVAC-I,EDSAC,EDVAC,IBM-701.

Generation of computers

First Generation Computers



Vacuum Tubes

Generation of computers

Second Generation of computers

- They were smaller, faster & less expensive than the first generation of computer.
- They used transistor as memory device.
- They consumed less electrical power & generated less amount of heat than first generation of computer.
- Punched cards were used as input and output devices.
- E.g. IBM 1620, IBM 1401, CDC 3600.

Generation of computers

Second Generation of Computers



Transistor

Generation of computers

Third generation of computers

- They were small, reliable & efficient than the first & second generation.
- Integrated circuits were used in this generation.
- They consumed less electrical power & generated less amount of heat than second generation.
- They had faster & larger primary & secondary storage or memory as compared to second generation.
- Input devices mouse, keyboard, scanner & output devices monitor, printer, speaker etc. were used.
- They were suitable for scientific & commercial applications.
- It is a GUI environment where new users quickly learn.
- E.g. IBM-360, IBM-370, VAX-750.

Generation of computers

Third Generation of Computers



Integrated Circuit

Generation of computers

Fourth generation of computers

- They are smaller,cheaper,faster & efficient than the first,second,third generation.
- Microprocessor chips are used in this generation.
- They consumed less power.
- They had faster & larger primary & secondary storage or memory as compared to second generation.
- Input devices mouse, keyboard, scanner & output devices monitor, printer, speaker etc. are used.

Generation of computers

- They were suitable for scientific & commercial applications.
- It is a GUI environment where new users quickly learn.
- Palmtop, desktop belongs to fourth generation.
- E.g. 8086,8088,Pentium IV,i3,i5,i7.

Generation of computers

Fourth Generation of Computers



Microprocessor

Generation of computers

Fifth generation of computers

- The computers having high processing capacity & Artificial Intelligence.
- The speed is extremely high than the any other generations.
- Self – decision capability.
- Very large memory.
- Can think & understand speech in natural language like human.
- It is also still in developmental stage.
- In this generation molecular energy, nano technology, neural network, parallel processing had been developed.
- E.g. LISP & PROLOG programming languages were used.

Generation of computers

Fifth Generation of Computers



Artificial Intelligence (AI)

History and Development of Computers

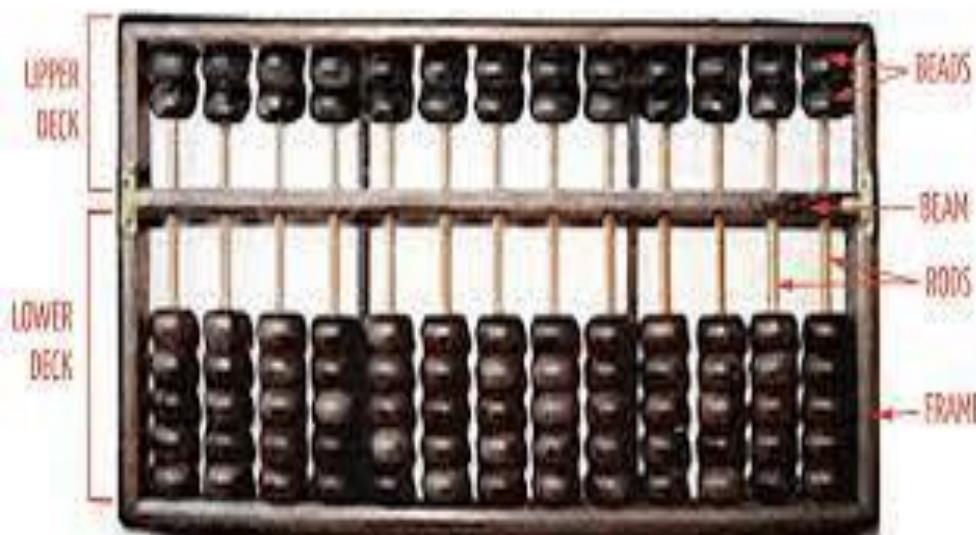
Early Computing Machines:

Abacus

It was the first mathematical device used to facilitate arithmetic computation and is still in use today, and may be considered the first computer. It was developed around 3000 years ago. This device allows users to make computations using a system of sliding beads arranged on a rack.

History and Development of Computer

Abacus Machine



History and Development of Computer

Leibnitz Arithmetic Machine

In 1694, a German mathematician and philosopher, Gottfried Wilhem Von Leibnitz, improved the Pascaline by creating a machine that could also multiply and divide. Like its predecessor, Leibnitz's mechanical multiplier worked by a system of gears and dials.

