



DIJEMSS:
**Dinasti International Journal of Education
Management and Social Science**

E-ISSN: 2686-6331
P-ISSN: 2686-6358

<https://dinastipub.org/DIJEMSS> ✉ dinasti.info@gmail.com ☎ +62 811 7404 455

DOI: <https://doi.org/10.38035/dijemss.v6i2>
<https://creativecommons.org/licenses/by/4.0/>

Important Role Of Operating System In Computer Network Connection

Raditya Arya Darmawan¹, Weni Gurita Aedi².

¹Informatics Engineering, Pamulang University, Jl. Raya Puspitek, Buaran, Kec. Pamulang, South Tangerang City, Banten 15310, Indonesia, belajarbikinakun58@gmail.com

²Informatics Engineering, Pamulang University, Jl. Raya Puspitek, Buaran, Kec. Pamulang, South Tangerang City, Banten 15310, Indonesia, dosen01906@unpam.ac.id

Corresponding Author: belajarbikinakun58@gmail.com

Abstract: Operating systems play a crucial role in supporting network management, ensuring that devices are properly connected and security protocols are effectively implemented. As the adoption of Internet of Things (IoT) devices increases, efficient operating systems facilitate integration and communication between these devices, which in turn increases efficiency and automation in various sectors, and has a real positive impact on our lives today. This study aims to describe the important role of operating systems in managing computer network connections. The research method used is qualitative descriptive, with data obtained from various sources, including e-books and journal articles related to operating systems and computer networks. Journal articles on network management, protocols, security, and performance, as well as research reports and case studies that discuss the role of operating systems in computer network connections. Based on the results of the data analysis, computer network connections are currently experiencing rapid progress with various innovations in network security technology also being a major focus, with technologies such as encryption, firewalls, and VPNs to protect data from cyber threats. However, without an efficient operating system, management and communication between devices in an IoT network can be hampered. The operating system is responsible for ensuring that devices can be properly connected, as well as managing the necessary security protocols.

Keyword: Computer Network, Network Security, Operating System, Network Management.

INTRODUCTION

In the era of rapid development of globalization and ongoing digitalization, computer network connections have become an important element in various aspects of human life. Computer networks are nothing new, almost all organizations, institutions, and digital companies utilize network connections to strengthen their operational management. (Putra, Adnyana, & Jasa 2021). This can be seen in its ability to facilitate communication, support business operations, expand access to education, and provide entertainment. The use of computer networks has a very important role in agencies and companies (Yudianto & Rismayadi, 2022). The quality of computer network usage has a major impact on the progress

and development of an agency or company. So that network connections have a primary need in an organization in order to facilitate access to information. Therefore, the more computer network users in an agency, the more benefits the users can rely on. Because network connections allow devices to interact with each other and share information with high efficiency, speed up work processes and increase productivity.

The success of a network connection depends heavily on the vital role of the operating system (OS), which manages resources and ensures network stability and security. The operating system is the main software that manages all hardware and software on a computer (Salsabilla, 2022). Basic software installed as the first layer on storage media, such as a hard disk on a computer. This system has the task of managing and coordinating other hardware and software, to ensure that the computer operates properly and efficiently. In addition, this operating system functions as a liaison between users, applications, and computer hardware, allowing efficient and integrated interaction between all these components. The main role of the operating system is to manage and supervise all resources in a computer system. The operating system is responsible for managing the use of computer resources, including memory, processing, and data storage. This ensures that all components work together harmoniously and according to the needs and instructions given. The operating system is responsible for various important aspects of a computer network, including network hardware management, implementation and management of network protocols, and network security and performance. No matter how sophisticated the computer hardware is, without the support of the operating system, the computer system will not be useful (Josi, 2019). So it can be concluded that the operating system is the main foundation that allows a computer to function properly, manage hardware and software resources, and provide a connection for users to interact with the computer efficiently.

