DOI: 10.32347/2412-9933.2024.59.115-121
UDC 004.05: 004.451.83:004.378

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PROCEDURE FOR THE DEVELOPMENT OF A COMPUTER NETWORK ADMINISTRATION SYSTEM

Abstract. *The introduction of computer networks can significantly speed up the execution of information processes, as well as increase the efficiency of distribution and use of hardware, software and information resources. In a network, different computers perform different functions. Computers that give other computers access to their resources and manage the distribution of network resources are called servers. Those computers that use the servers' resources are known as clients. The article is devoted to the study of the important issue of the selection and use of tools for the order of server administration, which manage and maintain the server infrastructure in the environment of the network of computer clubs in order to determine the classification of system server administration tools, which are necessary for effective management of servers in computer networks. Carrying out various tasks requires making decisions about choosing server administration tools from the many available or developing new ones for managing and maintaining the server infrastructure, which leads the company to achieve business goals. Difficulties with the choice of effective tools for solving tasks lie in the competence of network administrators. This issue is especially important when it comes to training system administrators. That is, it is necessary to achieve certain educational goals, after achieving which the network administrator will be able to: describe the functions of the administration center, describe the rules for the effective use of package tools for system administration, determine the procedure for dispatching servers; use a variety of remote server administration tools to manage servers; apply cross-platform administration tools, apply tools for automating the performance of individual administration tasks, etc. To solve the problem, a list of typical groups has been defined: 1) administration of user groups; 2) administration of security measures; 3) administration of local and global networks; 4) monitoring of events and resources; 5) data archiving and recovery. Classes of tools for automating system administration tasks are offered: tool packages for system administration; cross-platform administration tools; tools for individual administration tasks. Considerable attention in the course is given to the analysis of the classes of system administration tools, since knowledge of system administration tools is necessary to troubleshoot, test, communicate, and fix the systems needed to continue operation. With the right tools, the job becomes less tedious as many tasks can be accomplished with these system administration tools. Overall, the article provides valuable information for system administrators looking for ways to improve their system administration skills and knowledge and may be useful for companies looking for ways to optimize their server infrastructure.*

Keywords: network administration; infrastructure; computer club server

Introduction

Today, the development of digitalization and digitalization of society cannot be imagined without computer networks, and their role is increasing every day, as well as the functionality of computer and network technologies is constantly expanding. Everyone needs to use networking technologies for professional activities, education, and leisure.

The formation of such skills should be given due attention, which in higher education institutions is

provided to students through the study of professional disciplines. The study of the basics of administration based on operating systems (Unix Linux and Microsoft Windows Server) is provided. The main tasks of network management are analyzed on the basis of peer-to-peer networks and network domain structures. The task of administering peer-to-peer networks is to organize work with each computer.

The study of network technologies involves mastering the principles of network communication, developing skills in organizing and managing network structures. The main thing in the application of networking technologies is the ability to develop network software and theoretical knowledge of managing network systems in their structural and logical order.

Objective of the work

Computer networks have become an integral part of our modern life. They provide communication between different computers and other devices, allowing us to share information and resources [5; 10]. These networks are used in all aspects of our lives, from personal use at home to large corporate systems.

The main components of network software play a key role in configuring and managing a computer network, and include the following components: The computers on the network run an operating system (Windows, macOS, or Linux). The operating system provides functionality to the computers and interacts with the network. Network protocols are a set of rules and procedures that define how devices communicate on a network. The most common protocol is TCP/IP (Transmission Control Protocol/Internet Protocol), which is used both on the Internet and in most local area networks. The TCP protocol defines the rules for splitting data into packets and delivering them to the addressee and combining the packets after receiving them into a single whole without loss. The IP protocol enables the transmission of packets between computers that have different architectures and operating systems.

Summary of the main material

– Network administrators use specialized programs to configure and manage the network, which allow them to control access to resources, set user rights, and monitor the network status [7-9].

– Data stored on one computer can be useful to a user working on another computer. Outdated data storage media can be used to transfer data, so computers are connected to a single network to save time, maintain data accuracy and reliability, and other resources during data transfer.

– Using computer networks, you can significantly speed up information processes, as well as efficiently allocate and use hardware, software and information resources. In a network, different computers perform different functions. Computer networks provide:

1) reliable and fast data exchange in the network;
2) general access to data, computing and technical resources, long-term data storage, etc;
3) general access and use of applications and software
4) remote management of computers with provision of access rights to resources;
5) remote collaboration of team members on certain projects. And so on.

