Research on the Design of Education Resource Service Cloud Platform of Wide-range District and Metadata Standars

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Abstract. Cloud computing provides users unified services by constituting a huge resource pool with large amount of highly virtualized resources. Its development and application have provided innovative thinking for constructing Public Education Resource Service Platform of Wide-range District Education. This article dissertated the architecture of constructing Public Education Resource Service Platform of Wide-range District Education by adopting cloud computing model and the educational district resource deployment plan under this platform. Secondly, a study of the key issue for constructing shared resource library of Wide-range District Education, definition and specification of educational resource metadata. Also it provided the metadata composition and vocabulary designs. The study mentioned above provides some reference value of sharing internal education resources of Wide-range District Education and promoting resource optimization.

Introduction

The construction of public service platform about educational resources is an important support for the strategic development of the management mode about Wide-range District Education, and also is the important technical means to consummate the management system .In the background of the mature Internet, the public service platform of Education Resources about Wide-range District can effectively promote both the optimization for educational resources' allocation and excellent utilization and sharing [1]. This paper studies and designs the public service platform of educational resources in the Wide-range District based on the Cloud Computing service model and its architecture, which can be deployed and managed uniformly within the school district. The platform aims at providing integrated services for all levels of users. In addition, the key issues in the construction of the platform resource library , including the interdisciplinary ,low level of resource sharing and poor interoperability caused by multi-source heterogeneous characteristics of educational resources [2, 3], is the obstacles to the construction and sharing of resources in the three level resource system of Wide-range District Education .Due to the above issues, the adaptive methods are put forward : a set of metadata definition standard, vocabulary design and the interface standard of foreign data exchange, which is suitable for the educational resources in the Wide-range Education District. To a certain extent, the above scheme can improve the extensive sharing of resources in the region.

The Overall Framework of the Platform

A Wide-range education district may covers dozens of different schools and owns more than 5000 teachers as well as tens of thousands of students , then cloud computing architecture is essential way to achieve basic education resources of public services platform in the case of such a large amount of users. The height of "Cloud" is extensible, flexible, on-demand access, which brings several advantages for different-level users in Wide-range Education District, such as high work efficiency, cost savings and other benefits.

The structure of the platform is divided into four layers including infrastructure layer (IaaS), platform service layer (PaaS), software application service layer (SaaS) and user access layer [4], all

of which are respectively corresponding to different cloud services. IaaS layer consists of a variety of network infrastructure, such as computing devices, servers, storage, etc, in order to provide a variety of virtual resource services for the platform. PaaS layer provides software's support environment and public service interface for the platform; SaaS layer is responsible for providing the user with a variety of application software services [5, 6]. According to the platform service model, "educational resources clouding" is composed by varieties of resources provided by different schools who participate in the cooperation. Users in the cloud, no need to know the specific physical location of the resource, the system can automatically analyze and determine the visitor's IP address, then formulate the routing strategy and access its adjacent resources. The system adopts SaaS service model based on cloud computing, and uses the unified method to authentic ordinary users' access to resources, in which once register user can access all the resources of the server. Then, the system could achieve the real realization of resource sharing in the school district. All teaching resources are stored in the cloud using the Hadoop framework, Map Reduce and HDFS technology.

The Construction of Shared Resource Library about Public Service Platform in School District

The construction planning of public service platform about University District Education Resources is the basis of system's macro-deployment and concrete implementation. The following analysis for platform resource construction is carried on from two aspects: platform resource system and resource base construction scheme.

The Establishment of Platform Resources System. Establishment of Resource System. The public service platform of educational resources about the Wide-range District Education adopts the "cloud computing" deploying model, including three-level resource system: the Wide-range District, school district and school. The Wide-range District educational resources is the main resource body, and the school district, school, respectively, are second and third level resources so as to achieve the largest share of resources in the wide-range area. As shown in Fig. 1.

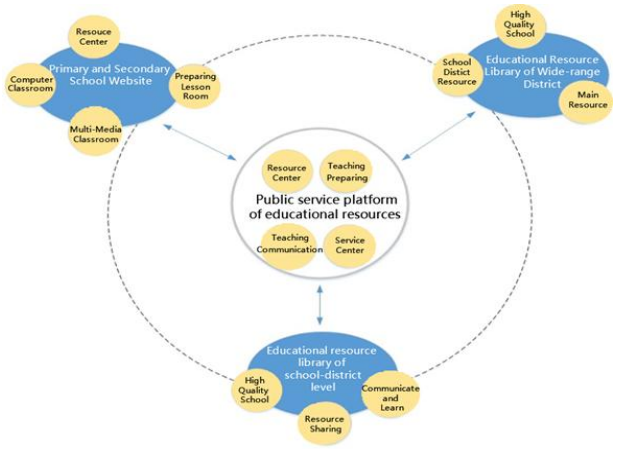

Figure 1. Wide-range Education District, School District, school three distributed resource library system schematic

The location of the resource pool at all levels is as follows:

The first level: the basic education resources library in the Wide-range Education District. The second level: the basic education resources library around school district level. The third level: the school library.

Resource Deployment Plan. Users at all levels can not only utilize services provided by the platform according to their demands, but also deploy management platform and service node. Resource deployment scenarios are shown in Fig. 2.

