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Analysis of computer network optimization methods

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Abstract
In this work, various methods of optimizing the operation of computer networks are considered and researched, the advantages and disadvantages of each method are analyzed, and the facts confirming their effectiveness are given. Prospects of future application are considered and conclusions are drawn regarding their feasibility and effectiveness in practical use.
Keywords: optimization, computer networks, network traffic, protocols, scalability, routing.

Анотація
У роботі розглянуто та досліджено різні методи оптимізації роботи комп'ютерних мереж, проаналізовано переваги та недоліки кожного методу та наведено факти, що підтверджують їх ефективність. Розглядаються перспективи застосування у майбутньому та зроблені висновки щодо їх доцільності та ефективності у практичному використанні.
Ключові слова: оптимізація, комп'ютерні мережі, мережевий трафік, протоколи, масштабованість, маршрутизація.

Introduction

Optimizing the operation of computer networks plays an important role in increasing productivity and ensuring the reliability of network processes. There are many methods and technologies that can help in this.

Primary methods optimization

Traffic optimization methods are a process of reducing the volume of data transmitted over the network and reducing the time required for their transmission. One way is to use a data compression protocol such as "gzip" or "deflate"[1]. These protocols compress the data before it is transmitted, which allows to reduce the amount of data transfer and, accordingly, to reduce the execution time. Another possible option is web page caching, which reduces the number of requests to the web server, which also reduces page load times.

Network speed optimization methods are the process of reducing the time of sending and receiving data on the network. One way to optimize your speed is to use a broadband Internet connection. Another way is to reduce the use of network traffic, for example, by turning off background updates of applications that can use a significant amount of network traffic[2]. It is also possible to use methods of distributed data processing, which allows you to distribute tasks between efficient computers and reduce processing time.

Network security optimization techniques are the process of ensuring network protection from malicious attacks and ensuring data confidentiality, integrity, and availability. One way to optimize network security is to use strong passwords and change them regularly[3]. Another way is to use network firewalls and anti-virus software to block malicious traffic and protect your network from attackers.

Network routing optimization methods are the process of ensuring an efficient and optimal data transfer route between computers on the network. One way to optimize is to use routing protocols such as OSPF or BGP. These protocols allow you to determine the most efficient route for data transmission.

Network scalability optimization methods are the process of ensuring the possibility of expanding the network with minimal costs and ensuring stable operation of the network during the expansion. One way to optimize scalability is to use network virtualization[4], which allows you to create virtual networks and distribute the load between them. Another way is to use a split network infrastructure, which allows you to divide the network into several segments and provide flexibility when expanding the network.

Conclusions

Optimizing the operation of computer networks is an important process that allows you to ensure

efficient and stable operation of the network, reduce maintenance costs and increase productivity. Different methods can be used for this depending on the needs.

In addition, it is important to consider the individual tasks and characteristics of the network in order to choose the best approach to its optimization. For example, large networks with high traffic levels can use virtualization, while smaller networks can use simpler optimization methods.

In general, this is an ongoing process, after which new requirements and challenges may appear over time, requiring new solutions and approaches to optimization. Therefore, constant improvement and analysis of network operation help to ensure its efficient and stable operation.

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