

# Evolution of Operating System



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*In this article, we will discuss the history of operating systems, i.e., how operating systems are evolved over years. The journey that started from back in 1940 leveraging current digital era and providing the best experience to the users. Later in the article, we will also discuss some of the advantages and disadvantages of OS.*



## Evolution of Operating System



Operating systems (OS) are the backbone of every digital device, bridging hardware and software. These operating systems are evolved over the years and cater to the best user experience.

The journey of operating systems started in 1940 with the beginning of the digital age. The earliest computer was operated without an operating system, and the programs were manually written and executed sequentially.

So, in this article, we will glimpse how operating systems have evolved over the years.



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*Also, Explore [Functions of Operating System](#)*

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## First Generation (Serial Processing)

- **Time Period:** The 1940s and 1950s marked the start of electronic computers. They were the new trend, replacing old mechanical ones.
- **Size and Cost:** These early computers were huge! And they came with a big price tag too.
- **Basic Functions:** Despite their size and cost, they could only do simple tasks.
- **No Operating System:** Imagine a computer without an operating system! That's how they were. They just did tasks one by one.
- **Serial Processing:** This means they finish one task before starting the next. No multitasking here!

### Limitations of First Generation

- **Wasted Power:** The main computer brain, the CPU, often just sat there doing nothing. It waited a lot, especially during tasks like reading data, which wasted its power.
- **One Task at a Time:** These systems were like a person who can't multitask. They could only handle one job at a time, making things slow.
- **Long Wait Times:** Imagine giving someone a job and waiting ages to see the result. That's how these systems were. You'd give them a task, and it took forever to get the outcome.

## Second Generation (Batch System)



- Due to the inefficiencies of serial processing, the need for a more optimized approach became evident. This led to the development of a batch-processing system. This era (1950-60) is called the second generation of operating systems.
- In a batch system, similar tasks (or jobs) are grouped into batches and then processed sequentially without any user interaction.
- The goal was to automate the processing of jobs and minimize the setup time.
- A scripting language, Job Control Language (JCL), was introduced to manage these batches.
- It allows operators to specify the sequence of jobs to be executed.

#### Advantages

- The system optimizes the processing sequence by grouping similar tasks, reducing the overhead and setup time between jobs.
- It allows for automated processing of tasks, i.e., reduces the need for manual intervention.
- The system could better utilize CPU and minimum idle time by processing tasks in batches.

#### Limitations

- It lacks real-time user interaction, i.e., users have to wait for the entire batch to be processed.
- If the batches contain multiple tasks, giving output takes a longer time.
- Once the batch is processed, corrections can't be done.



## Third Generation (Multi-Programmed Batch System)

In the previous two generations, the systems ran jobs one at a time in sequence, which was efficient because the CPU had to wait for I/O operations to complete. To overcome this, multiprogramming was introduced in the next generations of operating systems.

- Multiprogramming allows multiple jobs to reside in the main memory at once, i.e., the CPU could switch to another job if one job needs to wait for I/O operation. Due to multi-programming CPU could process more jobs in a given amount of time.
- Since multiple jobs are done at once, there was a need for more advanced memory management. These memory needs led to the development of concepts such as memory partitioning, paging, and segmentation.
- Since multiple jobs are done at a time, it is important to decide which job to execute first, second, or last. Algorithms like First-Come-First-Serve, Shortest Job Next (SJN), and Round Robin are developed.
- The complexity of the OS was increased, and system utilities were developed to help manage files, devices, and other system resources.
- Operating systems were accompanied by hardware like Integrated Circuit, which allowed for smaller, faster, and more reliable computers.

**Must Check:** [Multi-Tasking Operating System](#)

**Must Check:** [Difference Between Multiprogramming and Multitasking](#)

## Fourth Generation (Time-Sharing Operating System)



The fourth-generation operating system was more commonly associated with programming languages that were close to human language and often used for database-related tasks.

The fourth generation has features like:

- Graphical User Interface that allows users to interact with the system using windows, icons, and menus.
- Ability to run multiple applications simultaneously.
- Built-in capabilities to connect to and function on networks, including the Internet.
- Automatically recognize and configure hardware devices.
- Advanced security mechanism to protect against malware, unauthorized access.
- Compatibility with a wide range of hardware devices and architecture.
- The OS allocates a small time slice or quantum to each task.



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## Difference Between Static and Dynamic Memory Allocation

This article includes the difference between static and dynamic memory allocation with examples and applications

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## Advantages of Operating System

- User-friendly: Makes computers easy to use.
- Manages resources: Handles CPU, memory, and storage well.
- Multitasking: This lets you run many apps at once.
- Error handling: Keeps the system running smoothly.
- Developer-friendly: Ensures apps work well and consistently.

## Disadvantages of the Operating System

- Can Perform Slow: Extra software layer might reduce speed.
- Needs specific setups: It might not work well on old computers.
- Can be costly: Some, like Windows or macOS, aren't free.
- Software limits: Not all apps work on every system.



- Learning new systems: Switching can be tough for users.

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## Conclusion

In this detailed article, we have discussed the history of operating system, i.e., how operating systems are evolved over years. The journey that started from back in 1940 leveraging current digital era and providing best experience to the users. The article, also covers the advantages and disadvantages of Operating System.

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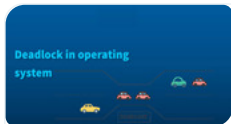
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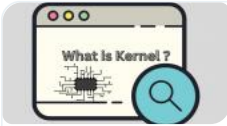


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What are different types of Operating System?



What are the different functions of operating system?



What are the different examples of Operating System?