History and Development of Computer

Leibnitz Arithmetic Machine



History and Development of Computer

Pascaline (Pascal Arithmetic Machine)

Pascaline was invented by Blaise Pascal in 1642 that added and subtracted, automatically carrying and borrowing digits from column to column. Pascal built 50 copies of his machine.

History and Development of Computer

Pascaline Arithmetic Machine



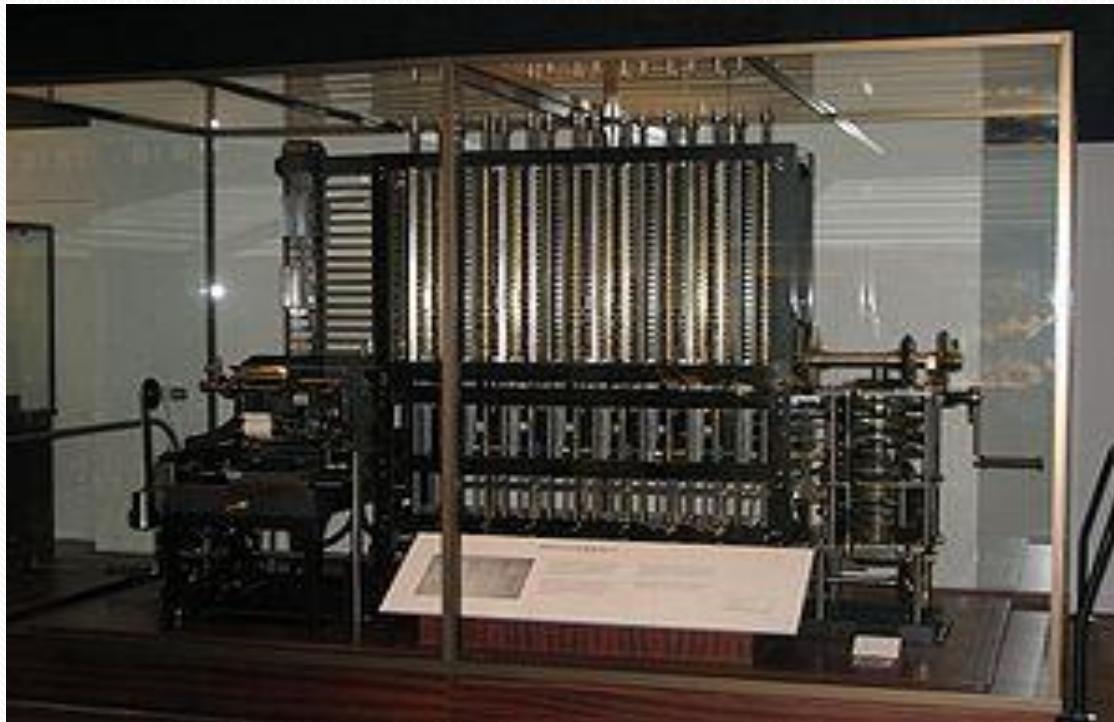
History and Development of Computer

Charles Babbage Difference Engine

A **difference engine** is an automatic mechanical calculator designed to tabulate polynomial functions. It was designed in the 1820s, and was first created by Charles Babbage. The name, the difference engine, is derived from the method of divided differences , a way to interpolate or tabulate functions by using a small set of polynomial co- efficient.

