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Evolution of computers



The computers we use today are very different from the early devices, that were invented for doing calculations.

Let us learn about some of the early calculating devices.

Early calculating devices

Abacus

The Chinese invented a machine called **Abacus**. It was the first machine used for calculations.

The purpose was to count. The old Abacus was made up of stones. It is now made up of strings and beads.



Abacus

Pascal's Adding Machine

In 1642, **Blaise Pascal**, a French mathematician invented the **Pascal's Adding Machine**. It performed difficult addition and subtraction.

Pascal invented the machine at the age of 18, to assist his father in calculations for the tax collected. It is a rectangular box with wheels on it.



Pascal's Adding Machine

Leibniz Calculator

Gottfried Leibniz, a German Mathematician invented the calculating device **Leibniz Calculator**.

It performed arithmetic calculations like addition, subtraction, multiplication and division. It was made up of a stepped drum connected to a counting wheel and teeth.

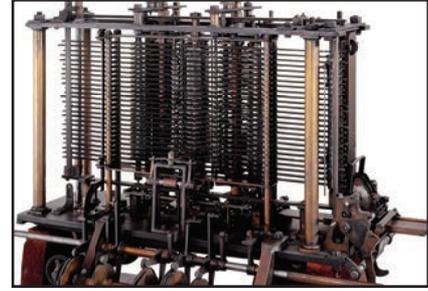


Leibniz Calculator



Analytical Engine

In 1837, **Charles Babbage** developed the first mechanical computer. He thought it could do difficult calculations. Mechanical computers were operated manually. The analytical engine had an input, output and processing system as in modern computers.

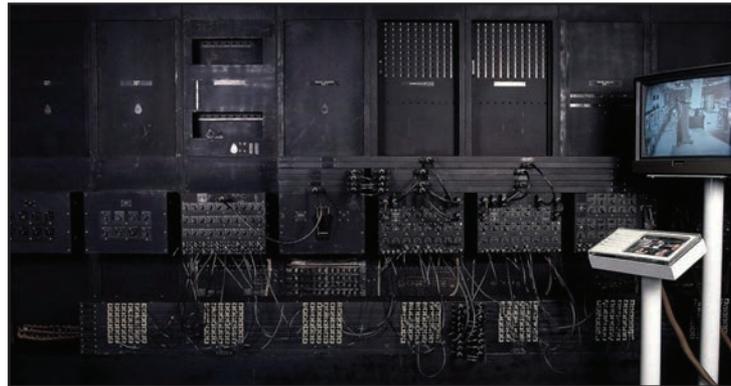


Analytical Engine

Electronic computing devices

ENIAC (Electronic Numerical Integrator And Computer)

In 1946, **John Mauchly** and **Presper Eckert** of USA designed the world's first electronic computer.



ENIAC

UNIVAC 1 (UNIVersal Automatic Computer)

UNIVAC 1 was the first commercial electronic computer developed in the year 1951 by ENIAC inventors.



UNIVAC 1

Tech facts



Alan Turing is called the 'Father of Modern Computers', as the base concept of new modern computers was devised by him.



Generation of computers

The evolution of computers to current stage is defined by means of generation of computers.

Generation	Period	Component	Characteristics	Examples
First	1940-56	Vacuum tubes	<ul style="list-style-type: none"> ● Huge in size, small memory, slow speed ● High power consumption ● Use of machine language 	EDSAC EDVAC UNIVAC 1
Second	1956-63	Transistors	<ul style="list-style-type: none"> ● Small in size, fast and cheap ● More storage capacity and more powerful operating system ● Assembly language programming 	IBM 1401 UNIVAC 1
Third	1963-71	Integrated Circuits (ICs)	<ul style="list-style-type: none"> ● Small in size, less power consumption ● Increased storage capacity ● Less heat generation 	IBM 360 series IBM 370 series



Fourth	1971- Present	Microprocessors	<ul style="list-style-type: none"> ● Great computing power ● Large storage capacity ● Unique storage devices at less cost 	Desktops Laptops Tablets
Fifth	Present- Beyond	Artificial Intelligence, Nanotechnology	<ul style="list-style-type: none"> ● Very high speed, huge storage capacity ● Voice recognition ● Large memory requirements ● More user-friendly 	Super computers

Characteristics of computers

The following capabilities make a computer system better than human beings.

