

Research on the Application of Grid Technology in the Sharing of Heterogeneous Teaching Resources in Universities

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Abstract: With the development of computer network technology and multimedia technology, the number of network resources in colleges and universities has increased continuously. In the campus network, information resource "isolated island" has been formed. The traditional campus network structure makes educational resources in a wide range. It is difficult to share, especially a large number of heterogeneous types of teaching resources, through the analysis of the current university resource sharing status and grid technology, based on grid technology, the campus network heterogeneous resources sharing method and design ideas.

1. Grid

1.1 Grid definition

Grid is the use of the Internet to be distributed in different geographical heterogeneous, dynamic changes in a variety of resources, including computing resources, storage resources, software resources, data resources, information resources, knowledge resources into a logical whole, integrated into one. To provide users with reliable, consistent, standard, cheap and integrated information and application services, virtual organizations, and ultimately to achieve resource sharing and collaborative work, the complete elimination of resources, "island." Grid is an important information technology emerging in recent years with the development of network information technology. It is an integrated computing and resource environment, or a computing resource pool^[1].

1.2 The characteristics of the grid

(1) Distribution and sharing: a grid system by the distribution of different locations, different types of computers, external equipment, a variety of resource library, knowledge base, grid services and other components. Distributed is the most fundamental, most typical and most important characteristic of the grid, so the grid can realize the resources of distributed heterogeneous platform management. The sharing is the purpose of the grid, the grid of software resources and hardware resources, they are located in different geographical location, resource types, network size, geographic range, but the grid resources can be fully shared, The network can be transparent use of various types of resources without having to know where the resources^[2].

(2) Dynamic and diversity: grid contains a variety of different structures, different types of resources are often dynamic interaction, the grid of resources, services, size will be accompanied by changes in time and real-time adjustment, including enrichment, Or remove resources that are no longer in use. With time, the resources in the system may increase or decrease dynamically, but the mesh can still provide a seamless and transparent service without any impact.

(3) Autonomy and uniformity: the owner of the grid resources have the highest management authority, the grid is a whole of all resources, a variety of local resources is only part of the overall grid resources, it must follow the network Grid unified norms and standards, unified management grid of resources. (4) Heterogeneity and self-similarity: Grid by a number of different types, different topological structure of the local area network, grid nodes of the resource types, functions are not the same, but between the whole and local similar. Of the law, that is, local in many parts of the global characteristics, and global characteristics are often reflected in the local.

1.3 The classification of the grid

According to the object partition of grid object, the grid is divided into the following four kinds:

(1) Computational Grid A variety of isomorphic and heterogeneous computers, workstations, clusters (NOWS), clusters (COWs), databases, advanced instruments, and storage devices distributed over a converged network form a transparent Very high, very powerful, virtual supercomputers that use it to perform large computational tasks. Its goal is to use the existing hardware and software resources in the network to achieve efficient aggregation of high-performance computing to support high-performance wide-area distributed collaborative computing, focusing on solving intensive, large-scale scientific computing problem^[3].

(2) Data grid: mainly used for data storage and processing, with the development of social science and technology culture, in many areas need to store and process large amounts of data, grid data grid as the basic elements of sharing, and then establish Improve data management, access, services and transmission mechanisms to complete the data sharing and storage requirements.

(3) Information grid: that is, Internet and Web based on the creation of an intelligent integrated information platform, on this platform, the information distributed in the form of transparent sharing of users to use, it enables end-users and applications Secure access to any information source, regardless of where it is, through the intranet, the Internet, and even local and distributed networks in an extranet environment. Information grid provides access to heterogeneous files, databases and storage systems, and it supports shared data for processing and large-scale collaboration. Information grid is the core component of grid computing model^[4].

(4) Knowledge Grid: It is an intelligent interconnection environment that enables users or virtual roles to effectively acquire, publish, share and manage knowledge resources, and provide users and other services with the necessary knowledge services to assist in knowledge innovation, Collaborative work, problem solving and decision support.

2. Analysis on the Current Situation of University Resources Sharing

The complexity of campus network structure in domestic universities leads to the difficulty of data exchange and sharing among different systems. Moreover, heterogeneous resources are difficult to manage. Even though some colleges and universities have adopted some multimedia software developed by software companies, the construction of shared resource system Stay in a low level of duplication and disorderly development. Specifically, the following shortcomings:

(1) The form of a single resource, network sharing resource library construction to follow the traditional teaching model, interactive network teaching resources poor.

