

Cooperative Intelligent Grid Based E-education Platform

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Abstract—Based on the researches of E-education GRID and Cooperative Intelligent Grid, a new cooperative intelligent grid based E-education platform was designed.

Keywords—E-education , Cooperative Intelligent Grid

I. INTRODUCTION

Grid technology is accompanied as the rapid development of Internet technology. the technology , using the Internet, organizes the geographically dispersed computer into a "virtual supercomputer", in which each computer involved in the calculation is a " node ". the whole calculation is completed by " a grid " consisted by the tens of thousands of" nodes ", this technology called grid. Simply put, it integrates the entire network into a huge super computer, to realize the sharing of computing resources, storage resources, data resources, information resources, knowledge resources, expert resources etc.

II. E-EDUCATION GRID

Education Grid, refers to E-education system and the operation process using of grid-building ideas and being established on the basis of the grid, formed by E-education enterprise, teachers, consumers and so on, It is a automatic response ,self-organizing enormous E-education network ,in which E-education resources, human resources, E-education information, education data, as well as the full range of education knowledge-sharing as the main dynamic characteristics ,and the digital education resources product, release, VOD(Video-On-Demand) , education marketing cooperation as the contents.

III. THE CONCEPT OF GRID BASED E-EDUCATION PLATFORM

1. Application requirements of E-education Platform

1.1 Platform should be transparent. Users need not to know the internal structure of the platform and operating principle, just through the grid browser, access to a grid server, to complete the work by E-education platform interface.

1.2 The Platform should be a full-featured, integrated system. Once connected to the platform ,the user can complete its works conveniently, including the exchange of information, pay for activities etc.

1.3 The Platform should be high security. The security of exchange of information, the security of electronic payments,

as well as the safety of the platform resources in E-education activities should be ensure.

1.4 The Platform should be dynamic adaptive. It should be able to dynamically monitor the operation and reasonable to carry out resource scheduling, including resource allocation, restructuring, expansion and so on.

2 .Architecture of E-education Grid

Thinking of grid technology in E-education application, the main significance lies in its five-level architecture , which has a strong significance for the integration of E-education. Grid makes global Internet resources and the computing power full sharing through the five levels of achievement.

Fabric: To control of local resources. Formed By the physical or logical entity for the purpose of providing for the top share of resources. Commonly used physical resources, including computing resources, storage systems, catalogs, network resources, etc.; logic resources include distributed file systems, distributed computing pools and other computers. The functional of Fabric is impacted by demand of high-level ,including resource queries and resource management to ensure the QoS.

Connectivity: support to facilitate secure communications. The layer definite secure communication and certificate authority to control the core of the agreement. Resources for data exchange between the authentication and authorization, security control are controlled by this layer. The layer components to provide function of single sign-on, agent entrusted with the local security policy of integration and user-based features such as confidence-building strategy.

Resource: sharing a single resource. Established the link layer in the communications and certification agreements to meet the security conversation, resource initialization, operation of resources monitoring, resource usage statistics such as the demand for structural layer by calling the function to access and control of local resources.

Pooling layer (Collective): coordination of resources. The level controlled of resources submitted resources together for the application of virtual organizations sharing and call. The various layers can share components, including directory services, resource coordination, resource monitoring and diagnosis, data replication, load control, account management and other functions.

Application: the user layer for grid applications. Application layer is in a virtual environment that exists in organizations. Application through layers of application programming interface (API) to call the corresponding services, through service on the grid to mobilize its resources to complete the

task. In order to facilitate the development of grid application procedures, it is need to build support for large-scale grid computing library.

IV. APPLICATION MODEL OF E-EDUCATION PLATFORM

To end-users, the use model of the grid should be in line with the principle of easy-to-use. Application Model of E-Business Platform should be: the users connect grid server through the browser, to exchange information, capital payments and security authenticate such on e-commerce activities, which are transparent for all deals.

Grid Application Server is program to provide specific services to Grid end-user, grid application server is similar to the current Web server, the difference is that Web server provides access to services page, and the Grid Application Server provides access to the resources services. Grid application server presents visiting grid computing resources or coordination use of multiple computing resources by Grid Programming Interface, providing grid resource access service by Grid service request protocol. Grid Browser is a graphical grid client access device, to achieve environment-friendly use of resources. Browsers use the Grid Services Markup Language, and by protocol sent resource access request to the grid application server, after the calculation, grid application server feeds back results to the browsers. Taking into account the characteristics of E-education, a new generation of grid application server: "Cooperative Intelligent Grid CIG" is presented.