- **Speed:** Speed is the amount of time taken by the computer in completing a task. The time taken by a computer to perform a particular task is less than that of a human being. The computers are classified on the basis of their speed by comparing their MIPS (Million Instructions Per Second).
- **Storage:** It refers to the capacity of a computer to store data and programs. Storage is done in storage media such as CDs, DVDs, pen drives, RAM (Random Access Memory) and ROM (Read Only Memory).
- **Accuracy:** The degree of correctness and exactness of operations performed by a computer is termed as accuracy. Generally, the computers do not commit any errors. If an incorrect data is entered into a computer, it may lead to inaccurate results.
- **Reliability:** Computers do not get tired and work efficiently for many hours. In case of any failure in a computer system, there are provisions for backup of data and programs.



- **Versatility:** Computers are capable of performing both simple and complex tasks in less time. Computers perform completely different types of work at the same time. For this reason, computers are used in all fields such as Science, Technology, Business, Communications, etc.

Limitations of computers

Like other devices, computers too have their own limitations.

- **Computers lack in thinking:** Computers cannot think on their own. They need to be programmed by the humans first, before providing results. They can only work as per stored instructions.
- **Computers cannot decide:** Computers cannot take their own decisions, as they do not possess knowledge, information, intelligence on their own.
- **Computers cannot express their ideas:** Even though computers are widely used in all the fields, they cannot express their own ideas to solve problems. They need to depend on the human beings to solve the problems.
- **Computers cannot implement:** Computers perform efficient data storage and handle bulk data. But, only the humans decide the part of implementation.

Let us revise 

- Abacus was the first machine used for calculations.
- Pascal's Adding Machine performed difficult addition and subtraction.
- Leibniz Calculator performed arithmetic calculations like addition, subtraction, multiplication and division.
- Charles Babbage developed the first mechanical computer.
- Mechanical computers were operated manually.
- ENIAC was the world's first electronic computer.
- The evolution of computers to current stage is defined by means of generation of computers.
- The characteristics of computers are speed, storage, accuracy, reliability and versatility.
- The computers lack in thinking, decision-making, expressing ideas and implementation.



Quick check



A. Fill in the blanks.

- _____ was the first machine used for calculations.
- _____ computers were operated manually.
- The component used in the third generation computers is _____.
- Voice recognition is supported by _____ generation computers.

B. State whether the given statements are True (T) or False (F).

- The Leibniz Calculator worked on strings and beads.
- UNIVAC 1 was the first commercial electronic computer.
- EDSAC computer was huge in size.
- Transistors were used in fourth generation computers.

Question time



A. Choose the correct answer.

1. The first electronic computer is

- a. Abacus b. UNIVAC 1 c. ENIAC

2. This was made up of a stepped drum connected to a counting wheel and teeth.

- a. Leibniz Calculator b. Abacus c. Analytical Engine

3. Which of these machines worked on electricity?

- a. Abacus b. Analytical Engine c. ENIAC



B. Answer the following questions.

1. What is the purpose of using Abacus?
2. Who invented the Pascal's Adding Machine?
3. Who is known as the 'Father of Modern Computers'?
4. What are the characteristics of a computer?
5. Discuss the various limitations of a computer.
6. Describe the electronic computing devices.
7. Explain the generation of computers.

Think and answer



Why was Pascal's Adding Machine categorised as a mechanical machine?

