**The Classification and Functions of Operating System (OS)**

Name

Professor

Institutional Affiliations

Course

Date

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An operating system (OS) is a collection of software that manages computer hardware resources and provides common services for computer programs (Sahu et al., 2021). The operating system acts as a platform on which software applications can run, and it is responsible for allocating resources, scheduling tasks, and managing data. It also facilitates communication between software applications and the computer hardware.

**Classification of Operating System**

Operating systems can be classified into six types, including batch operating systems, time-sharing operating systems, network operating systems, distributed operating systems, mobile operating systems, and real-time operating systems. (Indeed Editorial Team, 2023). The batch operating system operates without a direct connection to the computer. Instead, a distinct system divides and organizes similar tasks into batches to enhance processing efficiency and speed up response times. Particularly suitable for lengthy and time-consuming tasks, such systems find application in managing payroll systems, data entry, and processing bank statements. To prevent device slowdowns, users prepare their tasks offline and then submit them to an operator (Indeed Editorial Team, 2023).

The time-sharing operating system, also referred to as a multitasking OS, allocates time to specific tasks and switches between them regularly. Unlike batch systems, the time-sharing system enables users to concurrently perform their tasks within the system. Examples of time-sharing operating systems are Multics and Unix, which facilitate the distribution of many users across different terminals to reduce response time (Indeed Editorial Team, 2023).

Distributed systems utilize multiple central processors to manage concurrent real-time applications and cater to diverse users, distributing data processing tasks among the processors as needed. Communication between processors takes place through various channels, including high-speed buses or telephone lines, defining these systems as loosely coupled or distributed. The processors within a distributed system, referred to as sites, nodes, or computers, can vary in both size and function (*Operating System - Quick Guide - Tutorialspoint*, n.d.).

A Network Operating System functions on a server, endowing it with the capability to manage data, users, groups, security, applications, and various networking functions. Its primary aim is to streamline shared access to files and printers across multiple computers within a network, commonly in a local area network (LAN), a private network, or interconnected with other networks.

Real-time operating systems offer essential support to systems with stringent time constraints, particularly in fields like scientific experiments, medical imaging, robotics, and air traffic control. These systems excel in providing minimal response times between input, processing, and response, making them ideal for processes requiring high sensitivity and precision (Indeed Editorial Team, 2023). Applications such as operating missile systems, medical equipment, and air traffic control demand this precision to prevent potential loss of life and property due to delays. Real-time operating systems can be categorized as hard real-time, ensuring the completion of time-sensitive tasks with no virtual memory, and soft real-time, where critical tasks take precedence without equally rigid time requirements (*Operating System - Quick Guide - Tutorialspoint*, n.d.).

Mobile operating systems, such as Android OS, Apple, and Windows Mobile OS, are customized for compact devices like smartphones, tablets, and wearables. These systems seamlessly integrate the capabilities of personal computers with additional features optimized for handheld devices. When a device is powered on, a mobile operating system initializes to provide access to installed applications and adeptly manage wireless network connectivity (Indeed Editorial Team, 2023).

**Functions of Operating System**

The operating system performs diverse tasks crucial for smooth computing. Among these functions is processor management, where, in a multi-programming environment, the OS uses process scheduling to determine the sequence and duration of processor access for various tasks. It efficiently assigns tasks to the processor, monitors process statuses, and deallocates the processor upon task completion, ensuring optimal utilization in a streamlined manner (Solanki & Paliwal, 2018).

Another function of operating system is memory management. Memory management is crucial in efficiently overseeing primary memory to load and execute programs. It tracks memory usage, controls process access order and duration in multiprogramming, and allocates/deallocates memory, optimizing system performance and preventing conflicts among concurrent processes (Singh, 2019). Another key function is device management, where the operating system supervises device communication through drivers. It manages connected devices, assigns Input/Output controllers, determines process access, and efficiently allocates/deallocates devices, ensuring seamless functioning, task execution, and communication with requesting processes.

Additionally, operating system manages file systems, organizing data into directories for efficient navigation. Essential file management tasks, such as tracking file locations, user access settings, and status, are overseen by the OS. It handles file operations like creation, deletion, transfer, copy, and storage, ensuring data integrity and security against unauthorized access (Odun-Ayo et al., 2021). Likewise, the operating system acts as an intermediary between users and computer hardware, offering a user interface through commands or a graphical interface, facilitating interactions with applications and the underlying machine hardware.

Besides, operating system ensures security with password protection and measures like login protection, an active firewall, and secure system memory to prevent unauthorized access and maintain data integrity (Odun-Ayo et al., 2021). In addition, it plays a vital role in optimizing system performance by efficiently allocating CPU time, memory, and I/O devices to processes, ensuring fair resource utilization. Process scheduling is a critical function, preventing any task from monopolizing the CPU, enabling effective multitasking (Solanki & Paliwal, 2018).

Moreover, operating system serves as a network manager, orchestrating internet traffic by overseeing data packaging and transmission. Additionally, it acts as a settings and security guard, enabling users to configure Wi-Fi or Ethernet settings, monitor network performance, and optimize internet speed (Singh, 2019). Further to this, the operating system is accountable for job accounting, tracking time and resources utilized by tasks and users, as well as error detection to prevent system malfunctions. Moreover, it collaborates with other software and users by allocating interpreters, compilers, and assemblers to different users within the computer system.

In conclusion, the varied classifications and functions of operating systems are tailored to meet the diverse requirements of different computing environments. As technology advances, operating systems are poised to assume a pivotal role in influencing the trajectory of future computing. A comprehensive grasp of their classifications and functions is indispensable for developers, administrators, and users alike.

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