

Research on Service-oriented Knowledge Management Model of Multi-campus College and University

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Abstract: Knowledge management theory is increasingly attracting the attention of colleges and universities, and has become a new perspective to the reform of college management. With the development of education informatization, the service orientation will become the main direction in knowledge management. On the fact of many campuses in colleges and universities, this paper presents a university knowledge management system framework model based on service-oriented idea and grid technology, and discusses the processes of service-oriented multi-campus university knowledge management.

Key words: service oriented; knowledge management; multi-campus universities; management mode

1 Introduction

The arrival of knowledge society and the development of higher education popularization bring a series of changes to the teaching and management of colleges and universities. For a long time, colleges and universities are considered the bases of production, transmission, innovation and application of knowledge. So the knowledge management theory is increasingly attracting the attention of colleges and universities, reforming the management method of colleges and universities from a new perspective.

Since the early 1990s in China, after the large-scale merging and reconstruction of colleges and universities, most colleges and universities have become multi-campus layout geographically^[1]. These multi-campus universities satisfy not only the need of our society but the need of the increasing differentiation and comprehensiveness of knowledge and subjects. The development of multi-campus university expands the recruitment of students scale rapidly, and pushes ahead with the transition of higher education from *elite* education to popular education. These changes brought many problems to the administrators of higher learnings in our country on how to manage and coordinate the work among many campuses efficiently. And it also put forward a new challenge to the knowledge management in colleges and universities. Today it has

become the top priority in colleges and universities to manage the campus information and knowledge resources accurately and efficiently, to improve the teaching efficiency and to enhance the competitive advantage. To these problems, the current research focuses more on the management system and mechanism as well as the literature resources integration and sharing while less on the integration of whole knowledge resources and the sharing among multiple campuses.

A Service-oriented Architecture (SOA) is a component model^[2], which refers to different functional units of the application as services. Services are linked by well-defined interfaces and agreements among one another. Interface is defined by using neutral manner and is independent of the hardware platform, operating system and programming language for implementing services, which makes the services constructing in a variety of system interact in a unified and general way. The emergence of SOA brings a new concept to traditional information industry. Information systems are no longer separated architecture forms, but can easily contact each other and combine and share information. SOA is known as the basis framework of next generation Web services. Now it has become a new development direction in the computer information field. Because Service-oriented architecture conforms to the information development of colleges and universities from passive response to proactive service, it is becoming the development direction of colleges and universities information service.

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The grid concept refers to the integrated and distributed computing infrastructure for the advanced science and engineering applications with coordinated resource sharing and problem solving in the dynamic and multi-institutional virtual organization^[3-6]. Grid computing can provide remote distributed resource access across organizations. And it is extremely flexible for various resources sharing, whose sharing scopes vary from the client/server mode to peer mode. The highest goal of Grid is sharing resources in the whole society maximally, from global computing resources, storage resources, information resources and knowledge resources, to satisfy the needs of each unit and each person's computing and storage. Grid will become one of the mainstream trends of the future knowledge resource sharing technology.

So, as a new application integration development plan, service oriented architecture under the environment of Grid can well solve the problem of multi-campus college and university in knowledge management. In this paper,

the multi-campus university knowledge management model service-oriented under the environment of Grid is discussed to provide reference for the implementation of knowledge management in multi-campus college and university effectively.

2 Service-oriented multi-campus university knowledge management system framework

2.1 System framework

The system framework model is the combination of the ideas of service oriented architecture, the computing skills, analysis ability and knowledge of Grid and the knowledge management technology. It can implement searching resource knowledge in distributed heterogeneous and dynamic information environment, namely finding knowledge resources on heterogeneous resources through resource agents. Figure 1 shows the system framework of multi-campus college and university knowledge management service-oriented based on grid.

