INFORMATION SYSTEM OPTIMIZATION COMPUTER BASED: ANALYZING THE ROLE OF THE OPERATING SYSTEM, SERVER INFRASTRUCTURE, AND PROGRAMMERS

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Abstract

This qualitative research examines the optimization of computer-based information systems by examining the important roles of operating systems, server infrastructure, and programmers. The study aims to understand how these three components interact and contribute to the improvement of information system performance. Through an in-depth analysis of literature and related theories, this study presents the findings that an efficient operating system can improve security and performance, a reliable server infrastructure supports scalability and availability, and qualified programmers are essential in system development and maintenance.

The results of this study show that the synergy between operating systems, server infrastructure, and programmers is a key factor in achieving information system optimization. The resulting recommendations focus on strategies to effectively integrate these three components, with the aim of supporting managerial decisions in the development of better information systems.

Keywords: Information System, Operating System, Server Infrastructure, Programmer, Optimization.

1. INTRODUCTION

In the era of globalization and growing digitalization, computer-based information systems have become a key element that determines the success and competitiveness of organizations. Operating systems, server infrastructure, and programmers not only act as technical components, but also as strategic pillars that support the company's vision and mission. This research is designed to investigate in depth how the optimization of these three elements can significantly improve the performance of information systems, which in turn, strengthens the operational and strategic foundations of an organization.

Advances in information technology have brought about a paradigm shift in the way organizations manage data and information. Efficient operating systems not only facilitate faster and more secure data processing, but also enable better integration between various applications and services. A robust and reliable server infrastructure has become critical in handling large volumes of data, ensuring continuous service availability, and providing the scalability required for business growth. Meanwhile, skilled and experienced programmers become valuable assets in designing, developing, and maintaining systems that not only meet current needs but are also flexible and adaptable for the future.

This research adopts an analytical approach by exploring academic literature, industry case studies, and information systems management theory. By considering various perspectives and contexts, this study seeks to build a comprehensive framework that describes the dynamic interactions between operating systems, server infrastructure, and programmer manpower.

Furthermore, this study identifies best practices and strategies that can be implemented to achieve the desired optimization.

Hopefully, the findings from this study will provide valuable insights for stakeholders in formulating policies and procedures that will improve the performance of information systems. As such, organizations can be more responsive to the challenges faced in a fast-paced and ever-changing business environment, while taking advantage of opportunities arising from information technology innovations. The end result is the creation of sustainable added value and increased customer satisfaction, which are key indicators of the organization's long-term success.

Problem Formulation

How does an operating system affect the security and performance of a computer-based information system, and what are the factors to consider in its selection to achieve optimization?

In the context of server infrastructure, what factors contribute to the scalability and availability of information systems, and how can organizations build a reliable and efficient infrastructure?

What is the role of programmers in the development and maintenance of adaptive information systems, and how can organizations improve the competence and effectiveness of programmers to support system optimization?

Literature Review

Optimization of computer-based information systems is an important research area in the field of information technology. This literature review will explore three main aspects that affect the optimization of information systems: operating systems, server infrastructure, and programmer manpower.

Operating System: The operating system acts as a link between hardware and software, managing system resources such as memory, processors, and I/O devices. An efficient operating system can improve the security and performance of information systems. Research by GeeksforGeeks (2024) emphasizes the importance of the operating system in allocating resources and services such as memory and device allocation.

Server Infrastructure: Server infrastructure includes hardware such as servers, routers, and storage systems, as well as software such as database management systems and applications. Reliable servers support the scalability and availability of information systems, allowing

companies to meet their objectives and provide a competitive advantage in the market. Server virtualization has become a trend in modern IT infrastructure, enabling more efficient use of resources and reduced hardware costs.

Programmers: Programmers play a key role in the development and maintenance of effective information systems. Optimization of code by programmers can improve application functionality, making applications run faster and more efficiently by minimizing the use of computing resources. Solid programming skills almost always produce positive and measurable results.

2. RESEARCH METHODS

This literature review shows that optimizing computer-based information systems requires careful integration of the operating system, server infrastructure, and programmer personnel. By understanding and implementing best practices in these three areas, organizations can improve their operational efficiency and effectiveness.

3. RESULTS AND DISCUSSION

The Effect of Operating System on Information System Security and Performance:

The operating system (OS) is a critical component that affects the security and performance of information systems. The selected OS must be able to manage resources efficiently, protect data from unauthorized access, and ensure that applications run smoothly. Based on research conducted by Chen et al. (1995), OS structure has a significant impact on personal computer performance[1]. An operating system that has strong security mechanisms can protect the system from cyberattacks and ensure data integrity.