(2) The lack of a unified resource system development standards. Each school or department according to their own technology and performance to establish their own resource system, the resources of the property, structure, there is no uniform standard, it is more confusing. Lack of effective theoretical guidance in resource construction, resulting in a lot of low-level, repetitive construction, uneven distribution of resources, the development of imbalances.

(3) The public network storage space is not even small, teachers and students teaching, learning and other activities required information, information can not be stored, making the campus network to provide us with learning and application of information has considerable limitations, Difficult to play a real role. Although the means of educational resource sharing in China is not big compared with foreign countries, there is still a big gap in the popularization and application of technical means and infrastructure. All kinds of teaching software, the quality of the website is not high, the modern information technology means use the development imbalance in the education, these are the factors restricting the development of educational resources sharing in our country.

3. The Construction of Heterogeneous Teaching Resources Sharing System in Campus Network

With the popularization of educational information, the campus network has become an

important foundation for higher education platform. Teachers and students can be through the network, fast and convenient communication, learning, but in practical applications, a variety of applications due to network and operating system heterogeneity, it is difficult to achieve unified management, the campus can not achieve information, The full sharing of services. From the current application situation, the campus network needs to solve the problem: the sharing of data between different systems and interoperability, heterogeneous resources, effective management^[5]. Grid-based teaching resource sharing model of architecture, shown in Figure 1:

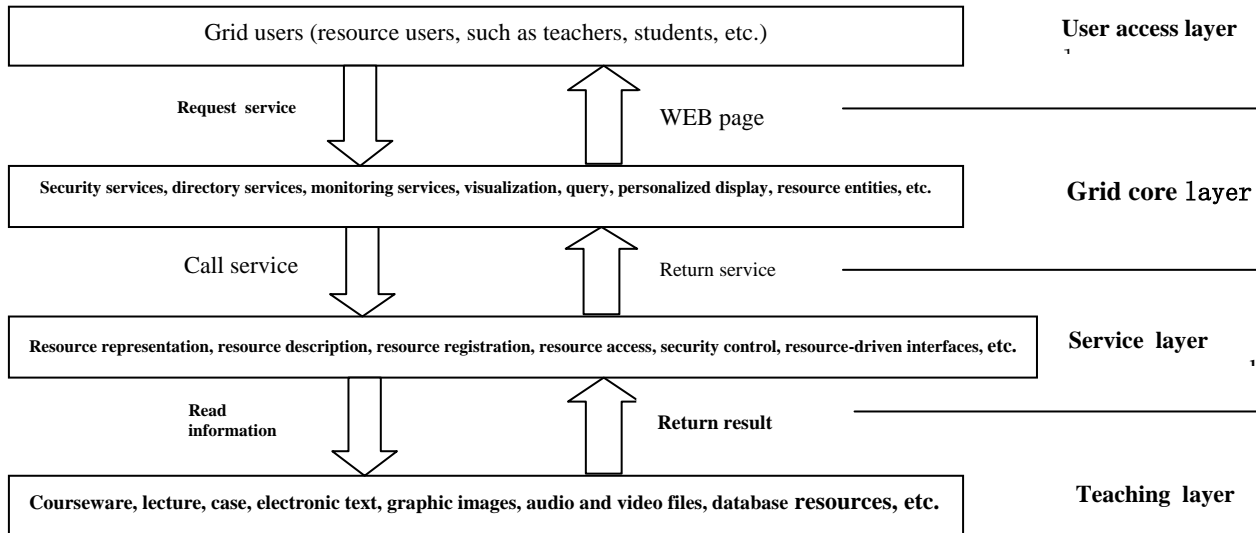


Figure 1 Teaching resources sharing architecture

(1) Grid user access layer: access to educational resources sharing system, public access, the main use of objects to provide resources based on Web pages human-computer interaction interface. Through the grid Web page, the teaching resource users can submit tasks, monitor the task running, manage and transfer the relevant teaching resource data, query the campus grid resource information, while the grid resource users need to register and account management functions. Grid users can also browse and acquire various teaching resources in the Web-based graphical interface and submit the resource query request to the teaching resource sharing system in the form of resource keywords. The resource grid can be accessed by calling the relevant function modules of the resource sharing system To achieve the grid users to submit the resource requirements, and finally the resulting resource results displayed in the grid portal to the user, allowing users to transparently access teaching shared resources^[6].