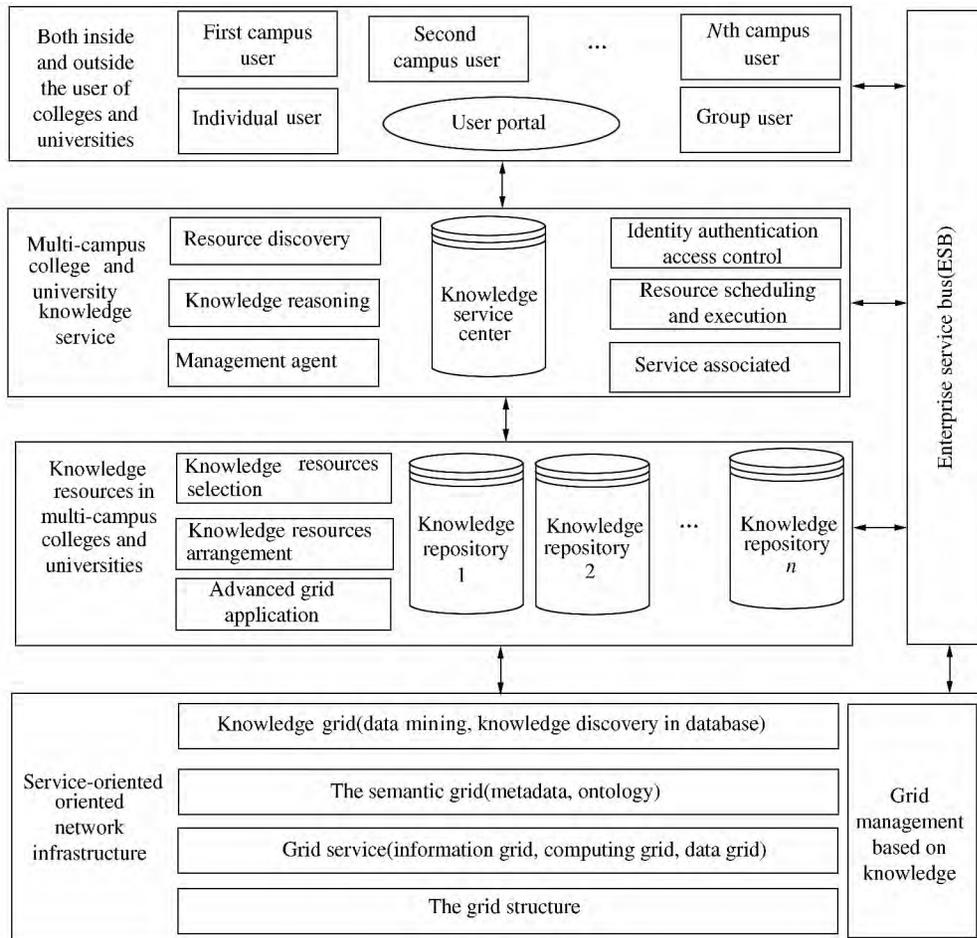


Figure 1 Service-oriented multi-campus college and university knowledge management system framework

2.2 System main function

From Figure 1 , it can be seen that the system framework of service-oriented multi-campus college and university knowledge management based on grid can provide the following services: knowledge resource discovery , resource maintenance and distribution , resource storage and agent , knowledge reasoning and delivery , users demand scheduling and execution and users identity authentication and access control , etc. The following is a brief introduction to the function of the main services^[7].

1) Knowledge resource discovery

Knowledge resource discovery agent can intelligently find the various existing resources on the grid , and return the information about resources and services for further processing. These resources also include all kinds of knowledge resources found by knowledge management personal.

2) Knowledge resources maintain and release

Based on the service scope and theme of grid nodes information , the knowledge information resources and services gathered by knowledge resource discovery agent will be selected , sorted , connected and maintained correspondingly , and then registered the corresponding results in the form of metadata directory. These results can be released in a public place or public registration system.

3) Knowledge resources storage and agent

The preliminary sorted resource can be stored and the storage agent service can be provided. The user's information request can be projected for underlying storage operation and effective management storage copy in heterogeneous environment. This function is available to achieve by using the information stored in the metadata directory.

4) Knowledge reasoning and sending

In the system knowledge base as the center , reasoning agent extracts new knowledge from the existing infor-

mation and knowledge base , and returns the results to the question system.

The integration of resources and services make various resources in the whole grid link together seamlessly. By using cache technology and metadata directory , the grid information flow can be reduced to improve the utilization of system resources. The application of resources and services can satisfy users' needs in a unified content view. It provides not only the original information but more knowledge achievements based on the original information.

2.3 The advantages of architecture

The service-oriented multi-campus college and university knowledge management system framework has the following advantages^[8].

Independence. The system is in dependence with the hardware platform , operating system and programming language. The service in the system can interact in a unified and general way.

Loose coupling. Its interface definition is neutral and flexible. It can continue to exist to adapt to the changing circumstances when the internal structure and the realization of the service are changed.

Security. The application to serve consumers is based on the service. Database access takes place behind the firewall , which can improve the security of the information exchange and data sharing.

3 Service-oriented multi-campus university knowledge management process

In a service-oriented multi-campus college and university knowledge management system , the process of knowledge management mainly includes knowledge development and creation service , knowledge processing and integration services and knowledge sharing and utilization services. The process is shown in Figure 2.

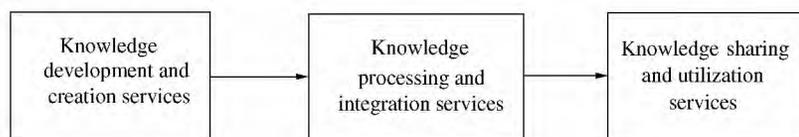


Figure 2 Service-oriented multi-campus college and university knowledge management process

3.1 Service-oriented multi-campus university knowledge development and creation

The starting point and most important part of service-oriented multi-campus college and university knowledge management is knowledge development and creation. As shown in Figure 3, through the service-oriented multi-campus college and university knowledge management development and the creation service, knowledge development and creation can be

achieved. The faculty, staff and students in colleges and universities can develop and create new knowledge in the system. At the same time, by transferring knowledge to the knowledge service center or the information system, they can get development and create more new knowledge. Information mining system can also help them dig out more potential knowledge, which can be provided to information system, or to send to the group support systems as a reference.