History and Development of Computer

Charles Babbage Difference Engine



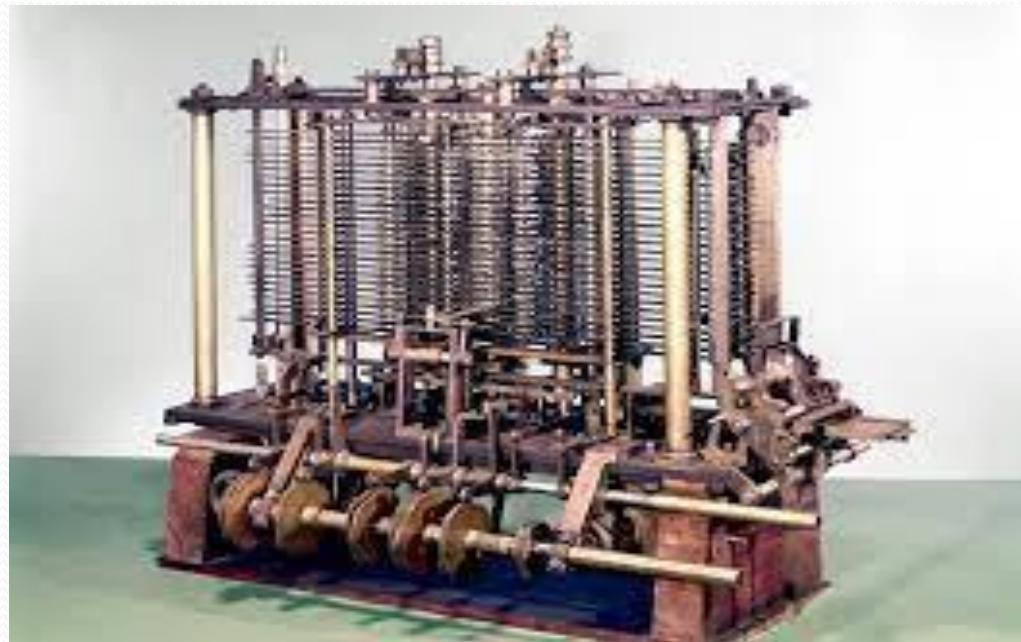
History and Development of Computer

Analytical Engine

The Analytical Engine was a proposed mechanical general-purpose computer designed by English mathematician and computer pioneer Charles Babbage. It was first described in 1837 as the successor to Babbage's difference engine, which was a design for a simpler mechanical calculator.

History and Development of Computer

Analytical Engine



History and Development of Computer

Augusta Ada King, Countess of Lovelace (*née* Byron; 10 December 1815 – 27 November 1852)

was an English mathematician and writer, chiefly known for her work on Charles Babbage's proposed mechanical general-purpose computer, the Analytical Engine. She was the first to recognize that the machine had applications beyond pure calculation, and to have published the first algorithm intended to be carried out by such a machine. As a result, she is often regarded as the first computer programmer.

History and Development of Computer

Lady Ada

- Lady Augusta Ada contributed in the refinement of this machine by inventing and using a new number system called the binary number system using only two digits 0 and 1 instead of using decimal digits.

History and Development of Computer

Hollerith Tabulating Machine

- The **tabulating machine** was an electromechanical machine designed to assist in summarizing information stored on punched cards. Invented by Herman Hollerith, the machine was developed to help process data for the 1890 U.S. Census. Later models were widely used for business applications such as accounting and inventory control. It spawned a class of machines, known as unit record equipment, and the data processing industry.

History and Development of Computer

Hollerith Tabulating Machine



History and Development of Computer

Mark-I

- In the 1930s American mathematician Howard Aiken developed the Mark I calculating machine, which was built by IBM. This electronic calculating machine used relays and electromagnetic components to replace mechanical components. In later machines, Aiken used vacuum tubes and solid state transistors to manipulate the binary numbers. Aiken also introduced computers to universities by establishing the first computer science program at Harvard University.

