Design of Intelligent Distance Education Platform Based on SOA

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Abstract. As more updated research results been applied in distance education, computer should act as more intelligent and humane tutors. To address shortcomings of current distance education platform, the paper brought out concept of intelligent distance based on Service-oriented Architecture (SOA). Start from platform architecture, distance education platform model implemented based on SOA was presented. Aiming at poor intelligent and independency of answering system, the intelligent answering system model was also given. To solve low efficiency of search engine that cannot meet requirements of learners in existing platform, an overall structure of intelligent search engine was designed. A multi-dimensional track model on distance education quality was also proposed to address the problem of inadequate distance education monitoring

Keywords: Distance education, Intelligent, SOA

1. Introduction

With advances in network technology, the latest research results in fields of grid computing, artificial intelligence and expert system will be more used in distance education system. The computer will no longer be blunt machine, but more intelligent and humane teachers. As a major theme in the internet age, distance education development has become focus of concern. After investigation on distance education platforms, we know that there are problems of poor intelligence, sharing, interaction and personalization. Development of intelligent distance education platform should be guided by modern education idea and education theory, information technology as a means to carry out teaching support network for the purpose of building a network management, curriculum development and teaching close contact system can support a variety of organizational form of teaching and teaching methods, can be applied to all aspects of online teaching, has a good interactive feature that provides a variety of services, open distance learning support system [1]. To address above problems in distance education platform now, an intelligent distance education platform based on SOA was brought out. Starting from platform architecture, SOA was selected as architecture of intelligent distance education platform. The paper is organized as follows: section 2 presents basic architecture of distance education based on SOA; section 3 gives intelligent strategies of distance education platform and section 4 concludes our work

2. SOA-oriented Distance Education Platform

2.1. SOA Basic Concepts

SOA is a component model. It connects different functional units of program through well-defined interfaces and contracts. These interfaces are defined in neutral manner and independent of hardware, operation system and programming languages that implement service, so that services in the constituted systems can interact with each other in a unified and consistent way [2].

SOA provides a standard programming model, so that software residing on network can be published, found and invoked. SOA software developer can publish service to network in the form of component, so

that any program whose component is service can interact with other programs similarly based on service. The SOA mainly includes three main roles, namely service requestor, service registration and service providers. Service requestor completes service finding and calling. It firstly looks for available service meet to specific conditions in the service register. Once it is found, service requestor bind it with service provider and perform actual service calling. Service register centralized store service information to facilitate service requesters to find services. Meanwhile, it provides service provider with a platform to publish information. Service register actually plays intermediary role. Service provider is the owner of service, which is responsible for publish service information to service registration center as well as control access, execution and service maintenance and upgrade of service.

2.2. Distance Education Platform Model Implemented on SOA

As SOA provides standardized architecture, the technical approach of distance education resource integration is as follows: transform various resource modules into service without modify existing system, and then package newly developed resource into service. These services are relatively independent of each other and can be combined, so that it can effectively achieve the integration of educational resources.

Based on above ideas, the paper brings out system model for integration of distance education resources, as shown in Fig. 1. The system used service-oriented hierarchical structure to integrate education resources. The layers are database layer, XML uniform description layer, uniform access layer, SOA service registry center, application logic layer and device access from bottom to up.

(1) The database layer includes existing g distributed heterogeneous resources for education, library database, academic information database, student achievement database, online course database, courseware and other educational resources database.

(2) XML unified presentation layer. It is used to standardize courseware resources and provide a unified description document.

(3) Uniform access layer completes package of existing education resources.

(4) SOA service register center. It provides service publish mechanism to achieve sharing and collaboration of education resources. Encapsulate original education resources and register it to SOA service register center to from various services, such as personalized service, resource searching service and online curriculum selection system.

(5) Application logic layer. It provides personalized service to facilitate unified access of device access layer with multiple manners.
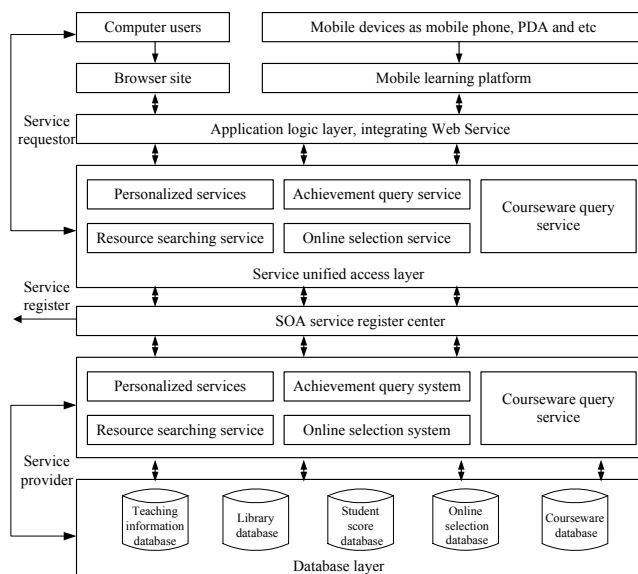

Fig. 1 Distance education platform model based on SOA

3. Intelligent Strategies of Education Platform

3.1. IntelligentTest Paper Composition

Intelligent test paper composition not only has low cost, high efficiency, confidentiality and continuous consistency, but can automatically generate a satisfactory principle papers even in more restrictive conditions. Meanwhile, as exam questions can be a wide range of collection and screening, pooling and sharing of good teachers for their labor, so the paper quality can be guaranteed, which is truly in distance education credit separation of teaching and management, demonstrating distance education the open nature and laid a good foundation to reduce running costs and expand the size of school as well as provides a necessary prerequisite. How to score part of the examination and introduce technology to enhance efficiency and effectiveness and promote its development standardization and modernization will become a point for future research.