The computer network operating system plays an important role in facilitating proper connections. A deep understanding of the important role of the operating system as the core of the system, a program that runs non-stop when the computer is in use (Heryana et al., 2023). In this case, the operating system includes managing network hardware, implementing network protocols, ensuring security, optimizing network performance, and supporting network applications. The operating system plays a crucial role in managing computer power optimally, computers are interconnected by users with other components (Siagian, 2022). In addition, we will also see the latest innovations in operating systems that aim to improve network connectivity in the future. Therefore, it is found that by understanding the role of the operating system in computer network connections, we can better appreciate the complexity and importance of this element in an increasingly connected world. This is because the operating system has the responsibility to manage network resources, facilitate communication between devices, and ensure that data is sent safely and efficiently. Thus, we can see how crucial the role of the operating system is in maintaining smooth digital interactions.

In managing computer network connections, there are complex challenges. Where in managing computer network connections there are network hardware management problems that include setting up and maintaining routers, switches, and other network devices. To overcome the problems faced, protocol implementation and management are very necessary. This aims to maintain a network that requires special attention to ensure that data can be sent and received correctly throughout the network. Network security is becoming increasingly crucial due to increasing cyber threats, so operating systems need to continue to update and develop effective protection mechanisms to prevent unwanted incidents.

Literature Review

An operating system is software installed on a computer's hard drive, which allows the hardware to interact and work with the software inside it (Amanda, 2021). Operating systems have undergone major changes since their initial concept, spanning a wide range of devices

from personal computers to mobile devices and large servers. Without an operating system, a computer network would not function properly because there would be no manager of the resources and applications running on it. A computer network is a system consisting of computers and other network devices working together to achieve a common goal (Pragasiwi & Galih, 2022). Without coordination between the hardware and software in a network, the efficiency, security, and availability of the system would be compromised. The operating system plays a central role in ensuring that all network components function properly, making it critical to computer network connectivity. The operating system is responsible for managing and coordinating the various hardware and software components so that they work together effectively. One way to understand this structure is to consider the main divisions that include hardware, operating systems, applications, and users.

The operating system plays a vital role in the implementation and management of network protocols, which govern how data is sent and received over a network. One of the primary roles of the operating system in a network connection is the management of network hardware, ensuring that each device has a unique network identity and can function within the network, enabling efficient and smooth data communication between connected devices (Sari et al., 2013). This enables efficient and smooth data communication between connected devices. The operating system cannot directly recognize or control network hardware such as network interface cards (NICs), routers, and switches. These hardware devices require drivers and configurations set by the operating system to function properly. Without proper settings from the operating system, the device will not be able to communicate with other devices on the network.

Can ensure performance and availability in the network by providing an interface that allows administrators to configure network hardware, and the operating system facilitates monitoring of device status and implementation of required network protocols. That the network operating system not only provides an interface for device settings, but also has an important role in monitoring performance and ensuring network availability. In addition, effective hardware management is essential to maintaining network stability and reliability, especially in dynamic and complex environments such as those found in large companies or data centers. So the operating system supports performance monitoring and implementation of required protocols. The effectiveness of hardware management is very important to maintain network stability and reliability, especially in dynamic environments such as large companies and data centers. Thus, the role of the operating system goes beyond simple settings, including monitoring and management that are essential for network operations.

Implementation of network protocol management to regulate data sent and received over the network by the operating system in a network connection. Efficient and smooth data communication between connected devices. The operating system cannot directly recognize or control network hardware such as network interface cards (NICs), routers, and switches. This hardware requires drivers and configurations prepared by the operating system in order to function optimally. Without the correct settings from the operating system, the device will not be able to interact with other devices on the internet. Transmission Control Protocol/Internet Protocol (TCP/IP) is the basis for data communication on the internet and many local networks. The operating system implements the TCP/IP protocol to manage and organize real-time data and message communication between devices connected to the network, ensuring that data is sent and received correctly and efficiently, allowing devices on the network to communicate with each other directly and in a coordinated manner. By implementing TCP/IP, the operating system ensures that data is sent accurately and efficiently, allowing devices on the network to communicate and exchange information reliably (Syafriзал, 2020).

