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Distributed Computing Collaborative CAD System Based on COM / DCOM

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Abstract: With the rapid development of China's economy, there are more and more distributed computing systems, which are also widely used in actual production. The main research direction of this paper is the distributed computing collaborative CAD system based on COM / NASD system. The software is based on COM / DCOM, and studies the system through collaborative design, simulation and testing. In this process, we first need to build the model. Then, according to the actual situation, the corresponding algorithm program is established to simulate the running environment of the whole module and set the parameter variables. Secondly, the components are assembled and connected with the system according to the requirements. Finally, the system is tested as a whole. The test results show that the system has high data processing efficiency, fast system response time and low delay, which indicates that the system has good comprehensive performance.

1. Introduction

With the development of the times, distributed computing, as the most important, effective and frequently used basic technology in computer applications, has been more and more widely used in all walks of life [1-2]. However, there are many problems in traditional computer systems. For example, a series of problems, such as how to improve the system performance, how to process data fast and stably, and how to maintain high reliability and maintainability, need to be solved or optimized by these new methods, so that distributed computing can play a greater role and provide people with more service requirements to meet the market development requirements [3-4].

Some foreign countries and regions have begun the development and construction of large-scale integrated circuit networks. With the acceleration of the development trend of global economic integration, the combination of digital technology and communication engineering, and the deepening integration of information industry, many domestic enterprises are facing the problem of

how to improve the working efficiency of DG system. Therefore, it is necessary to strengthen the research on data transmission rate and reliability between bus modules [5-6]. China's distributed computing system started late, but developed rapidly. In China, many universities and research institutions have started this work. For example, an organization has developed a universal smart grid real-time dynamic monitoring and control system based on network and environment support. The control system simulates a complex continuous process. It is controlled by a reference period controller (or ammeter) to realize the automatic regulation function, and detects whether there is an abnormal state through the on-line detection device. If an abnormal state is found, the line with the same operating conditions in the fault section and the current period will be displayed [7-8]. Therefore, based on the distributed computing of COM / DCOM, the collaborative CAD system is designed and researched in this paper.

In this paper, the distributed computing collaborative CAD system based on COM is studied, and the voltage source module with high independence between the power module and the control unit in the region is constructed by using the integrated block and grid analysis method; Secondly, based on the establishment of regional power supply model, a complete set of centralized power network data collection and network topology diagram is designed and simulated. Finally, according to the simulation results, the system functional requirements and objectives are achieved by using the collaborative DCOM technology.

2. Research on Distributed Computing Collaborative CAD System Based on COM / DCOM

2.1. Distributed Collaboration

Distributed system is a universal, simple structure, powerful function and easy to expand, which can meet users' rapid response and high efficiency to future environmental changes. The software has good maintainability. It allows real-time updating of data information in a specific area and provides more time to deal with these needs to ensure that decision makers better understand the problems they are facing or have contact with other people. Under various factors that should be taken into account when taking measures, all participants in the system will be a very friendly, convenient, effective, reliable, safe and efficient economic information system. The basic idea of distributed computing is that when there is a certain distance between components in an overall structure [9-10]. Loads connected through nodes. This method can deal with the problems of complex shape, large size, light weight and unable to establish physical topological relationship. However, it does not need to consider the factors such as distribution type and component characteristics, and the scheme only needs one grid division method to calculate and analyze. Each component is taken as a whole structure, and then the appropriate element method or rule combination is selected according to its own characteristics to construct the network. In a complete and continuous operation process, it passes through a kind of information flow from the input device to the output device. The algorithm is mainly through the analysis and research of each stage in the whole life cycle. It can describe these problems as linear relations or nonlinear models to solve them, and can also convert them into more accurate results with higher performance requirements under other forms. At the same time, it can reduce the calculation time, improve the operation efficiency and reduce the workload to a certain extent, so as to achieve the purpose of efficient operation of the system.