Tips for teachers

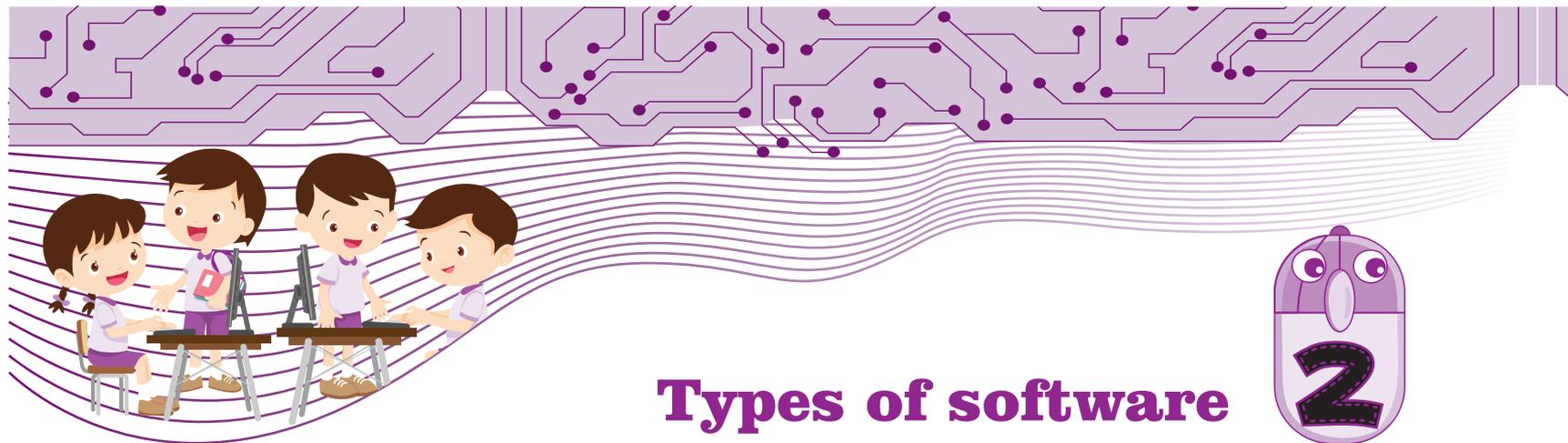


Bring some pictures of early calculating devices and talk about them. Explain the working methodology of such devices. Show the pictures of electronic computing devices. Differentiate and explain with early devices. Highlight the components of generation of computers with various examples.

Refer more



http://www.ptc/dcs.edu/moody/comphistory/comphistory_print.html



Types of software

Hardware and software are the two important elements of a computer system.

Hardware refers to the physical components of a computer that can be seen and touched.

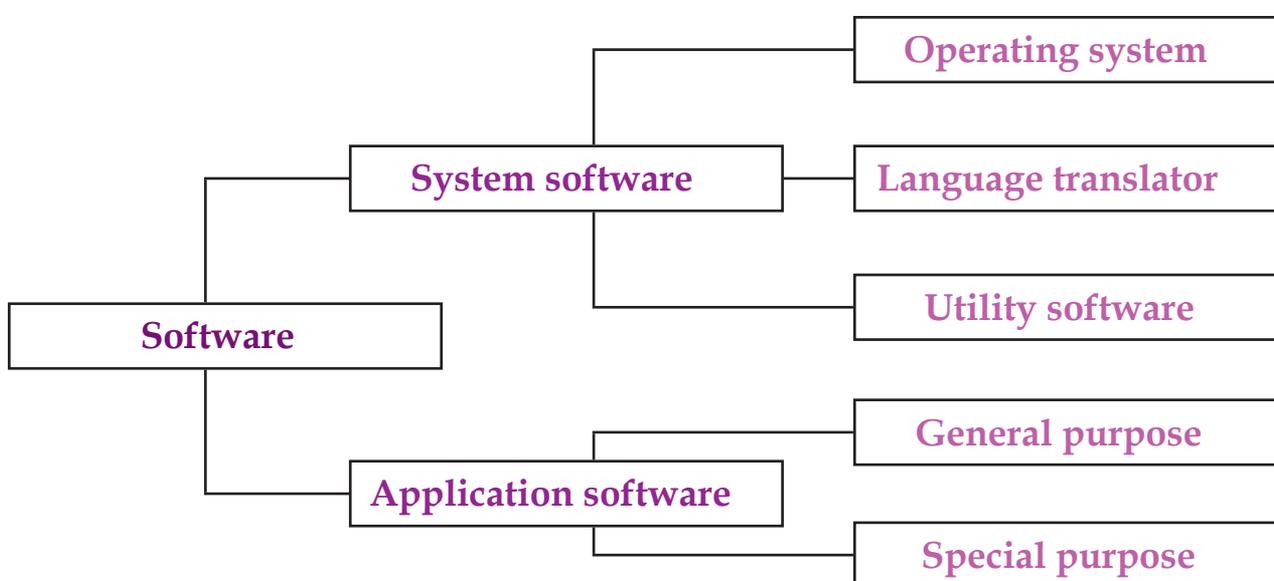
Software is the set of programs or instructions that makes the computer do specific tasks.

Need for software

We know that a computer software gets all the information processed by data and programs. We use software, not only for computer programs, but for non-executable data that is used in digital media, online documenting, etc. The requirement of hardware for the corresponding software is essential.