(2) The core grid layer: for many users, providing a wide range of grid resource applications, due to the needs of users of different rights, for example: teaching resources providers, managers, users and so on. Therefore, it is necessary to develop the core application and personalized application of online learning system according to the characteristics of resources and users' usage characteristics, to meet the needs of all aspects of teaching resources sharing, and to provide the core service of architecture.

(3) Service presentation layer: to provide information grid to build a series of shared services, including user authentication and authorization, metadata generation and management, resource discovery and management. The service presentation layer is independent of the specific grid information service domain and application domain, and provides the basic support services for various grid applications. Based on the resource layer, the service layer carries out unified management and deployment of heterogeneous resources, It provides the basic grid information service for the upper application, and describes the related services by using WSDL. The main contents include service interfaces and service access forms, and provide flexible and manageable Web services^[7].

(4) Teaching resources: teaching resources at the bottom of the grid-sharing platform, including a

variety of heterogeneous teaching resources, teaching resources, teaching and evaluation process is mainly the management of electronic textbooks, PPT courseware, The resources of the teaching resource layer can control the local teaching resources of the distribution and heterogeneity, collect and monitor the heterogeneous resources dynamically, and can be used for the management of the resources of the system, And provide remote access to a variety of heterogeneous resources. Resources can also be shared in the teaching resources, including software resources, equipment, equipment resources, storage resources, computing resources, network information resources. These shareable teaching resources are modeled as grid services, including physical resources and logical resources^[8].

4. The Application of Grid Technology in Network Teaching Resources Sharing

4.1 The construction of network teaching resources sharing system based on network technology

At the same time, by making full use of the resources of the grid technology to optimize the access technology, information collation technology, the Internet on the physical interconnection of a variety of the Internet to share the resources of the network system to provide users with a fully transparent service environment, Teaching materials to gather together to build university network teaching resource sharing, and make these teaching resources can be the greatest degree of use to improve learners learning interest and learning efficiency, but also can help teachers to prepare lessons for different courses provide relevant Teaching materials, improve the quality of teaching in colleges and universities.

4.2 Grid technology for high-performance scheduling technology

In the process of grid teaching resources system construction, the most urgent problem is to obtain the maximum performance of the large resources, in order to make full use of teaching resources, and in the application of grid technology, the key is to solve How to carry out task scheduling. Although the high-performance scheduling technology of grid technology has many advantages, compared with the traditional high-performance computing methods, the complexity of this technology has become more complex and cumbersome. The main reason for this problem is that the grid technology has its own characteristics, such as the dynamic variability of grid system resources, the diversity and the local manageability of the scheduler. These characteristics make the high-performance scheduling technology of grid technology In order to solve this contradiction, the grid scheduling technology needs to establish the related performance prediction model according to the characteristics of the grid teaching resource system and make full use of the grid Of the dynamic information that grid resource system performance fluctuations^[9].

4.3 Campus Grid Security Technology

As people gradually realize the advantages of the campus grid, more and more colleges and universities began to use the campus grid, but we can not one-sided to see the advantages of the campus grid, while ignoring its security, relative to the traditional network, The grid is more likely to be attacked, for which the security of the campus grid must be guaranteed. In order to greatly enhance the security of the campus grid, it is imperative to improve the security control mechanism of the grid environment, including the following aspects: authentication of the identity (authentication), authentication of the network, and so on. Mechanism, information access control mechanism and auditing mechanism, in order to establish the perfect security mechanism of grid environment, we should avoid the excessive grid processing capacity of security verification^[10].

5. Conclusion

As the key technology of the new generation of Internet, grid technology can eliminate the information islands and knowledge islands, and realize the intelligent sharing of teaching resources. The establishment of network in campus network environment computing platform, realize the campus network teaching resources sharing, in order to solve the environment of campus network

resource sharing and resource reuse problems, the higher school informatization and digitization have a more positive role in promoting.

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