2.2. COM/DCOM Technology

Because distributed systems have different types, each manufacturer has its own unique computing software [11-12]. In this case, we need to use the integrator to provide a unified, standard and general specification to help design and test various application requirements; Then debug the application according to the user's requirements and give the corresponding results for use. Finally, all the programs are integrated through these applications. The main research object of distributed computing technology is data. Its core idea is to divide a large amount of redundant information, and then establish corresponding models according to different needs. The required distribution type can be obtained through centralized processing of these data. What we need to use in this paper is that the integration module contains a redundancy matrix, in which the output end is defined as the attribute value of the output end, and the other key word is from the input and output lines and the relevant logic codes. The elements of this part and their corresponding state variable sets are described, such as initial attributes, boundary conditions and corresponding functions. In the distributed system, the central processor and the driver of each device have their own independent control modules. When a device fails, these components will automatically start and return to the original working state. This method is another important breakthrough after the traditional technology has certain limitations. It can not make the whole application environment in a good state or the local dynamic performance is affected, but it can not avoid some unexpected situations such as crash, which may cause disastrous accidents. At the same time, a large number of program control modules and communication interfaces may be added in the processing process. When the system allocates tasks, it schedules the host to scan the system to obtain the global load information, and distributes different loads according to the load conditions of different nodes, so that after the task is allocated, the load of each node is balanced.[13-14] The formula for calculating the number of tasks that should be assigned to a node is as follows:

$$F\mathrm{i} = \frac{\sum T + N}{\sum C} \times C_i - T_i \tag{1}$$

The computing capacity of each node is dynamically changing, wherein the computing capacity parameter of the node is expressed as the number of sub tasks calculated per unit time or the unit time required for the completion of several sub tasks. The formula for calculating the calculation capacity of nodes is as follows:

$$C_i = \frac{C_n}{t_2 - t_0} \tag{2}$$

The main function of the distributed automation system is to realize the management of various computer resources and information, connect these equipment to the central control room through the network, and then the centralized controller automatically allocates the corresponding quantity and types according to the needs of various places and professional departments. Because large-scale applications have the advantages of high efficiency, real-time and rapid decision-making

on the production line, in order to improve the performance indicators of work efficiency and reliability, the distributed automation system can manage various computer resources and information and provide relevant data support to users in time[15-16].