3.2. Intelligent Answering Expert System

Intelligent distance education platform should have a corresponding intelligent answering system. The intelligent answering system must be a practical system to provide network users with services. It contains various factors. It must follow some principles to design and construct such a system. Otherwise it is difficult for the designed system to meet various requirements of users. We should consider from aspects of user categories, system usage mode, problem representation, knowledge quality, data storage means, means to solve problems and answers and the accuracy and comprehensiveness of the intelligence user interface, question handling, body check, knowledge building, storage problems, the answer is presented of intelligent question answering system, so as to design user interface, question handling, body check, knowledge building, storage problems and answer presentation to meet all the requirements [3].

View from user classification, the users engaged in system can be divided into three categories. Firstly, learners mainly access knowledge by question in the system. The second is interpreter. They mainly answer questions in the knowledge database without answers to complete content of knowledge database. The third is manager, namely system developer. Manager also undertakes responsibility to extend knowledge body. Learner is the system's main target and main function of intelligent question answering system is to provide answering services for learners. The interpreter is user involved in completing the system. They continuously expand data in knowledge database by interpreting problems from learners so that the database been constantly improved. After obtained feedback information or detect drawbacks of system, managers can timely adjust the system and learn to expand body so that the query range and accuracy of intelligent answering system can be improved [4].

3.3. Intelligent Search Engine

Intelligent search engine is a new type search engine combining with artificial intelligent technologies. Except for provide traditional functions of quick search and relevance ranking, it can also provide users with services as user enrolling, automatic identification of user interests, semantic understanding, intelligent information filtering and push. It improved information searching from level based on keywords currently to that based on knowledge, which has some understanding and processing ability on knowledge, so that to achieve segmentation techniques, synonyms technology, concept searches, phrase recognition and machine translation technology. It has intelligent information services and user-friendly features, allowing information searching with natural language. The searching engine is made up of two main parts of client and server as shown in Fig. 2.
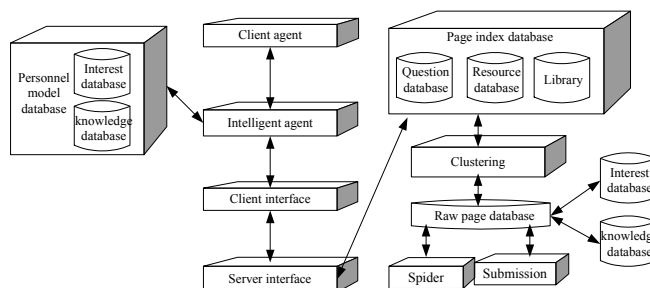

Fig. 2 Intelligent searching engine

The client consists of client interface, intelligent Agent, personnel model database and interface, where the intelligent Agent and model database are main parts in client. Main function of server is to collect pages

from network spider or robots to establish raw page database, and then perform data mining on raw page database with field knowledge database and interest database. After clustering, various page index databases can be formed.

3.4. Intelligent Quality Track and Monitoring System

Distance teaching quality monitoring means collect various information in each teaching parts as teaching management rules, financial status, student learning and external learning center status online, so as to find possible teaching quality problem based on analysis. Then the teaching behavior can be timely controlled and teaching quality can be stabilized and improved. We propose a distance education quality track and monitoring system based on Computer Supported Cooperative Work (CSCW) to perform comprehensive track on learning process, enrolling, register, online examinations, achievements of graduation and financial status, which play an important role in the whole teaching guidance. The system structure is shown in Fig. 3.
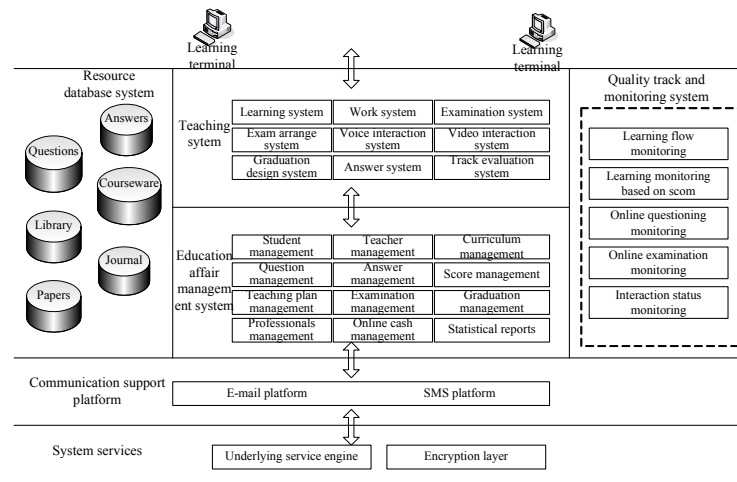

Fig. 3 Intelligent quality track and monitoring system

4. Conclusion

Aiming at poor intelligence and independence of current Q&A system, an approach to perform user interface, question process, main body query and knowledge database construction was provided and system model of intelligent Q&A was presented. Meanwhile, the concept of intelligent search engine was introduced and overall structure of the search engine was designed, which is personnel intelligent search engine based on online education resource environment. A distance teaching quality track system based on CSCW was also brought out to solve the monitoring problem in distance education. In the next future, we will focus on leaner evaluation model and others to improve education quality with quantitative indexes and scores.

5. References

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