When data is transmitted over a network, it is expected to be delivered without distortion or loss, so it is necessary that the entire network: computers, communication devices, network equipment and software follow the same clearly defined rules (network protocols) when transmitting data.

The data transmitted over the network is divided into small packets and supplemented with information related to the transmission process: addresses of recipient and sender computers, packet number and length, etc. The transmission route is determined by routers that control the delivery of packets (Fig. 1). Each packet is transmitted separately through a communication channel; if a packet is “lost” for some reason or if there is a data distortion during transmission, such packets are retransmitted. The data is combined and restored to its original form when all packets reach the final destination. [2 – 4].

If a part of the network is damaged, packets are still transmitted through the network quickly and reliably by breaking the data into separate small packets, and routers determine new routes for the packets to take, bypassing the damaged parts of the computer network. Computers that provide other computers with access to their resources and manage the allocation of network resources are called servers. Those computers that use the resources of servers are known as clients. Computer networks are classified according to the following properties (Fig. 2) [1, 9].

It is worth noting that the following software is used to organize data exchange in a network: network components of the operating system; device drivers; application programs. The Windows operating system (Microsoft Windows Server) has components for organizing a peer-to-peer local area network. If the network has a dedicated server, special software is installed on it – the server operating system. To receive network services, special application programs (network application programs) are required, they usually consist of two parts: client software – installed on the user's computer and provides the ability to request resources from other computers; server software – installed on computers that provide access to their own resources and responds to requests from the client component.

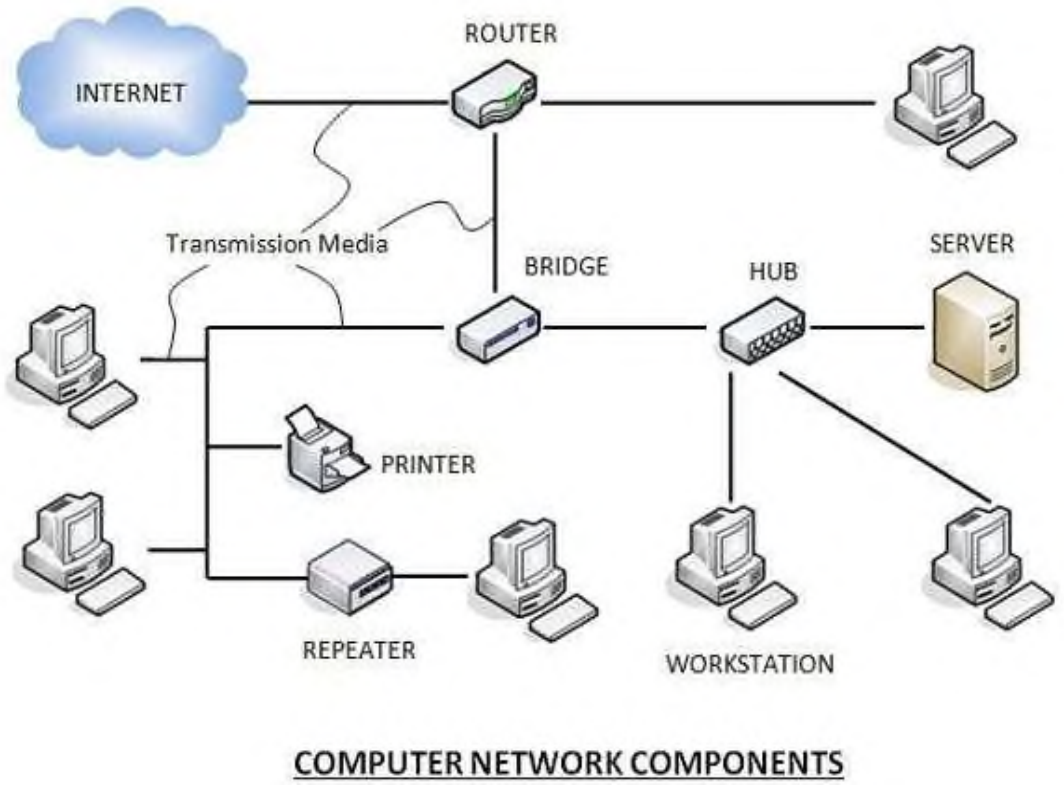

Figure 1 – Components of a computer network [2-4]

The technology for building software is called client-server. Programs developed using client-server technology are installed on computers in a peer-to-peer network. For example, this technology can be used to build knowledge test programs.

The procedure for developing a computer network administration system should ensure the achievement of the main goal of administration and the fulfillment of a number of network administration tasks, namely.