History and Development of Computer

Mark-I



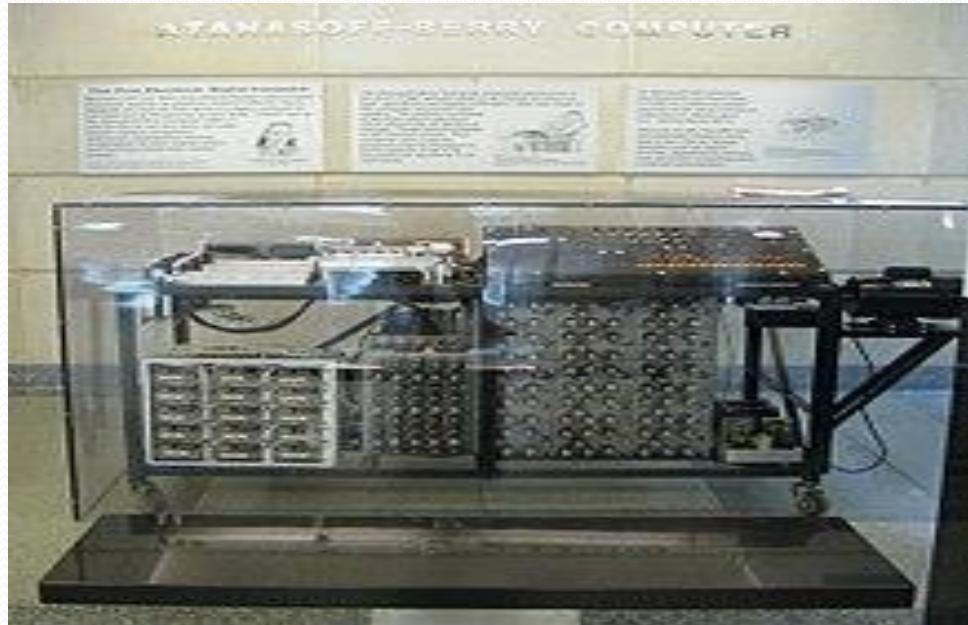
History and Development of Computer

ABC

- The **Atanasoff–Berry computer (ABC)** was the first automatic electronic digital computer . Limited by the technology of the day and execution, the device has remained somewhat obscure. The ABC's priority is debated among historians of computer technology, because it was neither programmable, nor Turing-complete. Conventionally, the ABC would be considered the first electronic ALU (arithmetic logic unit)—which is integrated into every modern processor's design.
- The first electronic, programmable, digital Machine, the colossus computer from 1943 to 1945, used similar tube -based technology as ABC.

History and Development of Computer

ABC



History and Development of Computer

- John Mauchely, an American physicist, proposed an electronic digital computer, called the Electronic Numerical Integrator And Computer (ENIAC), which was built at the Moore School of Engineering at the University of Pennsylvania in Philadelphia by Mauchely and J. Presper Eckert, an American Engineer. ENIAC was completed in 1945 and is regarded as the first successful, general digital computer. It weighed more than 27,000 kg and contained more than 18,000 vacuum tubes. Many of ENIAC's first tasks were for military purposes, such as calculating ballistic firing tables and designing atomic weapons.

History and Development of Computer

ENIAC



History and Development of Computer

UNIVAC

- Eckert and Mauchley eventually formed their own company, which was then bought by the Rand Corporation. They produced the Universal Automatic Computer (UNIVAC), which was used for a broader variety of commercial applications. UNIVAC was the first successful commercial computer.

History and Development of Computer

UNIVAC



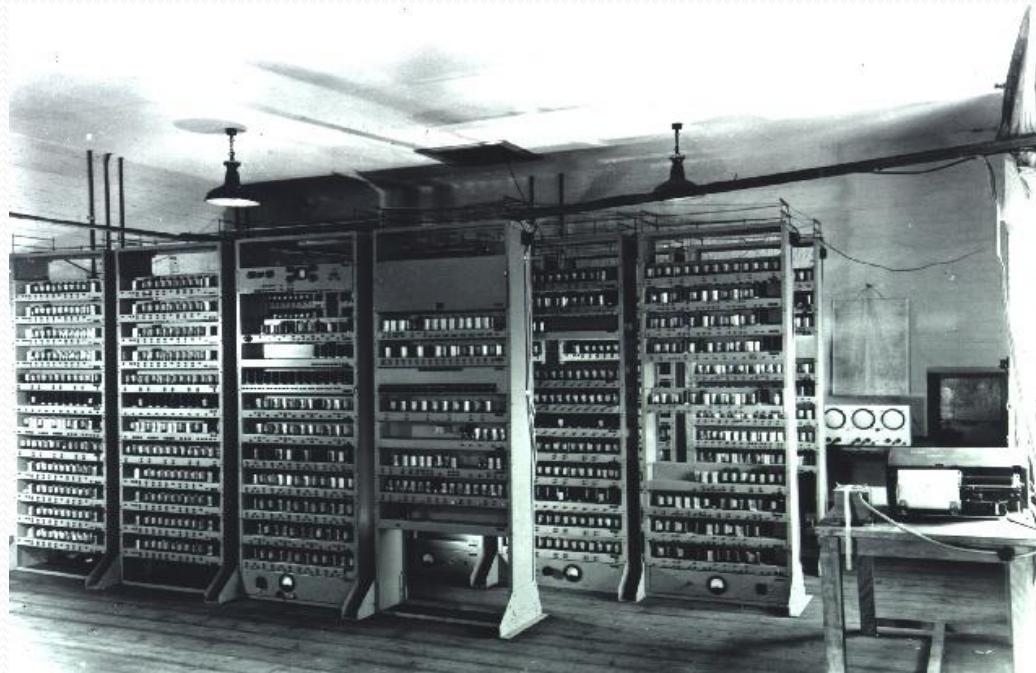
History and Development of Computer

EDSAC

EDVAC (**E**lectronic **D**iscrete **V**ariable **A**utomatic **C**omputer) was one of the earliest electronic computers. Unlike its predecessor the ENIAC, it was binary rather than decimal, and was a stored-program computer. ENIAC inventors John Mauchly and J. Presper Eckert proposed the EDVAC's construction in August 1944.