Factors to Consider in Operating System Selection:

In choosing an operating system for optimization, some important factors to consider include:

Compatibility with Hardware: The OS must be compatible with the hardware being used to ensure optimal performance.

User Interface and Ease of Use: The OS should have an intuitive and easy-to-use interface.

Software and Application Availability: The OS must support the applications required by the user.

Security Features: The OS should have strong security features to protect data and systems from threats.

Performance Requirements: The OS must be able to meet the desired performance requirements.

Cost: OS license and maintenance costs must be considered.

Support and Community: An OS with good support and an active community can help in troubleshooting and development.

The results showed that the selection of the right operating system is very important in

improving the security and performance of computer-based information systems. important in improving the security and performance of computer-based information systems. Factors such as hardware compatibility, user interface, application availability, security features, performance requirements, cost, and support and community must be carefully considered to achieve information system optimization. carefully to achieve information system optimization.

The influence of servers on computer-based information systems

In the context of information technology, "server" refers to a computer system equipped with specialized capabilities, especially for data storage and management. The main role of a server is to facilitate efficient access, allowing the transmission and reception of data and information at high speed. These servers have a physical manifestation, usually significant computer network hardware, equipped with components such as processors and high-capacity RAM, often referred to as "supercomputers."

Given the substantial costs required for server construction, a common practice is to rent out this server capacity. Rental rates vary, depending on the technical specifications and services provided by the server.

By definition, a server is a computer system designed to provide certain services within a computer network. It is powered by a scalable processor and a large amount of RAM. In addition, servers are usually operated with a specialized operating system, known as a network operating system.

Servers are responsible for running administrative software that manages access to the network and its resources, including files and output devices such as printers, as well as providing access to workstations connected to the network.

The following are some types of servers and their functions:

1. Web Server: Stores website content and communicates using HTTP.

Mail Server: Manages and stores users[1] email data.

Application Server: Runs applications that can be accessed by clients.

Database Server: Provides the database for the applications being run.

FTP Server: Allows file transfer between client and server.

DHCP Server: Manages the distribution of IP addresses in the network.

File Server: Stores and manages access to files.

Proxy Server: Acts as an intermediary for requests from clients to other servers.

Streaming Server: Provides multimedia content such as video and audio.

For the scalability and availability of information systems, some important factors include:

Vertical and Horizontal Scalability: Vertical scalability means increasing server capacity by adding more resources such as CPU or RAM. Horizontal scalability involves adding more

servers working together.

- Performance and Optimization: Improve software and hardware performance to handle larger

workloads.

- Scalable Architecture: Using architectures such as microservices or serverless to easily add

or subtract resources[4].

To build a reliable and efficient server infrastructure, organizations can:

Choosing the Right Hardware: Tailor the hardware to your specific needs and expected workload.

Using an Optimized Operating System: Like Ubuntu Server, which offers stability and strong

community support.

Virtualization Implementation: Allows physical servers to run multiple virtual servers, increasing efficiency and flexibility.

Proactive Management: Perform regular maintenance and updates to minimize downtime and ensure security.

By paying attention to these factors, organizations can create an infrastructure that not only meets current needs but is also ready for future growth and change.

The Role of Programmers in the Development and Maintenance of Adaptive Information Systems

Programmers play a crucial role in the development and maintenance of adaptive information systems. Here are some of the main roles that programmers have:

Designing and Developing Systems: Programmers are responsible for designing and developing information systems. They translate business requirements into program code that can interact with users and manage data.

Implementing Features and Functionality: Programmers write program code to implement the required features and functionality in the system. They ensure that the system can adapt to the changing environment and business needs.

Ensuring Security and Performance: Programmers must pay attention to the security and performance aspects of the system. They identify and address potential vulnerabilities and ensure the system runs efficiently.

Managing the Database: Programmers manage the database used by the system. They make sure the data is properly stored, accessible, and well-managed.

Troubleshooting Problems and Bugs: Programmers solve problems and bugs that arise in the system. They do debugging, retesting, and fixing errors.

Keeping Up with Technology: Programmers must constantly update their knowledge of the latest technologies. They need to understand new trends and tools that can help the system adapt better.