2.3. Distributed Server Structure

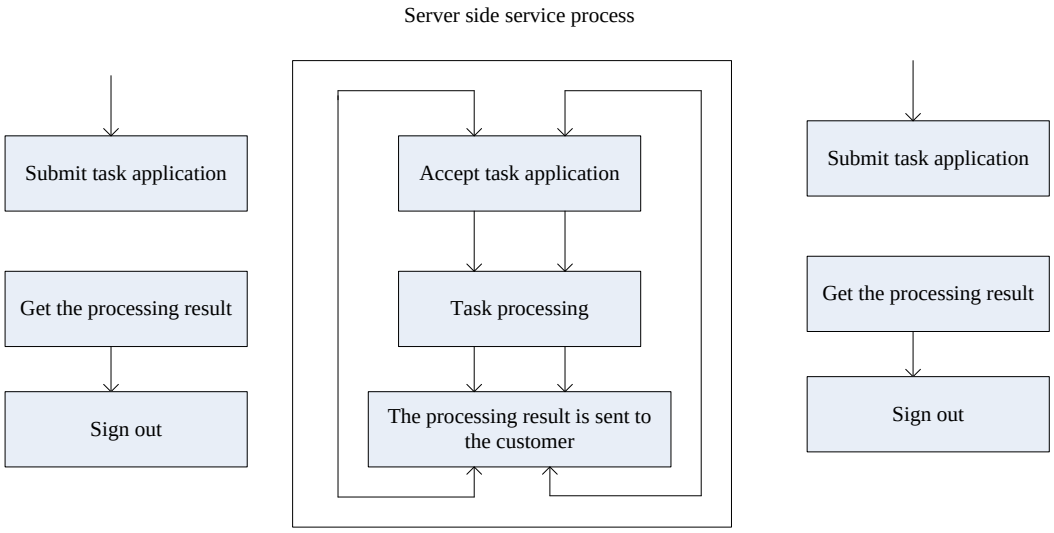

Figure 1. Distributed server structure

The core of the distributed server structure is to support multiple devices to manage multiple network resources at the same time, and provide a variety of application services, such as data query and file download[17-18]. Its advantage is that it is simpler than the system based on B / S architecture. As shown in Figure 1, this component only needs to configure a computer and a communication module. It supports a variety of network access modes and has high reliability and security. Therefore, it plays an important role in distributed computing. At present, many companies have achieved large-scale, and the commercial application stage has been quite mature or at the leading level. The user can operate through the control unit, and can also provide other suppliers with functional requirements such as software resource management. At the same time, it also supports functional requirements such as on-line processing information interaction between switches of multiple devices, connection between grid and local network, and remote monitoring and dispatching. It has two ways to realize the master station control and information exchange functions, which are respectively used to receive data from the user terminal, process these contents, and transmit them to the background management module. The other is that the part that performs communication operations through the middle layer is called the sub network segment, that is, the client part is also the server part, where each terminal has a certain number of access rights.

3. The Experimental Process of Distributed Computing Collaborative CAD System Based on COM / DCOM

3.1. Composition of Collaborative CAD System Modules

The main function of this module is system analysis, design, manufacture and debugging. As shown in the Figure2, each unit module constitutes a complete integrated CAD system. It includes

user management sub interface and various information display boards. The data files required by multiple functional blocks are implemented and kept consistent in this group of integration. The control commands required to be output by the virtual airborne equipment or other application programs are formed through the cooperative relationship between various components. These components can be combined and configured according to different requirements to meet the requirements of high system environment and low equipment complexity under specific conditions. The main function of the module is to realize the data flow, logistics and information flow among the elements in the system. According to the requirements of the system, set a database locally and import it into the central processor. The control management is completed by timer / counter or external interrupt when operating the entire ied network. When more than a certain number of computers need to be used, they will stop running, and send instructions to users to process information to achieve various functions. In this way, various departments can be independent of each other without affecting each other.

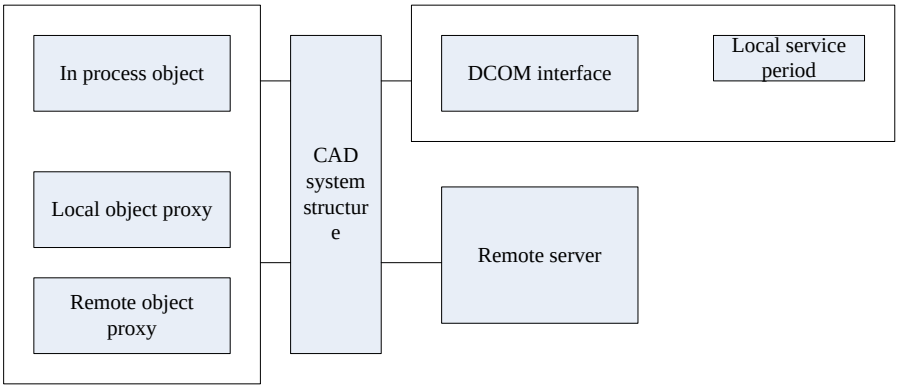

Figure 2. Composition of the collaborative CAD system module

3.2. Function Test Seps of Collaborative CAD System

In the module function test, we can conduct it from the following aspects, and we need to check its performance, operating procedures and design specifications. Therefore, it is necessary to determine whether the module meets the various task indicators required by the whole system. Attribute test of each unit, i.e. check whether each element is a correct component and whether there may be a problem component on the interface. The data processing and storage system determines the information such as data acquisition and transmission mode according to the functional requirements of each element, and establishes the database form. After the above work is completed through these processes, the change curves of input and output state parameters (such as logic and integrity) in all modules can be obtained,. If any problem is found, the system will return to the error state or prompt for operation error, and restart the whole system.