In addition to ensuring efficient data communication, operating systems now also play an important role in maintaining network security, which aims to prevent and monitor unauthorized access, misuse, and denial in computer networks (Irfan, Satra, & Fattah, 2021).

The operating system provides various mechanisms to protect the network from threats and attacks. The operating system (OS) is usually equipped with a firewall, which plays a role in network traffic security and can monitor fixed rules. This firewall acts to block several secure networks such as internal networks and untrusted external networks, by monitoring incoming and outgoing traffic, the firewall helps prevent unauthorized access to the network, maintaining data integrity and confidentiality (Baso & Ardiansyah, 2023). In addition, the firewall protects transmitted data by filtering data packets and deciding whether the data is safe and allowed to pass through the network. This involves checking the source, destination, and contents of data packets according to the security rules set by the network administrator. Thus, the firewall managed by the operating system in the network security strategy ensures that only legitimate and safe traffic is allowed to enter or leave the network. Thus supporting various encryption and authentication methods to ensure that data transmitted over the network remains secure and can only be accessed by authorized parties. The operating system also implements authentication methods that ensure that only authorized users can access data or network resources. Authentication can be done through various means, including passwords, digital certificates, and two-factor authentication (2FA).

Operating systems continue to innovate to support better network connectivity. Some of the latest innovations include support for 5G networks, the Internet of Things, and software-based networking technologies. Operating systems are starting to use 5G networks that offer higher speeds and lower latency compared to previous network generations (Putra & Sutabri, 2024). 5G networks enable high-speed connections, such as high-quality video streaming, online gaming, and augmented reality (AR), virtual reality (VR), and internet of things (IoT) applications. The Internet of Things (IoT) connected to the network needs to support effective management and security of IoT devices. IP address management is one of the important aspects of the network, because every IoT device connected to the internet requires a unique IP address to communicate with other devices on the network (Hapsah & Nasution, 2024). In addition, the security of IoT devices is a critical challenge that must be addressed by the operating system. IoT devices are growing rapidly and are often the target of cyber attacks, where attackers or malicious parties can take control of devices using various techniques and strategies by exploiting the vulnerabilities of IoT devices (Wijoyo et al., 2023). In addition, support for 5G in the latest operating systems also opens up opportunities for the development and use of new applications that were previously impossible with slower network technologies. For example, a more sophisticated Internet of Things can develop with the support of reliable and fast connectivity provided by 5G networks (Rizky et al., 2024). Furthermore, the operating system plays an important role in the implementation of software-defined networking by providing a platform for software-based network control (Cornelius, 2024). In this case, it allows the development and implementation of more adaptive network policies. Therefore, Software-Defined Networking can increase flexibility and scalability, and allows the operating system to optimize resources and strengthen network security. Software - Defined Networking offers a centralized network management system that is software-based and separate from data, making it easier to manage networks more efficiently (Purnomo & Arisandi, 2019).

METHOD

This study uses a qualitative descriptive approach by collecting or searching for sources of information on the internet (Assyakurrohim et al., 2022). The purpose of this approach is to provide a comprehensive and detailed picture of the phenomenon being studied. The focus of this study is on the description and interpretation of data from various literature sources. The data sources in this study come from e-books and journal articles that are relevant to the topic of operating systems and computer networks, journal articles that discuss network management, network protocols, network security, network performance, and innovation in

operating systems, as well as previous research reports and case studies related to the role of operating systems in computer network connections.

Data collection methods include searching the latest academic literature such as Google Scholar, PubMed, IEEE Xplore, and other relevant databases. Selection of literature based on inclusion criteria such as topic relevance, source credibility, and year of publication (prioritizing the latest literature). Collection of articles, books, and research reports that meet the inclusion criteria. After that, the data obtained is analyzed in a comprehensive description based on the in-depth findings of each selected literature. The data is then collected and analyzed.