History and Development of Computer

EDSAC



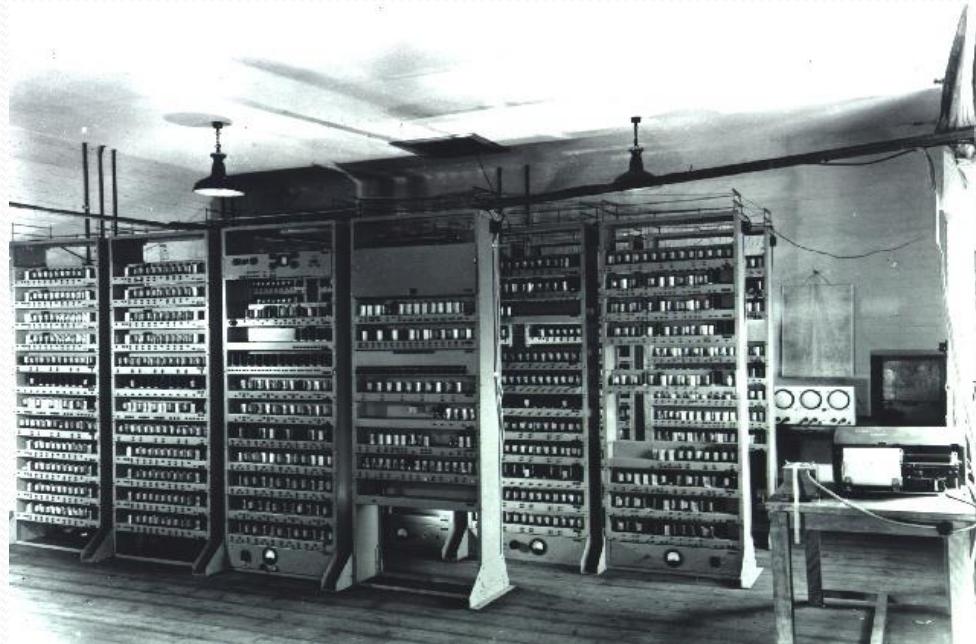
History and Development of Computer

EDVAC

- At the Institute for Advanced Study in Princeton, Hungarian-American mathematician John von Neumann developed one of the first computers used to solve problems in mathematics, meteorology, economics, and hydrodynamics. Von Neumann's 1945 Electronic Discrete Variable Computer (EDVAC) was the first electronic computer to use a program stored entirely within its memory.

History and Development of Computer

- EDVAC



The Computer System

The four parts of computer system are

- Hardware
- Software
- Data &
- Users

Computer System:

- The combination of input unit, output unit, storage unit ,CPU is called computer system.

Computer Architecture:

- The design and construction parts of computer system is called computer architecture.

The Components of Computer Hardware or Anatomy of a Digital Computer

Anatomy means structure.

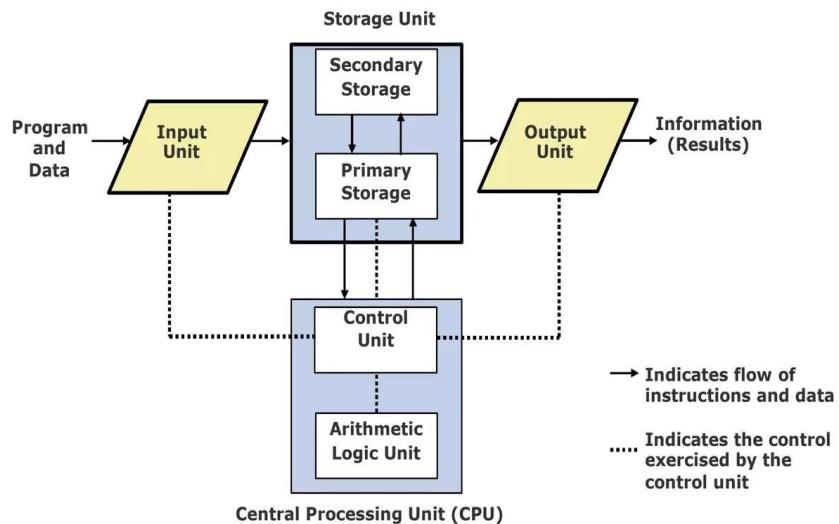
The five major building blocks of a PC or digital computer system. These five units correspond to the five basic operations performed by all computer systems. Functions of these units are given below.

