**The Classification and Function of Operating System**

Name

Professor

Institutional Affiliations

Course

Date

**The Classification and Function of Operating System**

Operating systems, as articulated by Odun-Ayo et al. (2021), serve as a critical interface between users and computer hardware, managing diverse functionalities that bridge applications and hardware components. This paper delves into the classifications and multifaceted functions of operating systems, drawing insights from authoritative sources such as Odun-Ayo et al. (2021), Anna Kobusińska (n.d.), Casseau et al. (2021), IEEE Xplore (n.d.), Solanki & Paliwal (2018), and Singh (2019). The comprehensive classification framework spans user-centric factors like user capacity and interaction types, as well as environmental considerations, including real-time, distributed, network, mobile, and embedded systems. Moreover, the functions of operating systems are dissected, revealing their critical roles in processor and memory management, device supervision, file systems organization, security enforcement, network orchestration, performance optimization, and collaborative software allocation. As technology advances, this exploration not only provides a comprehensive understanding of current OS landscapes but also sets the stage for envisioning the trajectory of future computing.

**Classification of Operating System**

Operating systems can be classified based on multiple factors, such as the number of users they support, the number of tasks they can perform at a given time, the type of interaction they allow with the system, and the type of environment they work in (*Operating Systems: Functions, Types, Examples | StudySmarter*, n.d.). In terms of user capacity, operating systems can be categorized as either Single-User or Multi-User. A Single-User OS permits only one user to operate the machine at any given time, ensuring exclusive access. On the other hand, a Multi-User OS facilitates concurrent use by multiple individuals, allowing simultaneous engagement with the device by different users (Casseau et al., 2021).

Regarding the number of tasks, operating systems fall into two categories: Single-Tasking and Multi-Tasking. Single-Tasking OS is designed to manage only one task at a time, whereas Multi-Tasking OS has the capability to handle multiple tasks concurrently, enabling efficient multitasking and simultaneous execution of various processes. Also, operating systems can be classified based on user interaction, falling into either Command-Line Interface (CLI) or Graphical User Interface (GUI) categories. A Command-Line Interface OS necessitates the manual input of commands, whereas a Graphical User Interface OS facilitates user interaction through visual elements such as icons, providing an intuitive and visually guided user experience (IEEE Xplore, n.d.).

Furthermore, according to Casseau et al., (2021,p 60) ,operating systems can be classified based on their environment, encompassing Real-Time, Distributed, Network, Mobile, and Embedded systems. Real-Time OS ensures real-time responsiveness and is commonly employed in embedded systems. Distributed OS utilizes multiple central processors for coordinated processing. Network OS manages and oversees interconnected computers within a network. Mobile OS is specifically designed for mobile devices, catering to the unique requirements of smartphones and tablets (Casseau et al., 2021). Embedded OS, on the other hand, is customized for compact devices such as digital watches and MP3 players, showcasing the adaptability of operating systems to diverse technological environments. This comprehensive classification framework elucidates the diverse functionalities and adaptability of operating systems in the ever-evolving landscape of computing.

**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.

**References**

*Anna Kobusińska*. (n.d.). Www.cs.put.poznan.pl. Retrieved December 27, 2023, from <http://www.cs.put.poznan.pl/akobusinska>

Casseau, E., Dobiáš, P., Sinnen, O., Rodrigues, G. S., Kastensmidt, F., Savino, A., Di Carlo, S., Rebaudengo, M., & Bosio, A. (2021, April 1). *Special Session: Operating Systems under test: an overview of the significance of the operating system in the resiliency of the computing continuum*. IEEE Xplore. <https://doi.org/10.1109/VTS50974.2021.9441042>

Odun-Ayo, I., Okokpujie, K., Oputa, K., Ogbu, H., Emmanuel, F., Shofadekan, A., & Okuazun, G. (2021). Comparative Study of Operating System Quality Attributes. *IOP Conference Series: Materials Science and Engineering*, *1107*(1), 012061. <https://doi.org/10.1088/1757-899x/1107/1/012061>

*Operating Systems: Functions, Types, Examples | StudySmarter*. (n.d.). StudySmarter UK. <https://www.studysmarter.co.uk/explanations/computer-science/computer-systems/operating-systems/>

*Research on the Evolution Law of Human-computer Interaction Function in Computer Operating System and Control Mode | IEEE Conference Publication | IEEE Xplore*. (n.d.). Ieeexplore.ieee.org. Retrieved December 27, 2023, from <https://ieeexplore.ieee.org/document/9382581>

Sahu, A., Singh, S., Hod, R., & Chawda. (2021). RESEARCH PAPER ON OPERATING SYSTEM. *International Journal of Creative Research Thoughts*, *9*(6), 2320–2882. <https://ijcrt.org/papers/IJCRT2106251.pdf>

Singh, A. (2019, February 7). *Functions of operating system*. GeeksforGeeks. <https://www.geeksforgeeks.org/functions-of-operating-system/>

Solanki, M., & Paliwal, M. (2018). *An Overview on Operating System*. *5*. <https://www.jetir.org/papers/JETIRFH06005.pdf>