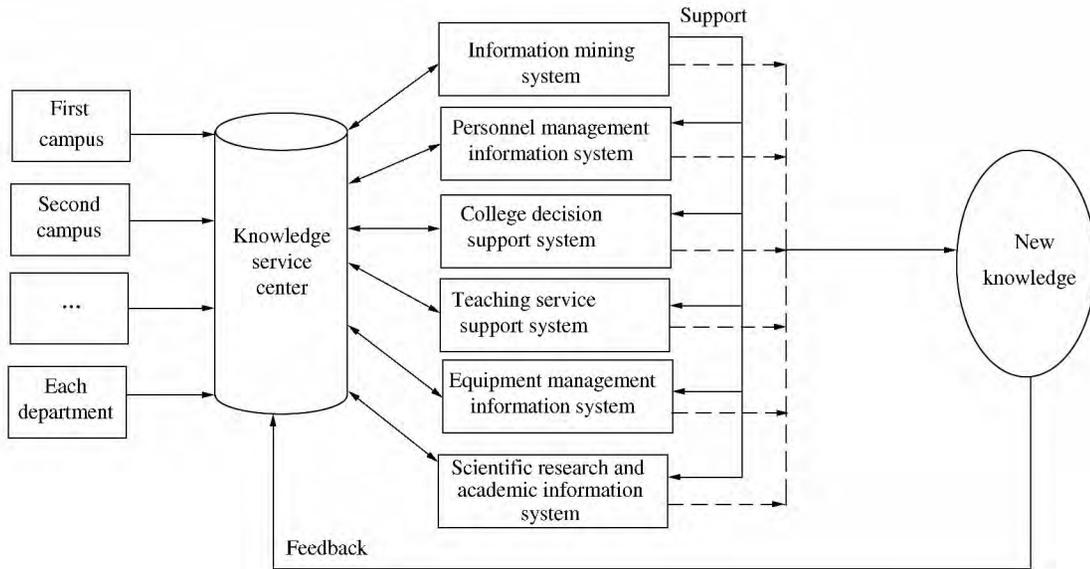


Figure 3 Multi-campus college and university knowledge development and create

The development of knowledge and creation can be achieved by applying computer technology. But one of the most critical factors is knowledge producer. The knowledge that producers obtain by using relevant knowledge production technology will create different novel knowledge from the previous ones, to achieve the purpose of knowledge innovation in the multi-campus college and university knowledge management system.

3.2 Service-oriented multi-campus university knowledge processing and integration

As for the knowledge resource between departments of the multi-campus colleges and universities, there are differences in information knowledge format. For example, the first campus teaching department data and files may differ from the educational administration department data. After processing and integrating in the center of the knowledge service, these processed

heterogeneous data can be gathered into the knowledge service center of the university, shared and used by various departments. Information and knowledge resources are no longer the department exclusive, but also can be obtained by other departments. For instance, the data of teaching, scientific research, teaching guarantee, personnel and logistics, the relevant emails, announcements, all kinds of decision scheme, the completion of the planning, and plans and tasks in various multi-campus departments, all these can be processed and integrated in the service center of university knowledge, shared and used by faculty, staff and students.

3.3 Service-oriented multi-campus university knowledge sharing and utilization

The key of knowledge management of multi-campus colleges and universities lies in how to implement knowledge sharing and utilization among them. The de-

partments knowledge can be very convenient used by themselves ,but it is relatively difficult for other departments to share and utilize. However , from the knowledge service center , things will become easily. For example , the equipment department in the first campus can get any required classroom information and knowledge provided by the educational administration department in the second campus. And the educational administration department in the second campus can get any teaching guarantee information and knowledge which is provided by the equipment department in the first campus.

In this mode ,each campus faculty , staff and students can communicate knowledge each other and can use organization knowledge and resource provided by the school to solve the problem in teaching and scientific research and learning. At the same time ,some good methods and tools used by faculty , staff and students can be spread in the organization knowledge system through the feedback system , to let more staff and students use it , so as to enhance multi-campus college and university education quality and benefit.

4 Conclusion

The service-oriented architecture conforms to the service ideain the higher education information development. So it has become the development direction in the college and university informatization. Knowledge management has become a new perspective to reform college and university management. Now , under the condition that multi campuses in colleges and universities have become a common phenomenon in our country , the knowledge management in colleges and universities meets a new challenge. Based on service-oriented architecture and knowledge management thoughts and grid technology , this paper proposes a service-oriented multi-campus college and university knowledge management system framework based on grid , and discusses the service-oriented multi-campus university knowledge management process. It provides the reference and consultation in the technology and strategy choice of knowledge management in multi-campus colleges and universities.

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