Now, let us see the two types of software.

- System software
- Application software



System software

System software is a software that controls the entire operation of a computer. It has an overall control on the hardware. System software is further sub-divided into three types. They are **Operating system**, **Language translator** and **Utility software**.

Operating system

An operating system controls and coordinates the overall activities of a computer. It acts as a mediator between the user and the computer hardware. **Examples** – MS DOS (Microsoft Disk Operating System), Windows, Linux, Mac and UNIX.



Tech facts

MS DOS was initially named as QDOS (Quick and Dirty Operating System).

Functions of Operating system

The functions of operating system are:

1. File management
2. Device management
3. Memory management
4. Controls and runs the software
5. Handles input and output
6. Security

Language translator

A language translator is a system software that converts programs written in programming language into computer-readable (machine) language of 0s and 1s. **Examples** – Assembler, Compiler and Interpreter.

Assembler converts the programs written in assembly language to machine language.

Compiler converts the programs written in high-level language to machine language as a whole.

Interpreter converts programs written in high-level language to machine language, line by line.



Utility software

Utility software is a system software that helps in maintaining a computer. It helps to analyse and monitor the performance and proper functioning of a computer.

Examples – Antivirus software, Backup software, Compression utility software, etc.

Antivirus software

This is a system utility software that helps to protect our computer and network from viruses. It protects our computer from failures and loss of data.

Examples – McAfee, Symantec, AVG, etc.



McAfee



Symantec



AVG

Backup software

Backup is a procedure that copies data to an alternative location for recovery. It protects data from corruption and changes. Backup can be done on storage devices and servers.

Examples – CD, DVD, Pen drive, Cloud servers, etc.



CD



DVD



Pen drive



Cloud servers

Compression utility

It is a software program that compresses and extracts file size to occupy less disk space. Large files can be compressed, attached and sent through e-mails. Many operating systems come with a basic compression utility.

Examples – WinRAR, 7-Zip, PKZIP, etc.



WinRAR

Tech facts



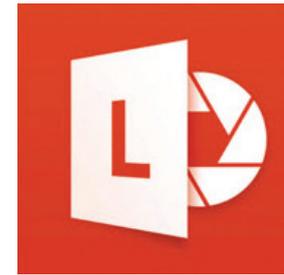
Eugene Roshal developed RAR (Roshal Archive) file format for data compression.

Scanning software

A scanning software is designed for use with specific types of image scanners such as flatbed scanner and drum scanner. Scanning software can be used with document and optical scanners to create, edit and digitise images.

Document scanners scan and convert two-dimensional objects into digital images. Optical scanners use light receptors arranged in rows to detect various changes in light. We use scanning software for both the scanners to store the digitised images into the personal computers and other secondary storage devices.

Microsoft has developed Office Lens, which is a mobile based OCR. It scans and digitises notes on whiteboards, blackboards, documents, etc.



Microsoft Office Lens

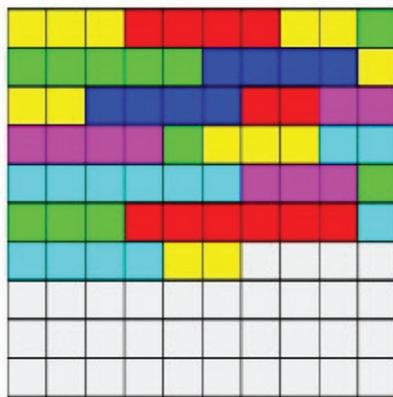
Tech corner



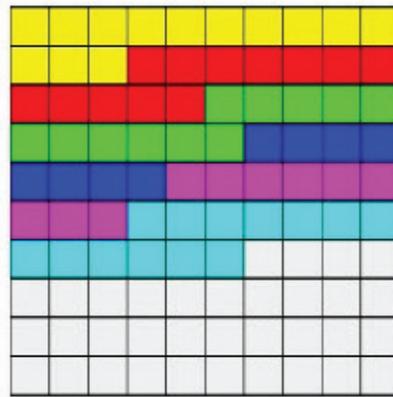
Google drive has a built-in OCR for scanning documents stored in Google Docs.

Defragmentation software

Defragmentation softwares are the tools that arrange the non-contiguous bits of data that makes up the files on the computer, such that they are stored closely together.



