

An Overview on Operating System

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ABSTRACT: *Operating systems are used in computers, and computers are highly useful in saving time, therefore operating system play an essential part in people's life. Computers mostly utilise operating systems. Users can describe an operating system as a system that runs their application programmes and provides a user interface through which they can connect with computer hardware. The majority of commercial operating systems on the market today include flawed code and security faults and vulnerabilities. The author decides to create this review paper due to a lack of understanding about operating systems. In this paper, the author discusses operating systems, their history and evolution, applications, functions and types, as well as their benefits and problems. The author feels that this work will aid in the comprehension of operating systems. The foundation of the robotics operating system is also used to write robot software. New updates have been released to address problems and defects, allowing OS to give its users with the safest computing environment possible. As a result, the future of operating systems seems promising.*

KEYWORDS: *Computer, Hardware, Management, Operating System, Software.*

1. INTRODUCTION

Humans would be unable to succeed, manage, and use computer systems without operating systems. An operating system is a software delivery system that provides software resources, processor hardware, and other shared resources to a computer database or programme. The operating system is the first application to run when a device boots up and is considered the most important form of system software. Users utilize operating systems to run their applications programmes. It also provides users with a suitable interface for interacting with computer hardware. Operating systems are also responsible for providing a multi-level secure execution platform, hosting device drivers, regulating input and output peripherals, managing data storage, assigning main memory to various programmes, generating threads, and launching processes. Linux, Mac OS, Windows, Unix, and other operating systems are examples[1].

Operating systems such as Windows and Linux, like any other technology, have problems in terms of computer security, since they encounter numerous viruses, mistakes, and flaws during the course of their lives. To address these issues, the developers of these operating systems release updates in order to address these issues and provide the most secure computing environment for their users and applications programmes. The author of this review paper discusses operating systems, their history, and evolution. Operating system types and functionalities, Operating system advantages, disadvantages, and applications[2].