1) Network planning. Despite the fact that large networks are usually designed and installed by specialized companies, the network administrator often needs to plan for changes in the network. This may include adding new workstations, changing network protocols or services, installing servers, dividing the network into segments, etc. All of these changes must be carefully planned to avoid compromising network integrity, performance, and network infrastructure issues.

2) Configuring and installing network nodes. This includes replacing the network adapter in the PC with the appropriate settings, moving nodes to other subnets, and adding or replacing network printers with updated workstation settings.

3) Configuring and installing network protocols. The task is to plan and configure basic network protocols, test them and determine the optimal configurations for the corporate network.

4) Configuration and installation of network services include:

– setting up network infrastructure services (DNS, DHCP, WINS, routing, remote access, VPN);

– setting up file and print services;

– administration of directory services (Novell NDS, Microsoft Active Directory);

– Administration of e-mail services;

– administration of database access services.

5) Troubleshooting. The administrator must detect malfunctions of various kinds, from problems with network adapters to failures in switches and routers, as well as incorrect settings of protocols and services.

6) Increase efficiency by finding network bottlenecks. Analyze network performance to identify bottlenecks that require equipment replacement, workstation modernization, or reconfiguration of network segments.

7) Monitoring of network nodes. Review the functioning of network nodes and verify that they are performing their functions.

8) Monitoring network traffic helps to identify problems such as high network segment congestion, adapter or port failures, and unwanted activity or attacks by intruders.

9) Ensuring network protection. This includes backup and recovery of data, development of security policies for accounts and services (passwords, their change), protection of communications (IPSec, VPN, wireless networks), and management of public key infrastructure (PKI).

To ensure the correct operation of network connections, it is also important to properly configure the IP address in Windows operating systems (fig. 3. Users can change the IP address through the graphical network configuration interface.

1) Go to the Network and Sharing Center.

2) Find the required network connection, right-click to open its properties.

3) Select Internet Protocol version 4 (TCP/IPv4) or Internet Protocol version 6 (TCP/IPv6), depending on the type of network, and click Properties.

4) Select Use the following IP address and enter the new IP address, subnet mask, gateway address, and DNS servers, then click OK to apply the new network settings.