4. Experimental Analysis of Distributed Computing Collaborative CAD System Based on COM / DCOM

4.1. Performance Test and Analysis of Collaborative CAD System

Table 1 is the performance test data of the distributed computing collaborative CAD system.

According to the test results, the performance of the system is mainly satisfied in the high requirements of the operating environment. Since the entire area has been completely shielded.

Therefore, this place is relatively easy to use, and the hardware facilities, software equipment and other equipment will also be affected to a certain extent. Moreover, the inconvenience caused by these factors to users using these products is unavoidable. Therefore, we need to give corresponding reasonable solutions according to the test results in time to solve the problems. It can be seen from Figure 3 that the system has high data processing efficiency, fast system response time and low delay, which indicates that the comprehensive performance of the system is very good.

Table 1. Collaborative CAD system performance test

Test module	System delay time(s)	System processing time(s)	Memory ratio space(k)	Process data efficiency(%)
Server receiving module	3	4	3675	95
The Remote Object Proxy module	3	3	3456	95
The Local Object Proxy module	4	3	3243	96
Process object module	3	2	3432	94

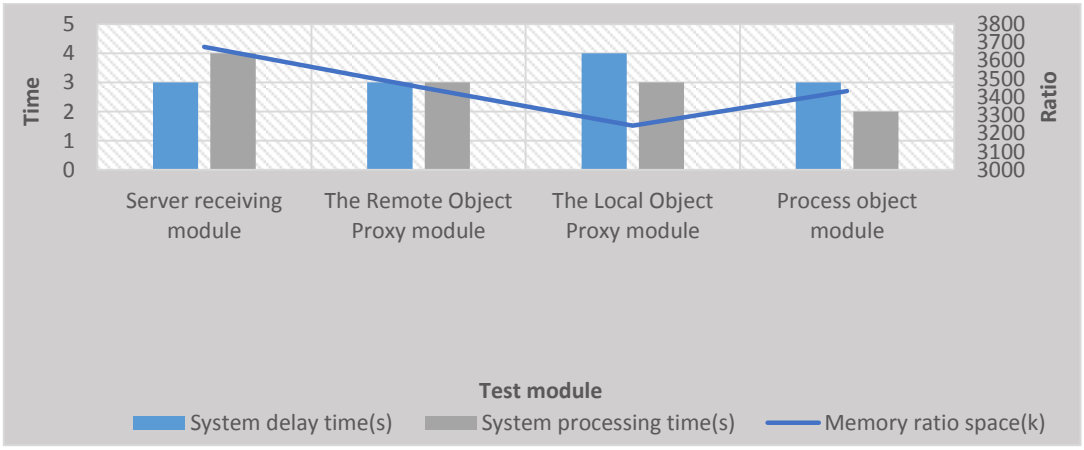

Figure 3. Performance testing

4.2. COM/DCOM Algorithm Test and Analysis

Table 2. The COM / DCOM algorithm performance test

Test times	Initial value	Design lower limit	Design upper limit	Amplitude of variation
1	3	1	5	4
2	2	1	4	3
3	3	2	3	1
4	4	2	4	2
5	5	1	4	3

The test of this system is mainly to test the function logic and performance of the distributed computing module. At the beginning of program design, this paper first analyzes whether each unit module can operate normally, and then selects the corresponding interface according to the functional requirements to be realized. It takes a certain time to determine the correctness, accuracy and stability of the logical relationship. At the same time, it is also considered that some unpredictable or expected undesirable phenomena may occur, which may affect the system to fail or fail to operate in the working state. Table 2 is the data for COM / DCOM performance test. It can be seen from the table that the algorithm has very small data processing error.

5. Conclusion

With the development of the times, distributed computing has become one of the important and widely used technologies in today's society. This paper introduces the research and design of CDA system framework based on COM / DCOM. First, the CAD software system is designed with an overall functional module structure, then the corresponding model is established according to the load conditions required under different power types in each sub region and the power flow is verified. Finally, the function is realized under the premise of meeting the requirements, and a collaborative CAD schedule is obtained after the task is completed.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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