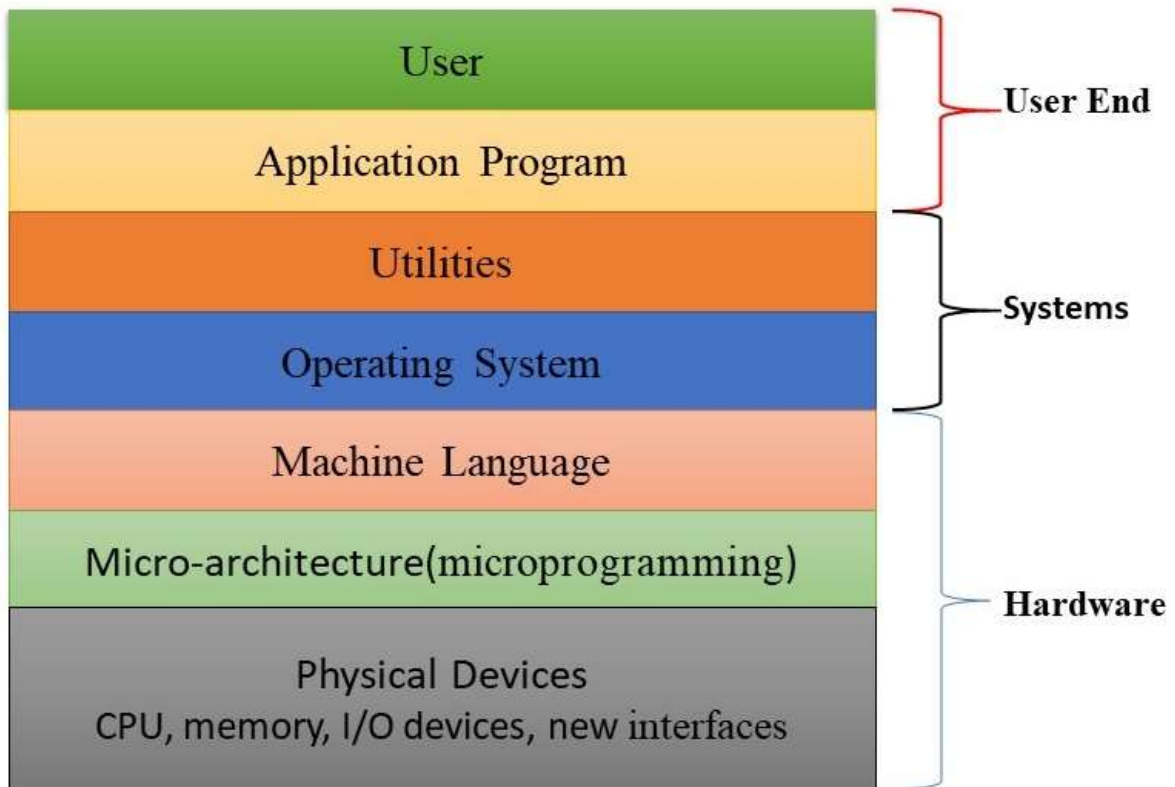


Figure 1: Illustrates the Architecture of operating system[3]

The interface between computers software and hardware is the architecture of operating system. The architecture of operating system is known in Figure 1.

1.1 Evolution and History of Operating system:

The operating system has progressed in recent years. The history and evolution of the Operating System are shown in Table 1.

Table 1: The history and evolution of operating system

Generation	OS and Devices	Electronic devices	Year
First	Plug boards	Vacuum tubes	1944-1955
Second	Batch Systems	Transistors	1955-1965
Third	Multiprogramming	ICs	1965-1980
Fourth	Personal Computers	LSI	1980
Fifth	Desktop, Laptop, Chrome book	VLSI becomes ULSI	1980 till date

1.2 Operating System Types:

Currently, there are many types of operating system such as Mobile operating system, Network operating system, Distributed operating system, Real-time operating system, Multitasking operating system, Multiprocessing operating system and Batch operating system which is shown in Figure 2.

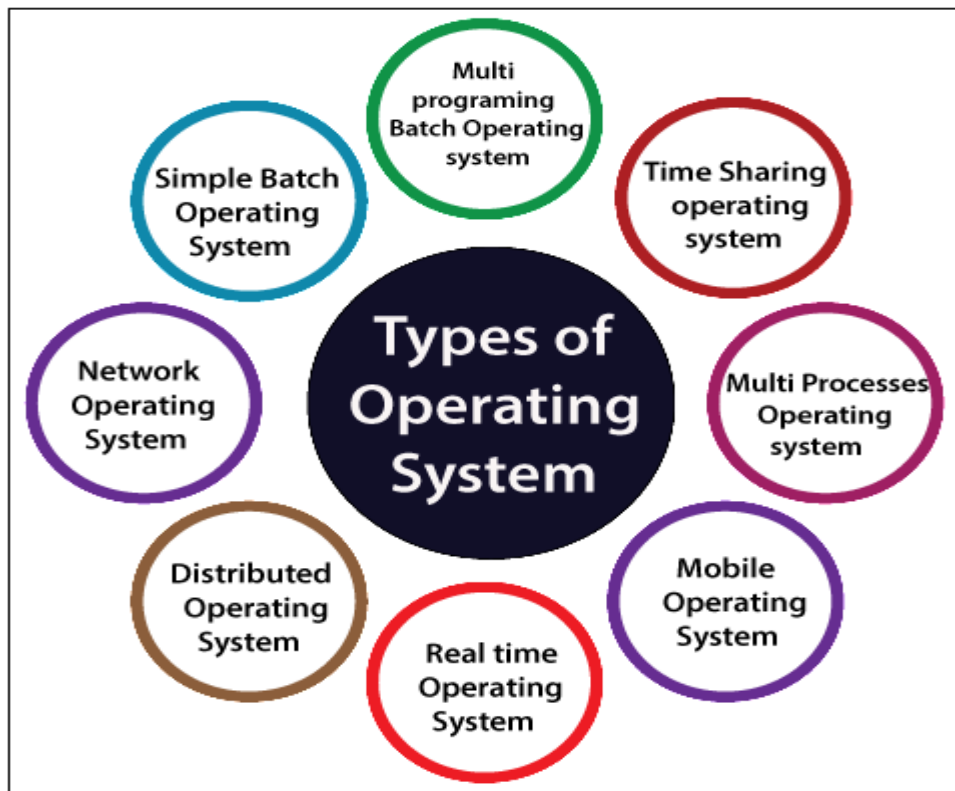


Figure 2: Various types of operating systems that are available in market[5]

1.2.1 Mobile Operating System: The systems that are meant to power wearable devices, tablets, and mobile phones are known as mobile operating systems. The following mobile operating systems are Android and iOS.