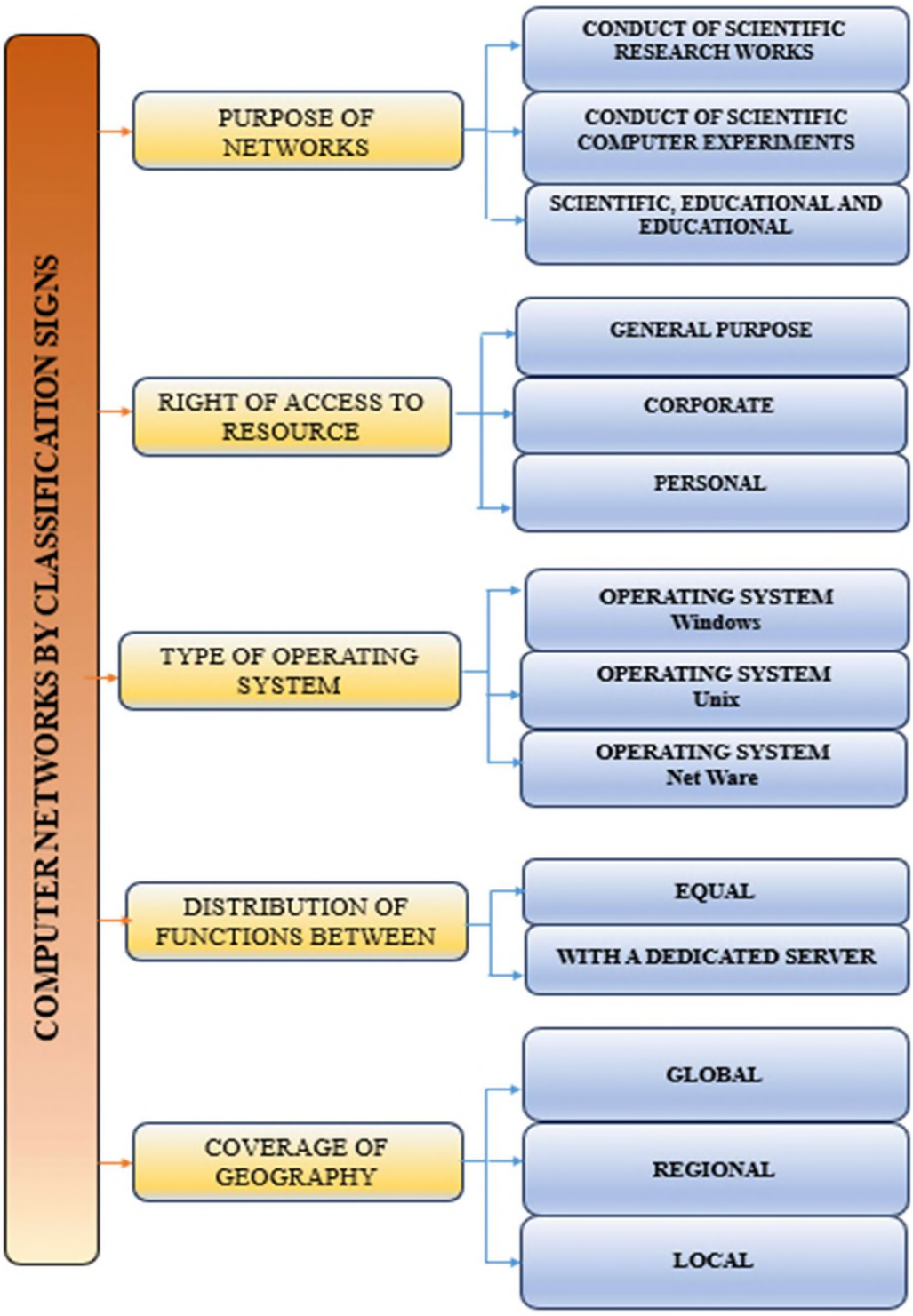

Figure 2 – Classification of computer networks [1, 9]

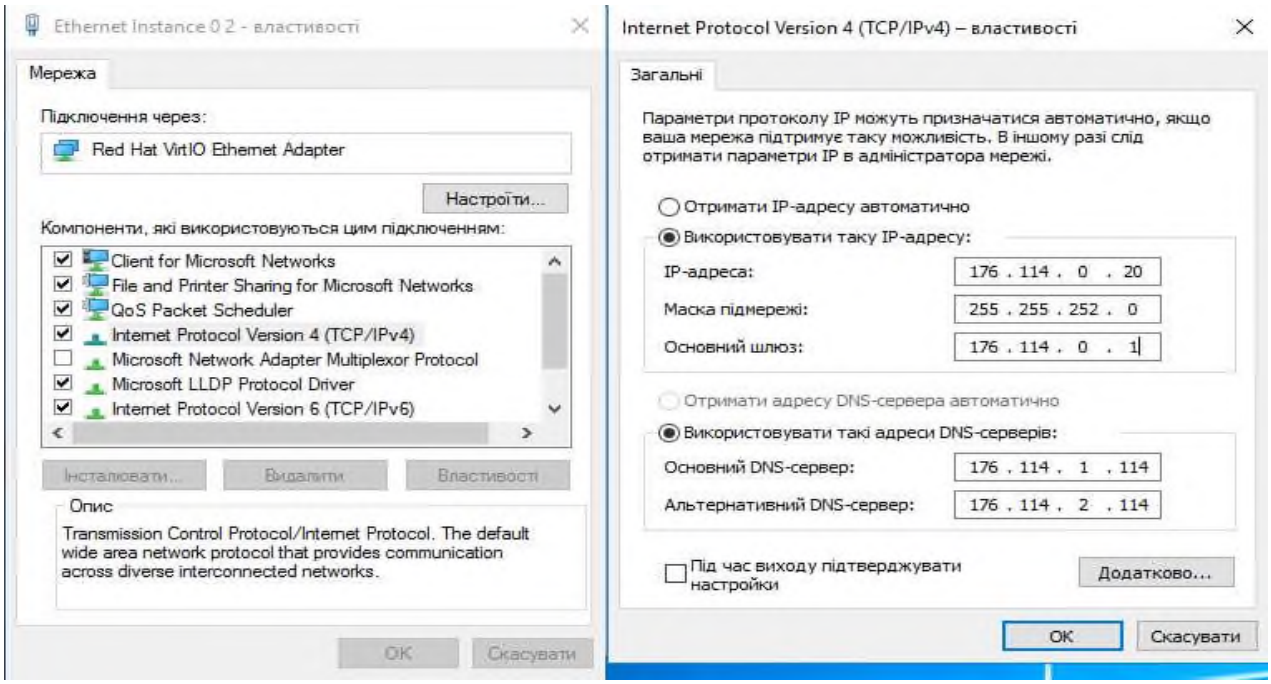

Figure 3 – Connecting computer networks [4-8]

After the network adapter is rebooted, the computer will use the new static IP address for network connections.

