Investigation of Information Support in Corporate Networks

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Abstract

The information technologies have become so firmly established in our life that we no longer think of ourselves without communicating with computer technology. The use of computers and other means of digital information processing allows a person to significantly expand the horizons of their capabilities, provides new means for the implementation of creative ideas. The activities of many organizations and educational institutions are based on the use of the network, both locally and globally. A corporate network is a network whose main purpose is to ensure the functioning of a particular enterprise that owns this network. Users of the corporate network are only employees of the enterprise. Unlike carrier networks, corporate networks, in general, do not provide services to other organizations or users. Despite the problems, automation will soon affect all forms of individual and social activities. Among the trends of the modern market of information services on the one hand, the unification and integration of the technologies used, and on the other hand is an individual approach to each client. Under these conditions, knowledge of modern approaches to the creation and integration of various components and subsystems of corporate IS allows us to speed up and simplify the process of using information technologies, to increase the efficiency of IT specialists.

1. Introduction

Currently, no one is surprised at the widespread use of computers: in the offices of large companies, in higher and secondary educational institutions, at homes. Wherever there is an electrical outlet, you can see a computer. But progress is moving forward, and a few years ago it seemed insufficient to use only the resources of the computer that stands before you. I wanted to attach resources to this computer, say a neighbor's computer. And so it came up with the idea of combining several computers. What eventually happened that a network was called in the broadest sense of the word before, which now no one is surprised or misunderstood. The number of tasks solved in the network is huge.

Depending on the scale of the enterprise, as well as on the complexity and variety of the tasks to be solved, there are networks of the department, campus networks and corporate networks (the term "corporate" in this classification acquires a narrow meaning - a network of a large enterprise). Before discussing each characteristic of the listed types of networks, let us dwell on the factors that force enterprises to acquire their own computer network.

This question can be clarified as follows:

1. In which cases the deployment of computer networks in the enterprise is preferable to the use of stand-alone computers or multi-machine systems?

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2. What new opportunities appear in the enterprise with the advent of the computer network?

3. And finally, does the company always need a network?

If you do not go into details, then the ultimate goal of using computer networks in an enterprise is to increase the efficiency of its work, which can be expressed, for example, in increasing profits. Indeed, if – thanks to computerization – the cost of producing an existing product and the time required to develop a new model has decreased or customer service orders have accelerated, this means that the enterprise really needed a network [1-5].

The conceptual advantage of networks which derives from their belonging to distributed systems, over autonomous computers is their ability to perform parallel computing. Due to this, in a system with several processing nodes, in principle, it is possible to achieve a performance exceeding to the maximum possible one of any single, arbitrarily a powerful processor at the moment. Distributed systems potentially have a better performance / cost ratio than centralized systems.

Another obvious and important advantage of distributed systems is their higher fault tolerance. Fail-over should be understood as the ability of a system to perform its functions (perhaps not fully) with failures of individual hardware components and incomplete data availability. The basis of the increased fault tolerance of distributed systems is redundancy [6-8]. The redundancy of processing nodes (processors in multiprocessor systems or computers in networks) allows one node to reassign assigned tasks to other nodes [9]. For this purpose, dynamic or static reconfiguration procedures can be provided for a distributed system. In computer networks, some data sets can be duplicated on the external storage devices of several network computers, so that if one of them fails, the data remains available.

The use of geographically distributed computing systems is more consistent with the distributed nature of applied tasks in certain subject areas, such as automation of technological processes, banking, etc. In all these cases, there are individual consumers of information dispersed over a certain territory - employees, organizations or technological installations [10, 11]. These consumers solve their problems autonomously, so they should be provided with their own computational tools, but at the same time, since the tasks they solve logically closely interconnected, their computational tools must be combined into a common system. The best solution in this situation is to use the computer network.

For the user, distributed systems also provide such advantages as the possibility of sharing data and devices, as well as the possibility of flexible distribution of work throughout the system. This separation of expensive peripherals - such as large-capacity disk arrays, color printers, plotters, modems, optical discs - is in many cases the main reason for network deployment in the enterprise. A modern computer user works at his computer, often without realizing that he is using data from another powerful computer hundreds of kilometers away. He sends e-mail through a modem connected to a communication server, common to several departments of his enterprise. The user has the impression that these resources are connected directly to his computer or are "almost" connected, since working with them requires minor additional steps compared to using really own resources.