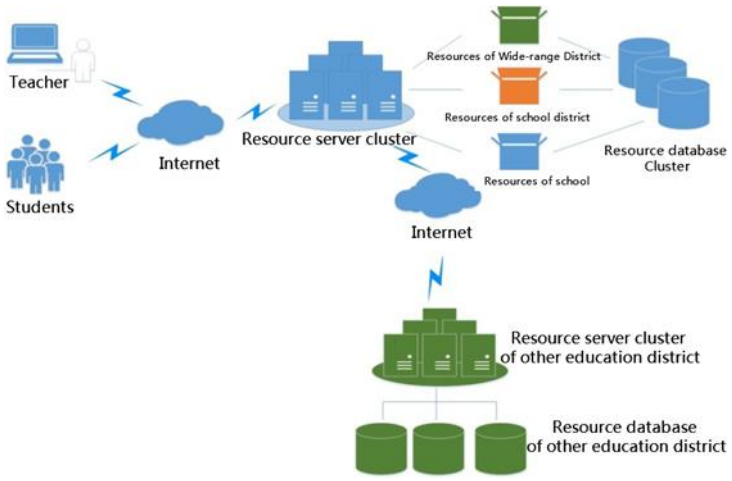

Figure 2. Resource Development

Due to creating a resource server group in each school district, all students and teachers as well as school administrators under the scope of the its district could enjoy the resources services of access, download and upload , after they validate the identification and authorization through a unified portal. At the same time, the resources are managed by strategy of level-classification, which are distinguished into three levels including the school, the school district, Wide-range Education District. According to the user's authorization to carry out targeted development that contains establishing a resource database in the school district and providing resource storage services. Resource public service platforms among different school districts can exchange data through the data interface, realizing sharing and transfer of resources.

Collecting of Resource. In the process of constructing the resource library, different methods are adopted according to the forms of the carriers. After considering source of the resources, the information is divided into several patterns, such as database, electronic documents (including text, graphics, images, video, audio, courseware, etc.), and other different forms. For example, in this paper, information resources database can be collected by special information-extraction tools such as ETL Technology ,aiming at collecting shared database-information resources into the shared resource library by means of the extraction (extract), transformation (transform), loading (load) process of source data. Electronic documents and courseware resources are put into shared - electronic library via the information - bridge software.

Metadata Specification Design of Education Resources in Wide-range Education District

The concept of metadata was originally proposed to solve the disorder of network resources. It is called "the data about data", specifically used to describe the characteristics and attributes of the data. Metadata can provide more useful information than the content itself, [7, 8].It allows users to accurately locate and acquire knowledge based on the value of the key word, owner, and other known attribute values [9]. Identifying description of various educational resources through meta-data method can shield its complexity, facilitate users to query information resources, and effectively realize the integration of various distributed education resources, as well as improve the efficiency of resource utilization [10].

In the process of designing the metadata attribute of educational resources about the Wide-range Education District, the relationship among object’s interoperability, commonality, personalization, and the ability to reduce the complexity of the description, are all carefully considered. After the full investigation of related national and industry standards based on reference Dublin Core (abbreviated as DC), conforming the based structure defined by RDF (Resource Descirption Framwork) and the applicable demands of the Wide-range Educational Resources library, the metadata standard of the resource library is established. After considering the generality and simplicity, the fifteen elements of the most common DC criteria are selected as the basis for the definition, moreover , the extended

attribute should contains related metadata of Wide-range District educational resources as much as possible. For example, taking into account the characteristics of the exchange and reuse of educational resources in the Wide-range Education District, the elements number, associated with the school district, should be added in the metadata definition so that resources can be shared in the Wide-range Education District further.

Table 1 Metadata composition of the Wide-range district educational resources

id	English Name	size	Required	data type
1.	Rid	10	Y	char
2.	Title	100	Y	char
3.	Creator	100	Y	char
4.	Subject	255	Y	char
5.	Keywords	255	Y	char
6.	Description		Y	text
7.	Contibutor	255	N	char
8.	Date		Y	Date
9.	Type	100	Y	char
10.	Format	100	Y	char
11.	RelateResource		N	Int
12.	Language	10	Y	char
13.	Audience	100	Y	char
14.	Review		N	Text
15.	Reviewer	100	N	char
16.	Version	10	N	char
17.	Tab			
18.	Publisher	255	N	char
19.	Identifer			
20.	RelationDescription	255	N	char
21.	Coverage	255	N	char
22.	Rights	10	N	char
23.	DistrictId	10	Y	char
24.	Sid	10	Y	char

Core metadata is regarded as a basic element, which can be queried through the general search tools. Through metadata, the system can easily exchange data with other systems. The 16 core metadata respectively include is the resource ID, title, subject, keywords, description, identification, format, date, language, type, author, subject, version, labels, publishers and other authors ; The second step is the design of core metadata about resource type. That is used to describe the specific resources of the Wide-range District Education, including school district number, school number, related resources, relationship description, coverage, authority, evaluation, evaluation. Finally, the basic education resource metadata, Including 14 essential elements and 10 optional elements, is naturally formed. Resource center can achieve the effective management of resources through the classification of resources, retrieval, audit, maintenance. In this project, the metadata of Wide-range district educational resources is described in Table 1.

Conclusion

The paper studies and discusses the several aspects of public service platform of about Wide-range District educational resources based on Cloud Computing , including ideas design, overall structure, platform resource library construction, system module design, etc. Moreover, since taking the school-district education as core, metadata standards, data access standards, interfaces are proposed and a sharing database of unified resource is also formed. This design pattern of this system can

realize the interconnection among schools around the same school district effectively and lay the foundation for the data layer of sharing educational resources in school district. All in all, the system could provide a feasible basis for the effective compatibility, integration and sharing of educational resources in primary and secondary schools around the whole school district.

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