

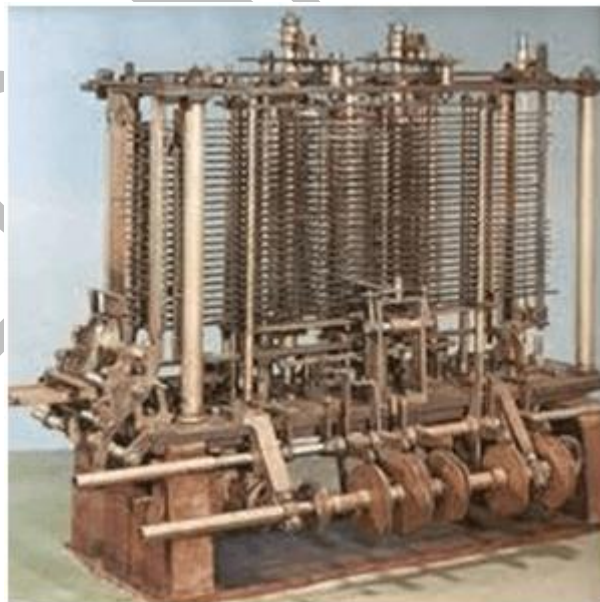
### **Difference Engine**

In the early 1820s, it was designed by Charles Babbage who is known as "Father of Modern Computer". It was a mechanical computer which could perform simple calculations. It was a steam driven calculating machine designed to solve tables of numbers like logarithm tables.



### **Analytical Engine**

This calculating machine was also developed by Charles Babbage in 1830. It was a mechanical computer that used punch-cards as input. It was capable of solving any mathematical problem and storing information as a permanent memory.



### **Tabulating Machine**

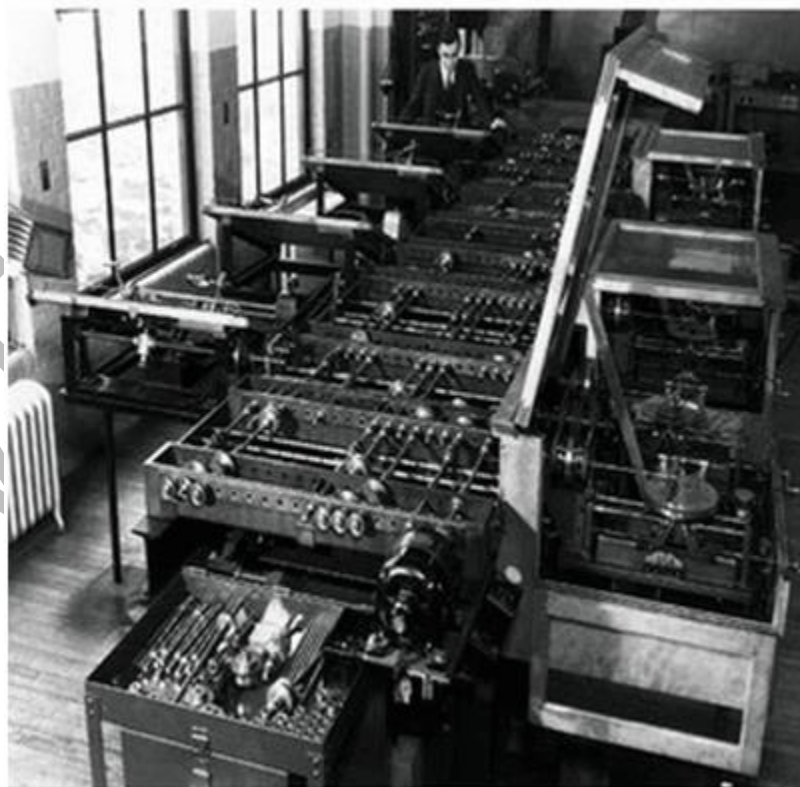
It was invented in 1890, by Herman Hollerith, an American statistician. It was a mechanical tabulator based on punch cards. It could tabulate statistics and record or sort data or information. This machine

was used in the 1890 U.S. Census. Hollerith also started the Hollerith's Tabulating Machine Company which later became International Business Machine (IBM) in 1924.