Recently, another motive of network deployment has begun to prevail, much more important in modern conditions than cost savings due to the separation between employees of a corporation of expensive equipment or programs. This motive was the desire to provide employees with quick access to extensive corporate information. In the conditions of tough competition in any sector of the market, the company ultimately benefits its employees can quickly and correctly answer any client's question - about the possibilities of their products, about the conditions of its use, about solving various problems, etc. in a large enterprise, even a good manager hardly knows all the characteristics of each product produced, especially since their nomenclature can be updated every quarter, if not a month. In this case, the client will not contact another company, but will continue to use the services of this manager.

The use of the network leads to improved communication between employees of the enterprise, as well as its customers and suppliers. Networks reduce the need for businesses in other forms of information transfer, such as telephone or regular mail. Often the ability to organize e-mail is one of the reasons for the deployment in the enterprise computer network. New technologies are becoming more and more common, which allow to transmit not only computer data, but also voice and video information via network communication channels. A corporate network that integrates data and multimedia information can be used to organize audio and video conferencing, in addition, on its basis it can be created its own internal telephone network.

2. The Benefits of Using Networks

1. Integral advantage - improving the efficiency of the enterprise.

2. Ability to perform parallel computations, due to which performance and fault tolerance can be improved.

3. Greater compliance with the distributed nature of some application tasks.

4. The ability to share data and devices.

5. The possibility of flexible distribution of work throughout the system.

6. Prompt access to extensive corporate information.

7. Improving communications.

Problems:

1. The complexity of developing systems and application software for distributed systems.

2. Problems with the performance and reliability of data transmission over the network.

3. The problem of security.

Of course, when using computer networks, there are also problems associated mainly with the organization for the effective interaction of individual parts of a distributed system.

First, there are software problems: operating systems and applications. Programming for distributed systems is fundamentally different from programming for centralized systems. Thus, the network operating system, performing in the general case all the functions of managing local computer resources, moreover solves numerous tasks related to the provision of network services. Development of network applications is complicated by the need to organize the joint work of their parts that are running on different machines. A lot of troubles deliver the compatibility of software installed in the network nodes.

Secondly, many problems are associated with the transport of messages via communication channels between computers. The main tasks here are to ensure reliability (so that the transmitted data is not lost and not distorted) and performance (so that the data exchange takes place with acceptable delays). In the structure of the total cost of the computer network, the costs of resolving "transport issues" are a significant part, while in centralized systems these problems are completely absent.

Thirdly, these are issues related to security, which are much more difficult to solve in a computer network than in a stand-alone computer. In some cases, when security is especially important, it is better to refuse to use the network.

There are many pros and cons, but the main evidence of the effective use of networks is the indisputable fact of their widespread distribution. Today it is difficult to find a company that does not have at least a single-segment network of personal computers; networks with hundreds of workstations and dozens of servers appear more and more,

some large organizations acquire private global networks connecting their branches, which are thousands of kilometers away. In each case, there were grounds for creating a network, but the general statement is also true: there is something in these networks.

3. Networks of Departments

Departmental networks are networks that used by a relatively small group of employees working in one department of an enterprise. These employees solve some common tasks, such as accounting or marketing. It is believed that the department can consist of up to 100-150 employees.

The main purpose of the department's network is to share local resources, such as applications, data, laser printers and modems. Typically, departmental networks have one or two file servers, no more than thirty users and are not divided into subnets. In these networks, most of the enterprise traffic is localized. Department networks are usually created on the basis of a single network technology - Ethernet, Token Ring. In such a network, one or, at most, two types of operating systems are most often used. A small number of users allows peer-to-peer network operating systems to be used in departmental networks.

The network management tasks at the department level are relatively simple: adding new users, eliminating simple failures, installing new nodes and installing new software versions. Such a network can be managed by an employee who is dedicated to performing the duties of an administrator only a fraction of his time. Most often, the network administrator of a department has no special training, but is the person in the department who knows computers best of all, and by itself it turns out that he is in charge of network administration.

There is another type of network that is close to departmental networks - workgroup networks. Such networks include very small networks, including up to 10-20 computers. Characteristics of workgroup networks are practically the same as those described above for departmental networks. Properties such as network simplicity and homogeneity are most apparent here, while departmental networks may approach in some cases the next largest network type - campus networks.