RESULTS AND DISCUSSION

The results of this study confirm that the operating system plays a crucial role in supporting the overall performance of a computer network. The operating system functions as the main manager of the network connected to software and hardware, including routers, switches, and network cards (NICs). Without an efficient operating system, network resource management will be hampered, which ultimately affects the stability and reliability of the connection. In this case, the operating system ensures that the network hardware can operate properly through proper settings and configurations. The operating system also plays a role in managing network protocols such as TCP/IP and HTTP, which allow devices on the network to communicate efficiently and data to be transmitted accurately. These protocols ensure that data is divided into small packets, which are then sent and reassembled at the final destination in a secure and coordinated manner.

In the era of the growing Internet of Things (IoT), challenges in network connectivity are becoming more complex. The increasing number of devices connected to the network requires an operating system that is able to manage communication between devices efficiently. A modern operating system plays a critical role in enabling the integration of IoT devices, optimizing communication between devices, and ensuring efficiency and automation in various sectors. The operating system is also responsible for facilitating the use of security mechanisms, such as data encryption and firewalls, to protect the network from cyber threats. This security is becoming increasingly important given the increasing risk of cyber attacks on increasingly complex and dynamic networks. Without adequate protection, threats to the integrity of data and network systems can have serious impacts on business and individual operations.

In addition, the operating system plays a role in improving network performance through proper bandwidth management. By using Quality of Service (QoS) techniques, the operating system can allocate bandwidth according to the needs of different applications. Applications that require low latency, such as video calls or media streaming, can be prioritized to get more bandwidth, while other applications with lower priorities continue to run smoothly without disrupting the overall network performance. This bandwidth management is especially important in environments with many devices and users, where network resources must be distributed efficiently to avoid congestion.

In addition, this study also highlights the innovative role of operating systems in supporting the latest technologies such as 5G networks and Software-Defined Networking (SDN). Support for 5G networks enables data transmission at higher speeds and lower latency, which is very useful for applications that require real-time communication, such as augmented reality (AR), virtual reality (VR), and more advanced IoT devices. 5G networks, which enable faster and more stable connections, open up opportunities for the development of new applications and services that were previously impossible with slower network technologies. On the other hand, the implementation of SDN provides greater flexibility and scalability in network management. The operating system plays a role in facilitating centralized management through software, allowing network administrators to quickly and efficiently manage network

traffic, as well as strengthen network security by implementing adaptive and threat-responsive security policies.

Ultimately, operating systems play an irreplaceable role in maintaining the efficiency, stability, and security of computer networks in an increasingly connected world. With the increasing innovation of technologies such as 5G and IoT, as well as the challenges posed by increasingly sophisticated cybersecurity threats, operating systems must continue to adapt and innovate to support the development of more advanced computer networks. The role of operating systems that encompass hardware management, network protocols, security, performance, and support for the latest technologies shows how important this element is in supporting the overall global digital infrastructure.

CONCLUSION

Operating systems play a vital role in computer network connections. From managing hardware and network protocols to network security and performance, operating systems ensure that computer networks operate efficiently and securely. Operating systems manage and configure network hardware such as Network Interface Cards (NICs) and manage network protocols such as TCP/IP, UDP, HTTP, and FTP, all of which are essential for smooth data communication. Bandwidth management by operating systems also ensures that network resources are distributed fairly, avoiding disruption to applications that require high performance. With support for the latest network technologies such as 5G and Internet of Things (IoT) device management, as well as implementations for more flexible network control, operating systems play a key role in supporting the ever-growing global connectivity. Innovations in operating systems will continue to drive the efficiency and security of computer networks, providing a strong foundation for the digital world of the future.