Advantages:

- It provides full access of device such as hardware and software to its users.

Disadvantages:

- Cost and duration of the updates is high.

1.2.2 Network Operating System: The ability to handle applications, security, groups, users, data, and many other networking operations is provided by a network operating system. It is essentially operated on a server.

Advantages:

- Servers which are centralized are highly stable.
- Remote access to servers is possible from different locations and types of systems.

Disadvantages:

- Buying cost of server is high.
- Preservation and updates are required.

1.2.3 Distributed Operating System: The term "distributed operating system" refers to a system that uses many mainframes situated on various machines to provide rapid computing to its workers.

Advantages:

- Through the resource share facility, a user can use the other resource which is available at other place.
- It offers better services to its customers.

1.2.4 Real time Operating System: A real-time operating system is one that works with real-time applications, or ones that handle data as it comes in without delay. RTOS include Windows CE, VxWorks, RT Linux, and QNX.

Advantages:

- In this system, user can reuse its code.
- This system is based on priority scheduling.

1.2.5 Multitasking Operating System: It's a system that enables various practises or activities to be completed at the same time using multiple CPUs. Time-sharing refers to the usage of a processor by several users at the same time.

Advantages:

- The idle time of CPU reduces.
- It removes the copy of software.

Disadvantages:

- Reliability is the main problem in multitasking.

1.2.6 Batch Operating System: It's a system that doesn't interface with the computer directly. As Certain computer procedures take a long time. Work with a comparable type of requirement is batched together and run as a collection to speed up the same procedure. Every user prepares his or her task on an offline device such as a punch card and presents it to the computer operator in this sort of OS.

Challenges in Batch operating system:

- In this system, the interaction of user and job is less.
- Difficult to provide desired priority.

1.3 Operating System Functions:

In operating system, there are some functions that are shown in Figure 3.



Figure 3: Various functions that are performed in operating system[6]

- *File Management:* It is the administration of file-related tasks such as file protection, sharing, naming, organisation, storage, and retrieval[7].
- *Job Accounting:* Job accounting can be stated as the account of time & resource used by different users.

- *Security*: Security is the function that protects the data and information of a computer system against unauthorized access, threat and malware.
- *Process Management*: Management is in charge of creating and deleting practices/processes. It also provides management and communication tools for processes.
- *Device Management*: To keep track of all instruments, device management is employed. The I/O controller is also involved in this management. It also performs the task of device allocation.
- *Memory Management*: It is used in programmes to allocate and de-allocate memory space.
- *Error Detection*: The identification of a mistake caused by noise or other impairments during transmission from the transmitter to the receiver is known as error detection. Error detection is the process of detecting mistakes in data and restoring it to its original, error-free state.
- *Coordination between software and user*: Certain directives issued by the user to coordinate the system are included in this.

1.4 Operating System Benefits:

- A user can execute applications/programs.
- The management of input and output is done in operating system.
- Synchronization of practices is done in operating system.
- By forming an abstraction, it allows you to hide details of hardware.
- It is easy to practice with Graphical User Interface (GUI) as GUI can be used in form of buttons and icons.
- Resource allocation is done in Operating System.
- Operating System acts as an intermediary among applications and the hardware components.

1.5 Operating system Challenges [8]:

- Operating system is not totally safe as any virus can occur at any time.
- User can lost all their data that is stored in system if any issue/problem is occurred in OS.
- Operating system's software is quite expensive for small size organization which adds burden on them. Example: Windows.