- Input Unit
- Output Unit
- Storage Unit
- Arithmetic and Logic Unit(ALU)
- Control Unit(CU)

The Components of Computer Hardware or Anatomy of a Digital Computer

Basic Organization of a Computer System

Also known as
Information
processing
cycle



The Components of Computer Hardware or Anatomy of a digital computer

Input unit

Computer takes data as in the form of input unit that depends upon the input device used. Input devices are mouse , keyboard ,scanner etc.

Input unit performs the following functions.

- It accept data and instruction from outside world.
- It converts these data & instructions in computer acceptable form.
- It supplies the converted data & instructions to computer system for further processing.

The Components of Computer Hardware or Anatomy of a digital computer

Output Unit

An output unit performs reverse operation that of an input unit. It provides information from data processing to outside world. Output devices are monitor ,printer ,speaker ,plotter etc.

Output unit performs the following functions.

- It accepts the results produced by a computer which are in coded form.
- It converts these coded results to human readable form.
- It provides the result to outside world.

The Components of Computer Hardware or Anatomy of a digital computer

Storage Unit

- Data & instructions entered into a computer system through input units have to be stored inside the computer before actual processing starts.

Storage unit stores

- Data & instructions required for processing.
- Result for output

The Components of Computer Hardware or Anatomy of a digital computer

Arithmetic & Logic unit(ALU)

- ALU performs both arithmetic as well as logic operations.
- Arithmetic operations are addition ,subtraction, multiplication & division etc. & logic operations are less than ,greater than, less than equal to, greater than equal to, equal to etc.

The Components of Computer Hardware or Anatomy of a digital computer

Control Unit(CU)

- Control unit acts as a central nervous system for other components of a computer system.
- It manages & co-ordinates the overall operation of the computer system.
- It maintains the sequence of operations being performed by the CPU. It fetches instruction from the storage area, decode these instructions and execute these instructions and transmits the signals to the ALU & registers.
- It also suggest the I/O devices to which data is to be communicated.

Applications of Computers

- Business
- Education
- Banking
- Communication
- Health
- Military
- Engineering Design

Applications of Computers

- Entertainment
- Scientific Research
- Sports etc.

Application of computer

- **Business**

A computer has high speed of calculation, diligence, accuracy, reliability, or versatility which made it an integrated part in all business organizations. Computer is used in business organizations for : Payroll Calculations, Sales analysis, Budgeting, Financial forecasting, Managing employees database etc.

Application of computer

- **Education**

Computers have its dominant use in the education field which can significantly enhance performance in learning. Even distance learning is made productive and effective through internet and video-based classes.

Application of computer

- **Banking**

Today banking is almost totally dependent on computer. Banks provide the facilities of: Banks provide online accounting facility, which includes current balances, deposits, overdrafts, interest charges, shares, and trustee records. ATM machines are making it even easier for customers to deal with banks.

Application of computer

- **Health**

Most of the medical information can now be digitized from the prescription to reports. Computation in the field of medicine allows us to offer varied miraculous therapies to the patients. ECG's, radiotherapy wasn't possible without computers.

Application of computer

- **Military**

Computers are the main tools which help in developing missiles and other equipment in the defence system. Designing and the maintenance are possible only through computers. Computer builds the links between the soldiers and commanders through the satellite. Construction of weapons and controlling their function is not possible without the aid of computers.

Application of computer

- **Engineering Design**

As per the title, computers aid in designing buildings, magazines, prints, newspapers, books and many others. The construction layouts are designed beautifully on system using different tools and software's.

Application of computer

- **Entertainment**

Entertainment fields such as multimedia, film making with animation, graphics, audio and visual design are done with the help of computers.

Application of computer

- Scientific Research

Computers are probably the biggest advance in scientific technology. They allow us to analyze huge data sets and run statistical analyses far quicker than in the past. Scientists also use them to run simulations and build electronic models.

Application of computer

- Sports

Athletic trainers use these data-sets to plan the training sessions during pre and regular season, and use technologies to provide measurable training routines.