REFERENCES

- Amanda, N. S. (2021). Peranan Microsoft Windows Dalam Sistem Operasi Perangkat Lunak Komputer. <https://osf.io/preprints/5cqfn>.
- Assyakurrohim, D. I. (2023). Metode studi kasus dalam penelitian kualitatif. *Jurnal Pendidikan Sains Dan Komputer*, 3(01), 1-9.
- Baso, F. &. (2023). Implementasi Metode Port Knocking pada MikroTik RouterOS untuk Mendukung Keamanan Jaringan. *Journal of Security, Computer, Information, Embedded, Network, and Intelligence System*, 31-35.
- Cornelius, F. (n.d.). OPTIMASI PERFORMA JARINGAN KOMPUTER DENGAN TEKNIK SOFTWARE DEFINED NETWORKING (SDN). Tugas Mahasiswa Program Studi Informatika, 1(2)., 2024.
- Heryana, N. K. (2023). SISTEM OPERASI. Batam: CV Rey Media Grafika.
- Irfan, I. S. (2021). Keamanan Jaringan VLAN dan VoIP Menggunakan Firewall. *Buletin Sistem Informasi dan Teknologi Islam (BUSITI)*, 2(1), 27-35.
- Josi, A. (2019). Sistem Operasi (Konsep dan Perkembangan Sistem Operasi). Yayasan Kita Menulis.
- Pragasiwi, G. (2022). Implementasi Backup Koneksi Ujian Berbasis Komputer di SMK Putra Jaya Centre Batam (Doctoral dissertation, Prodi Teknik Infomatika. <http://repository.upbatam.ac.id/3203/>).
- Purnomo, R. &. (2019). Analisis QoS Dengan Virtual Tenant Network Pada Software Define Networking. *Jurnal Teknologi Informatika dan Komputer*, 5(2), 33-42.
- Putra, I. B. (2021). Analisis Quality of Service Pada Jaringan Komputer. *Majalah Ilmiah Teknologi Elektro*, 20(1), 95-102.
- Putra, L. D. (2024). Analisis Teknologi Jaringan 5G pada Komunikasi Generasi Pemandang Dengan Menggunakan Metode Inquiry. *IJM: Indonesian Journal of Multidisciplinary*, 2(2).

- Rizky, M. F. (2024). Perkembangan Teknologi Jaringan 5G di Indonesia. Jupiter: Publikasi Ilmu Keteknikan Industri, Teknik Elektro dan Informatika, 2(3), 58-68.
- Salsabilla, N. (2022). Peranan Perangkat Keras (Hardware) Dalam Sistem Informasi Manajemen. <https://osf.io/preprints/osf/f675m>.
- Sari, H. L. (2013). Pengembangan Jaringan Local Area Network Menggunakan Sistem Operasi Linux Redhat 9 (Studi Kasus Pada Laboratorium Komputer SMA Negeri 1 Ujan Mas Kepahiang). Jurnal Media Infotama, 9(1).
- Siagian, A. F. (2022). Analisis sistem informasi manajemen perangkat lunak komputer. <https://osf.io/preprints/osf/6cz47>.
- Syafrizal, M. (2022). Pengantar Jaringan Komputer. Yogyakarta: C.V. Andi Offset.
- Wijoyo, A. A. (2023). ANALISIS KEAMANAN KOMPUTER DI ERA INTERNET OF THINGS STUDI KASUS MIRAI MALWARE DAN SERANGAN BOTNETS. Jurnal Ilmu Komputer, Teknik, dan Multimedia, 1(02), 92-96.
- Yudianto, R. J. (2022). Penerapan Jaringan LAN Menggunakan Metode VRRP (Virtual Router Redundancy Protocol). Jurnal Nasional Komputasi Dan Teknologi Informasi, 5(4), <https://www.semanticscholar.org/paper/Penerapan-Jaringan-LAN-Menggunakan-Metode-VRRP-Yudianto-Rismayadi/9b66ce828ace2cad11b2b2cfceecfa66a2ef918?p2df>.