1. The concept of CIG

With the rapid growth of distributed computing environment and popularity of applications, loosely-based cooperative work has become the mainstream of practical needs. In order to improve the intelligence level of the grid capacity and coordination to cope with the actual grid structure and the needs of evolutionary structure in the distribution grid, collaboration services, to support dynamic computing environments and changing customer needs. We put forward the "smart grid collaborative CIG", its conceptual model are as follows:

DAI + DCC + Grid → CIG

DAI is the combination field of artificial intelligence and distributed computing. Its research goal is conceptual model to describe the construction of natural systems and social systems, is to examine the distributed system, how the interaction between entities, how the distribution of knowledge and action and collaboration to enhance the performance of the entire system. DAI can be divided into the study of distributed problem solving and multi-Agent system (a loose type of collaborative work systems).

DCC is to examine the distributed system of "coordination", "coordination and control strategy", such as Theory and Method. Coordinatability based on the structure of large-scale systems "can transparency", "controllability", "substantial nature" to study the distribution of resources, coordination of large-scale systems, tasks can be coordinated coordination

criteria and conditions. DCC control strategy to coordinate the distribution of main-guided coordination, group coordination, coordination cycle, holographic coordination.

CIG grid is based on existing theory, which is a product of the Grid and distributed artificial intelligence distribution coordinate control and of the combination is an open, dynamic human community (society of people and computers). Society is composed of people and multi-machine, which is a open, dynamic and harmonious human society; community have common goals, and division of labor; existing norms and autonomy; any resources can be used in any place by any person.

2. Architecture of CIG

The current grid system, provide such as registration, publication, discovery, authentication and other basic services, in this level, in order for the release of Grid services, discovery and use in an inter-organization level to be implemented, the mainly work is to develop a platform / language neutral, support the loosely coupled interactive software service standards. Naturally, XML has become the basis of this standard. The definition of interactive services with SOAP, to describe the service interface WSDL / GWSDL and support services for registration, release and found that the UDDI standard and promote the development of a WEB-based service grid infrastructure taking shape. In such a basis of infrastructure, people can make use of XML, SOAP, WSDL / GWSDL, UDDI to development, deployment, discovery and use of grid services.

Though existing OGSA basic structure, taking into account certain characteristics of the grid system, such as loosely coupled, platform-neutral, but because of their ultimately reliance on the traditional technology (eg, workflow-based integration technology, in collaboration with the calculation logic close-coupled logic, etc.) to achieve, apart from the difficulty of the full realization of the concept of SOC. To this end, CIG should be the difference between the characteristics of OGSA

2.1 The explicit expression of coordinate logic and the logic separation of calculation. SOC in the need for extensive coordination logic, should provide a special mechanism for the expression of explicit coordination logic that can not be solidified in the language or platform. At the same time, based on separation of concerns that the basic principles of software engineering, we should make concerted decoupling logic and computational logic.

2.2 Collaborative programmable logic. Logical expression of the above-mentioned mechanism of synergy is not only to express a variety of features in the application of a synergistic manner, but also to support dynamic adjustment of the system to adapt to the environment and changes in demand, which requires coordination of dynamic logic can be modified.

2.3 Coordinate logic can be dynamic and flexible deployed. Entities as a result of service has been deployed to the grid system, the coordination logic in the appropriate grid distribution is crucial. Logic can be best coordinated grid

system in the dynamic deployment, freedom of movement, best services to adapt to the physical grid distribution. coordination is focused. CIG emphasized in the specific function is not achieved, because the grid service has been provided a variety of specific functions, it should focus its attention on how these services coordinated its resources to complete the user's goal.

3. Architecture of Cooperative Intelligent Grid Based E-education Platform

In the CIG system, the system of global coherence without explicit global control, the conduct of the inter-entity level of coordination, as well as whether the entities have self-adaptability is related to the overall system performance and the core content of an open, but also an important indicator of the degree to measure the system intelligence and automatic of collaboration. We know from the community / federal policy-oriented system architecture, the field of adaptive collaborative mechanisms and intermediary services, consultation mechanisms, such as rational aspects of the construct e-business platform of open, dynamic, non-explicit global control.

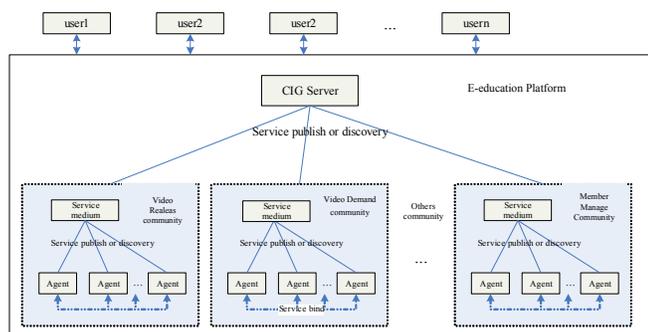


Fig. 1 System frame of cooperative intelligent grid based E-education platform

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