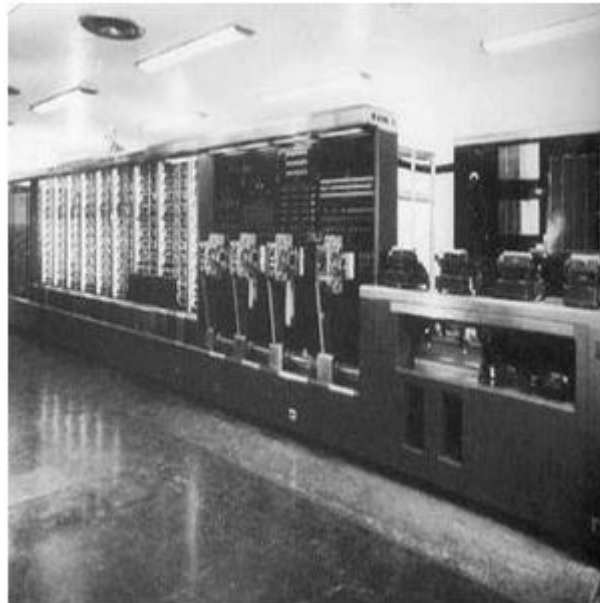
### **Differential Analyzer**

It was the first electronic computer introduced in the United States in 1930. It was an analog device invented by Vannevar Bush. This machine has vacuum tubes to switch electrical signals to perform calculations. It could do 25 calculations in few minutes.



## Mark I

The next major changes in the history of computer began in 1937 when Howard Aiken planned to develop a machine that could perform calculations involving large numbers. In 1944, Mark I computer was built as a partnership between IBM and Harvard. It was the first programmable digital computer.



## Generations of Computers

A generation of computers refers to the specific improvements in computer technology with time. In 1946, electronic pathways called circuits were developed to perform the counting. It replaced the gears and other mechanical parts used for counting in previous computing machines.

In each new generation, the circuits became smaller and more advanced than the previous generation circuits. The miniaturization helped increase the speed, memory and power of computers. There are five generations of computers which are described below;

### First Generation Computers

The first generation (1946-1959) computers were slow, huge and expensive. In these computers, vacuum tubes were used as the basic components of CPU and memory. These computers were mainly depended on batch operating system and punch cards. Magnetic tape and paper tape were used as output and input devices in this generation;

Some of the popular first generation computers are;

- **ENIAC** ( Electronic Numerical Integrator and Computer)
- **EDVAC** ( Electronic Discrete Variable Automatic Computer)
- **UNIVACI**( Universal Automatic Computer)
- **IBM-701**
- **IBM-650**

### Second Generation Computers

The second generation (1959-1965) was the era of the transistor computers. These computers used transistors which were cheap, compact and consuming less power; it made transistor computers faster than the first generation computers.

In this generation, magnetic cores were used as the primary memory and magnetic disc and tapes were used as the secondary storage. Assembly language and programming languages like COBOL and FORTRAN, and Batch processing and multiprogramming operating systems were used in these computers.

Some of the popular second generation computers are;

- **IBM 1620**
- **IBM 7094**
- **CDC 1604**
- **CDC 3600**
- **UNIVAC 1108**

### **Third Generation Computers**

The third generation computers used integrated circuits (ICs) instead of transistors. A single IC can pack huge number of transistors which increased the power of a computer and reduced the cost. The computers also became more reliable, efficient and smaller in size. These generation computers used remote processing, time-sharing, multi programming as operating system. Also, the high-level programming languages like FORTRAN-II TO IV, COBOL, PASCAL PL/1, ALGOL-68 were used in this generation.

Some of the popular third generation computers are;

- **IBM-360 series**
- **Honeywell-6000 series**
- **PDP(Personal Data Processor)**
- **IBM-370/168**
- **TDC-316**

### **Fourth Generation Computers**

The fourth generation (1971-1980) computers used very large scale integrated (VLSI) circuits; a chip containing millions of transistors and other circuit elements. These chips made this generation computers more compact, powerful, fast and affordable. These generation computers used real time, time sharing and distributed operating system. The programming languages like C, C++, DBASE were also used in this generation.

Some of the popular fourth generation computers are;

- **DEC 10**
- **STAR 1000**
- **PDP 11**

- **CRAY-1(Super Computer)**
- **CRAY-X-MP(Super Computer)**

### **Fifth Generation Computers**

In fifth generation (1980-till date) computers, the VLSI technology was replaced with ULSI (Ultra Large Scale Integration). It made possible the production of microprocessor chips with ten million electronic components. This generation computers used parallel processing hardware and AI (Artificial Intelligence) software. The programming languages used in this generation were C, C++, Java, .Net, etc.

Some of the popular fifth generation computers are;

- **Desktop**
- **Laptop**
- **NoteBook**
- **UltraBook**
- **ChromeBook**

<b>Parameter</b>	<b>Operating System</b>	<b>Application Software</b>
Definition	It is a system software that acts as an interface between the user and system's hardware.	It is a software program that can perform a specific task.
Programming language	It is written using low level languages like assembly language and C, C++	This software is written in high level programming languages like C++, Python, Java, etc.
Run time	It is the first software loaded by BIOS when the computer is tuned on.	It is used by the user based on their requirements.
Goal	Its main aim is to manage the hardware components efficiently.	It is used by the user to perform a specific function.
Installation	It is pre-installed in the devices.	User needs to install them from the Internet.
Necessity	Without OS, a computer can't run.	It has no effect on the general functioning of a computer.
Examples	Windows, Android, Mac, Linux etc., are some of the operating system.	MS office, Adobe reader, WhatsApp, etc., are all examples of application software.