1.6 Common desktops operating system:

Figure 4 shows the common desktop Operating system which is mentioned below:

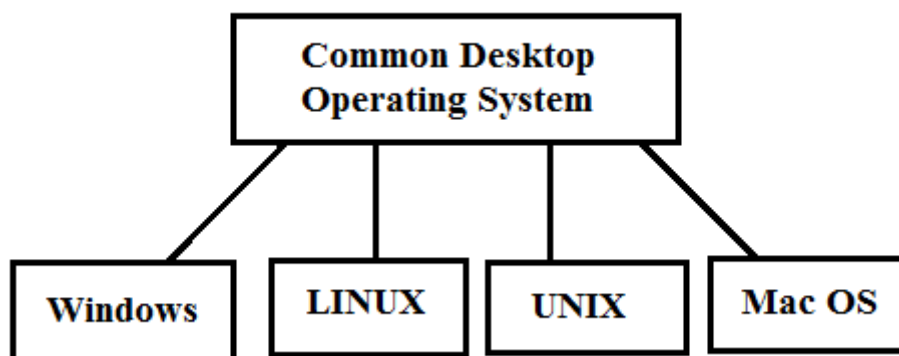


Figure 4: The above diagram shows the common desktop Operating system which people use in daily life.

- *Mac OS*: Since 2011, Apple Inc. has been manufacturing and marketing the Mac OS systems. Mac OS is primarily utilised in Apple's Macintosh PCs and workstations.
- *UNIX*: It was created in the 1970s. The C programming language is used in the UNIX operating system. It's a multiuser operating system with a focus on adaptation and flexibility[9][10].

- *Windows*: In 1985, Microsoft released Windows. It's a graphical user interface-based operating system that comes in a variety of versions, including Windows XP, Windows 7, and Windows 8. Windows is a Microsoft-based operating system which is often found in both personal and commercial computers. It was primarily responsible for the rapid rise of personal computers due to the user-friendly Windows 95.
- *Linux*: It is a system that provides consumers with a free or low-cost alternative [12]. It has a lot in common with UNIX. Linux has a reputation for being a high-performing and efficient operating system[11].

1.7 Applications of Operating System in human life:

- *Influence of computer in education*: After computers were introduced into the educational sector, learning and tutoring reached a high quality. We can use a computer to connect to the internet and convey this knowledge in a variety of ways in real time to learn any subject. Computers are also used to facilitate interaction between students and professors. Smart classrooms are also available at educational institutions.
- *Communication between human and computers*: With the advancement of technology, people have begun to attempt to interact with computers. People can become closer as a result of technological advancements such as Social Media, Mobile Phones, Videoconferencing, Chatting, and Email. In our lives, radio, television, and print media all played an important part. Computers have an impact on them as well, in terms of manufacturing, control, storage, and broadcasting. Humans may write a document on a computer, view it on a screen, edit it, and print it on a printer, or publish it to the rest of the world via the World Wide Web (WWW).
- *Latest trends and future expectation of Computers*: With the arrival of computers, the way we talk about human life has altered dramatically. As a result, it's important emphasising the changes that computers will bring in the near future. The technologies of space travel, driverless vehicles, 3D printing, interest-based education, machine learning (ML), and artificial intelligence will shape the future (AI).

2. DISCUSSION

As previously stated, an operating system is system software that is used to execute user programmes and offer an interface for communicating with computer hardware. Many technologies, including as artificial intelligence, machine learning, and the internet of things, are currently accessible on the market, and their developers have utilised operating systems[12], [13]. People may also use the Robotics operating system framework to create robot software. Introduction to operating systems, evolution and history, types and functions, benefits and challenges, and applications of operating systems are all addressed in this study [14]. This paper, according to the author, will assist those who wish to learn about operating systems. Operating systems are crucial in human existence because without them, humans would be unable to utilise and manage computers. In today's operating systems, there are certain concerns such as bugs, failures, and hardware issues. In light of this, developers are working hard to resolve these issues and give their users with the safest computing experience possible. As a result, the future of operating systems seems promising.

3. CONCLUSION

Currently, operating systems play a significant part in people's lives since computers and technologies make work easier. An operating system is a software programme that runs on a computer and provides a user interface for interacting with the hardware. The following desktop operating systems are Linux, Unix, Windows, and Mac OS. People have demonstrated a lack of comprehension about operating systems. The author chooses to write this paper in order to tackle this difficulty. The author of this review article covered operating systems, applications, functions and types, as well as their benefits and problems. Operating systems are mostly used in computers, but robotics operating systems are also being utilised to write robot software. Operating systems, like any other technology, are susceptible to bugs, viruses, and other problems. Updates are currently being developed to address these issues. Since a result, the operating system's future is bright, as it is employed in supercomputers and aids in the reduction of work load.

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