Before defragmentation



After defragmentation



This process allows the hard disk to access files quickly. This helps to improve the performance of our computer by making the files to read and store efficiently. Majority of the operating systems, come with default defragmentation software. Windows 7 has Disk Defragmenter as its default defragmentation software.

Application software

This software is a collection of programs, designed to do specific tasks on the computer. There are two categories of application software. They are:

- General purpose application software
- Special purpose application software

General purpose application software

This software is designed to meet the general needs of a user.

Common examples of general purpose application software are:

- **Word processing software** – This software helps the users to create and edit documents in an effective manner. It is mostly editor-based.
Examples – MS Word, Notepad and WordPad.



MS Word



Notepad

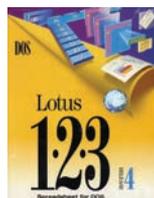


WordPad

- **Spreadsheet software** – This software helps the users to perform calculations by simulating paper worksheets in the form of grid. It helps in organising numerical data in the form of charts for further analysis.
Examples – MS Excel, Lotus 123, Apple Numbers, etc.



MS Excel



Lotus 123



Apple Numbers

- **Multimedia software** – This software allows the users to create and play audio and video files. They help in playing media files with audio players
Examples – Windows Media Players, Real Player and VLC Media Player.



Windows Media Player



Real Player



VLC Media Player

- **Presentation software** – This software shows information in the form of slide show. The functions of software include slide creation, charts, text formatting, animations, graphics, audio-video clips, etc.
Examples – MS PowerPoint, Adobe Flash and Open Office Impress.



MS PowerPoint



Adobe Flash



Open Office Impress

- **Graphics software** – It allows us to create, manipulate or model images on a computer like cartoons, logos, graphs, etc.
Examples – MS Paint, Adobe Photoshop, Dreamweaver, etc.



MS Paint



Adobe Photoshop



Dreamweaver



The apps used in mobiles are good examples of special purpose application software.

Special purpose application software

This software is designed to meet only specific needs of the user. They are also called **Customised** or **Bespoke Software**.

Examples – MATLAB, Tally, Payroll System, Reservation System, etc.

Let us revise



- Hardware and software are two important elements of a computer system.
- The two types of software are System software and Application software.
- System software is a software that controls the entire operation of a computer. They are Operating system, Language translator and Utility software.
- An operating system controls and coordinates the overall activities of a computer.
- Application software is a collection of programs, designed to do specific tasks on the computer. There are two categories of application software. They are: General purpose application software and special purpose application software.

Quick check



A. Fill in the blanks.

1. _____ and _____ are the important elements of a computer system.
2. _____ controls the entire operation of a computer.
3. _____ acts as a mediator between the user and the computer hardware.
4. Multimedia software help in playing media files with _____ .

B. Match the correct logos to the software.



a. Graphics software



b. Presentation software



c. Spreadsheet software



d. Multimedia software

C. State whether the given statements are True (T) or False (F).

1. The requirement of hardware for the corresponding software is essential.

2. Backup cannot be done on storage devices.

3. There are three categories of application software.

4. MATLAB is an example of customised software.

Question time



A. Choose the correct answer.

1. This converts the programs written in high-level language to machine language as a whole.

a. Assembler b. Compiler c. Interpreter

2. Which of these is not a compression utility?

a. WinRAR b. Notepad c. 7-Zip

3. This is a Bespoke software.

- a. Tally b. MS Paint c. Mac

B. Answer the following questions.

1. What is a System software? Give any two examples.
2. Write any three functions of operating system.
3. Why do we need a backup software?
4. What is the purpose of presentation software?
5. Explain scanning software and defragmentation software.

Activity corner

Colour the system software in pink and application software in yellow.

InDesign	Compiler	McAfee
Oracle	Numbers	Assembler

Hands-on

1. Go to the computer lab and find out the name of the antivirus software installed in systems.
2. Create a word document in your name and type the features of operating system. Save the file on the desktop. With the teacher's help identify the file size and write it. Compress the same file and now write the file size as per teacher's instructions.
3. Click Start button and type Disk Defragmenter. Now, defragment the disk C: drive of your computer. Choose the Configure option and change the schedule to weekly for other disk drives.

Tips for teachers



Recall the topics already learnt on software and hardware. Show pictures on system software and application software and explain them. Conduct a quiz on the types of software.

Refer more



<https://ist.mit.edu/software-hardware>