Improving Programmer Competence and Effectiveness

Organizations can take the following steps to improve programmer competency and effectiveness:

Training and Development: Provide regular training and development opportunities for programmers. This can be in the form of online courses, seminars, or workshops that focus on the latest technologies.

Collaboration and Mentoring: Encourage collaboration between programmers. They can learn from each other and share knowledge. Mentoring by senior programmers can also help hone skills.

Application of Best Practices: Using best practices in software development, including testing, documentation, and code management. This helps ensure the quality and sustainability of the system.

Business Understanding: Programmers must understand the business needs and objectives of the system. This helps them design relevant and adaptive solutions.

Soft Skills: In addition to technical skills, programmers also need to develop interpersonal, communication, and time management skills.

By combining technical competencies and soft skills, programmers can contribute effectively in optimizing information systems that are adaptive and responsive to environmental changes and business needs.

4. CONCLUSION

The Role of System Components: This research emphasizes the importance of synergy between the operating system, server infrastructure, and programmer personnel in the optimization of computer-based information systems. An efficient operating system enhances security and performance, a reliable server infrastructure supports scalability and availability, and qualified programmers are essential in system development and maintenance.

Optimization Factors: To achieve information system optimization, it is necessary to consider factors such as hardware compatibility, user interface, application availability, security features, performance requirements, cost, and support and community.

Integration Strategy: The resulting recommendations focus on strategies to effectively integrate the three components (operating system, server infrastructure, and programmer manpower), supporting managerial decisions in the development of better information systems.

Programmer Competency Development: Organizations should provide training, encourage collaboration, implement best practices, and develop programmers' business understanding and soft skills to improve their competence and effectiveness in supporting system optimization.

This document provides valuable insights for stakeholders in formulating policies and procedures that will improve the performance of information systems, enabling organizations to be more responsive to challenges and take advantage of opportunities for information technology innovation.

5. REFERENCES

Widyahartono, B. (Trans.). (n.d.). Basic Concepts of SIM, Structure and Jakarta: PT

Pustaka Binamon Pressindo.

Gomes, F. C. (2003). Human Resource Management. Yogyakarta: Andi.

Jogiyanto, H. M. (2005). Introduction to Computers: Basic Computer Science, Programming,

Information Systems, and Artificial Intelligence. Yogyakarta: Andi Offset.

Hasibuan, M. S. P. (2003). Human Resource Management. Jakarta: Bumi Aksara.

GeeksforGeeks. (n.d.).   Functions   of   Operating   System. Accessed   from

https://www.geeksforgeeks.org/functions-of-operating-system/.

Engineering LibreTexts. (n.d.). 4.1: The role of the operating system. Accessed from
https://eng.libretexts.org/Bookshelves/Computer_Science/Programming_and_Computation_F
undamentals/Computer_Science_from_the_Bottom_Up_%28Wienand%29/04%3A_The_Op

erating_System/4.01%3A_The_role_of_the_operating_system.

IBM. (n.d.). What Is   IT   Infrastructure? Accessed   from
                                                                                          from

https://www.ibm.com/topics/infrastructure.

Atlassian.   (n.d.). IT   Infrastructure: Definition   &   Components.
          Accessed

https://www.atlassian.com/itsm/it-operations-management/it-infrastructure.

Linuxlab (n.d.). The Role of Server Virtualization in Modern IT Infrastructure. Accessed from
https://linuxlab.org/the-role-of-server-virtualization-in-modern-it-infrastructure/. Codecademy. (n.d.).
General | Optimization   Programming.   Accessed   from
https://www.codecademy.com/resources/docs/general/programming-optimization.

Hongkiat. (n.d.). 10 Reasons Why You Need Code Optimization. Accessed from
https://www.hongkiat.com/blog/code-optimisation-why-you-need-it/.

MDPI. (n.d.). A Survey of Machine Learning-Based System Performance Optimization.

Accessed from https://www.mdpi.com/2076-3417/11/7/3235.

Springer. (n.d.). Performance optimization for cloud computing systems in the. Diakses dari
https://link.springer.com/article/10.1007/s11704-020-0072-3.

MDPI. (n.d.). Information | Free Full-Text | Simulation-Based Optimization. Accessed from
https://www.mdpi.com/2078-2489/13/10/469.

Springer. (n.d.). Intelligent Information Systems in Healthcare Sector: A Review. Diakses dari https://link.springer.com/chapter/10.1007/978-3-031-52787-6_11.