## Operating System

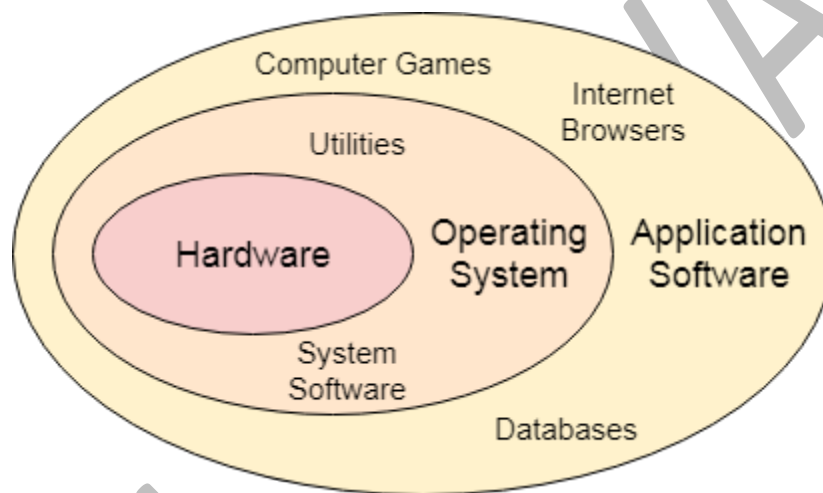
Operating System can be defined as an interface between user and the hardware. It provides an environment to the user so that, the user can perform its task in convenient and efficient way.

The Operating System Tutorial is divided into various parts based on its functions such as Process Management, Process Synchronization, Deadlocks and File Management.

### Operating System Definition and Function

In the Computer System (comprises of Hardware and software), Hardware can only understand machine code (in the form of 0 and 1) which doesn't make any sense to a naive user.

We need a system which can act as an intermediary and manage all the processes and resources present in the system.



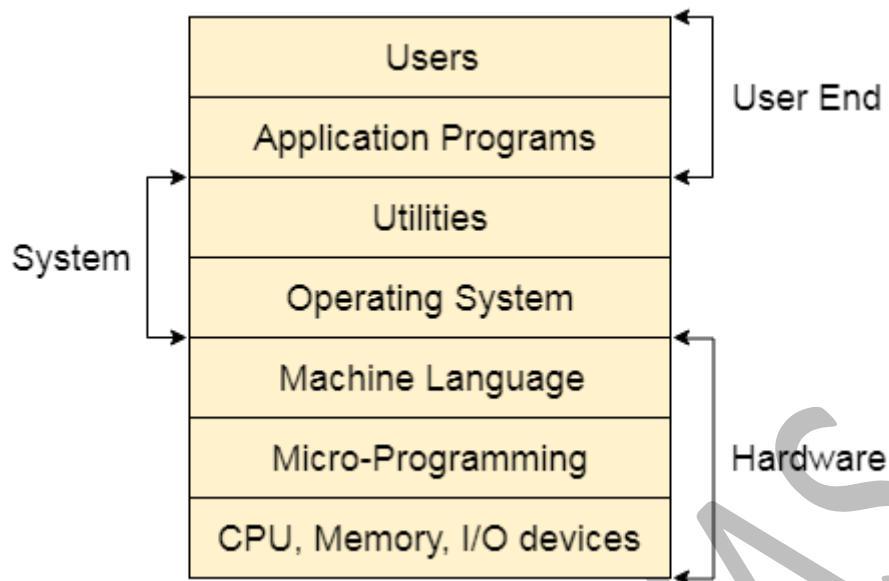
An **Operating System** can be defined as an **interface between user and hardware**. It is responsible for the execution of all the processes, Resource Allocation, [CPU](#) management, File Management and many other tasks.

The purpose of an operating system is to provide an environment in which a user can execute programs in convenient and efficient manner.

### Structure of a Computer System

A Computer System consists of:

- Users (people who are using the computer)
- Application Programs (Compilers, Databases, Games, Video player, Browsers, etc.)
- System Programs (Shells, Editors, Compilers, etc.)
- Operating System ( A special program which acts as an interface between user and hardware )
- Hardware ( CPU, Disks, Memory, etc)



What does an Operating system do?

1. Process Management
2. Process Synchronization
3. Memory Management
4. CPU Scheduling
5. File Management
6. Security