Conclusions

1. Computer networks are complex distributed systems that connect and control the operation of computers, network devices to exchange information and resources through the use of application software and network protocols.

2. The choice of technology, topology and network structure is determined by the specific needs of users and the size of the network. Computer networks play an important role in our modern lives, from home networks to global Internet connections. Thanks to them, we can easily and quickly exchange information, work in teams, and access a large number of resources.

3. Computer networks also require careful planning and security measures to ensure their efficiency and security. Computer networks continue to evolve, allowing us to stay connected and access information from around the world. They make us more and more dependent on technology, but at the same time provide us with a continuous flow of knowledge and opportunities.

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The article has been sent to the editorial board 17.08.2024

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ПОРЯДОК РОЗРОБЛЕННЯ СИСТЕМИ АДМІНІСТРУВАННЯ КОМП'ЮТЕРНОЇ МЕРЕЖІ

Анотація. *Впровадження комп'ютерних мереж може значно прискорити виконання інформаційних процесів, а також підвищити ефективність розподілу і використання апаратних, програмних та інформаційних ресурсів. У мережі різні комп'ютери виконують різні функції. Комп'ютери, які надають іншим комп'ютерам доступ до своїх ресурсів та керують розподілом ресурсів мережі, називаються серверами. Ті комп'ютери, які використовують ресурси серверів, відомі як клієнти. Стаття присвячена вивченню важливого питання відбору і використання інструментів для порядку адміністрування серверів, які управляють та обслуговують серверну інфраструктуру в середовищі мережі комп'ютерних клубів, з метою визначення класифікації інструментів системного адміністрування серверів, які необхідні для ефективного управління серверами в комп'ютерних мережах. Виконання різноманітних завдань вимагає прийняття рішень щодо вибору інструментів адміністрування серверів з численних наявних або розроблення нових з управління та обслуговування серверної інфраструктури, що приводить компанію до досягнення бізнес-цілей. Складності з вибором ефективних інструментів для вирішення завдань полягає в компетентності адміністраторів мереж. Особливо важливим є це питання, коли йдеться про навчання системних адміністраторів. Отже, необхідно досягти певних*

навчальних цілей, після досягнення яких адміністратор мереж зможе: описати функції центру адміністрування, описати правила ефективного використання інструментів пакетів для системного адміністрування, визначити порядок диспетчеризації серверів; використовувати різноманітні засоби віддаленого адміністрування сервера для управління серверами; застосовувати кросплатформні інструменти адміністрування, застосовувати інструменти для автоматизації виконання окремих завдань адміністрування тощо. Для вирішення поставленого завдання визначено перелік типових груп: 1) адміністрування груп користувачів; 2) адміністрування засобів забезпечення безпеки; 3) адміністрування локальних і глобальних мереж; 4) моніторинг подій та ресурсів; 5) архівування та відновлення даних. Запропоновано класи інструментів автоматизації задач системного адміністрування: пакети інструментів для системного адміністрування; кросплатформні інструменти адміністрування; інструменти для окремих завдань адміністрування. Значну увагу в роботі приділено аналізу класів інструментів для системного адміністрування, оскільки знання інструментів для системного адміністрування необхідне для усунення несправностей, тестування, зв'язку та виправлення систем, потрібних для продовження роботи. За допомогою правильних інструментів робота стає менш виснажливою, оскільки багато завдань можна виконати за допомогою цих інструментів для системного адміністрування. Отже, в статті наведено цінну інформацію для системних адміністраторів, які шукають способи покращення своїх навичок та знань у сфері системного адміністрування, що може бути корисним для компаній, які шукають способи оптимізації своєї серверної інфраструктури.

Ключові слова: адміністрування мереж; інфраструктура; сервер комп'ютерного клубу

Link to publication

APA Kryvoruchko, Olena, Tsiutsiura, Mykola, Tretyakov, Daniil. (2024). Optimization challenges of resources in it outsourcing companies in uncertain market conditions. *Management of Development of Complex Systems*, 59, 115–121, dx.doi.org\10.32347/2412-9933.2024.59.115-121.

ДСТУ Криворучко О. В., Цюцюра М. І., Третьяков Д. В. Порядок розроблення системи адміністрування комп'ютерної мережі. *Управління розвитком складних систем.* Київ, 2024. № 59. С. 115 – 121 dx.doi.org\10.32347/2412-9933.2024.59.115-121.