4. Enterprise Networks

Corporate networks are also called enterprise-scale networks, which corresponds to the literal translation of the term "enterprise-wide networks" used in English-language literature to denote this type of network. Enterprise-wide

networks (corporate networks) unite a large number of computers in all territories of a separate enterprise. They can be complexly connected and able to cover a city, a region or even a continent. The number of users and computers can be measured in thousands, and the number of servers in the hundreds, the distances between networks of individual territories are such that you have to use global connections. To connect remote local networks and individual computers in a corporate network, a variety of telecommunication facilities are used, including telephone channels, radio channels, and satellite communications. Corporate network can be represented as "islands of local networks", floating in a telecommunications environment.

An indispensable attribute of such a complex and large-scale network is a high degree of heterogeneity - it is impossible to satisfy the needs of thousands of users with the help of the same type of software and hardware. In the corporate network, various types of computers will be used - from mainframes to desktops, several types of operating systems and many different applications. The heterogeneous parts of the corporate network should work as a unit, providing users with convenient and easy access to all necessary resources.

We mentioned that enterprise networks (corporate networks) unite a large number of computers in all territories of a separate enterprise. For the corporate network are characterized by:

1. Scale - thousands of user computers, hundreds of servers, huge amounts of data stored and transmitted over communication lines, a wide variety of applications;

2. High degree of heterogeneity - various types of computers, communication equipment, operating systems and applications;

3. Use of global communications - the branches' networks are connected via telecommunication facilities, including telephone channels, radio channels, and satellite communications.

The emergence of corporate networks is a good illustration of the well-known postulate on the transition of quantity to quality. When individual networks of a large enterprise that has branches in different cities and even countries are merged into a single network, many quantitative characteristics of the combined network pass a certain critical threshold beyond which a new quality begins. Under these conditions, the existing methods and approaches to solving traditional problems of networks on smaller scales for corporate networks turned out to be unsuitable. Such tasks and problems that came to the forefront in the networks of working groups, departments and even campuses were either of secondary importance or did not appear at all. An example

would be the simplest (for small networks) task – maintaining credentials for network users.

The easiest way to solve it is to place the credentials of each user in the local database of credentials of each computer to which resources the user should have access. When access is attempted, this data is retrieved from the local account database and access is granted or not granted on the basis of them. In a small network consisting of 5-10 computers and about the same number of users, this method works very well. But if there are several thousand users on the network, each of them needs access to several dozens of servers, then, obviously, this solution becomes extremely inefficient. The administrator must repeat several dozen times (by the number of servers) the operation of entering the credentials of each user. The user himself is also forced to repeat the procedure of logical input every time he needs access to the resources of the new server. A good solution to this problem for a large network is to use a centralized reference service, in whose database the accounts of all network users are stored. The administrator once performs the operation of entering user data into this database, and the user once performs a log-on procedure, and not into a separate server, but into the entire network.

When moving from a simpler type of network to a more complex one - from departmental networks to corporate networks - the coverage area increases, it becomes more and more difficult to maintain computer connections. As the scale of the network increases, the requirements for its reliability, performance and functionality increase. An increasing amount of data is circulating through the network, and it is necessary to ensure their safety and security along with accessibility. All this leads to the fact that corporate networks are built on the basis of the most powerful and diverse equipment and software.

5. Conclusion

Today information technologies have become so firmly established in our life that we no longer think of ourselves without communicating with computer technology. The use of computers and other means of digital information processing allows a person to significantly expand the horizons of their capabilities, provides new means for the implementation of creative ideas. Already, computers are actively used in such areas of culture and art as literature, painting, cinema, and this is not the limit - the possibilities of computing technology put at the service of man are endless. At the same time, the information industry is quite young - the fundamental work on information theory appeared only in the first half of the twentieth century, and the electronic computing devices were invented only in the late 40s. Mankind is moving by leaps and

bounds to create a unified information environment of interaction, which will fundamentally change the psychology and social structure of society already in the current century. Despite the problems, automation will soon affect all forms of individual and social activities. Among the trends of the modern market of information services on the one hand, the unification and integration of the technologies used, and on the other hand is an individual approach to each client. Under these conditions, knowledge of modern approaches to the creation and integration of various components and subsystems of corporate IS allows us to speed up and simplify the process of using information technologies, to increase the efficiency of IT specialists.

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