

## Research on Regional Education Informatization Based on Cloud Computing

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**Abstract**—Regional education Informatization is a long-term, system and complex engineering. The study analysis the development status of our country's regional education informatization, according to the specific problems of China's regional education informatization, and put forward the architecture of regional education informatization services platform based on cloud computing, this paper expounds access mode of regional education informatization services platform based on cloud computing.

**Keywords**-cloud computing; regional education informatization; architecture; access mode

### I. INTRODUCTION

Education informatization is an important part of the national informatization, which is an important symbol of education modernization. Regional education informatization is the base of national education informatization, it is a long-term, system and complex engineering. Cloud computing as a model of computing resources (network, server, storage, applications and services) with convenient and requirement through the network, it provides support and conditions for regional education informatization construction.

### II. THE DEFINITION AND TYPICAL CHARACTERISTICS OF CLOUD COMPUTING

#### A. The definition of cloud computing

Cloud computing, which is a new shared infrastructure on the basis of distributed system, grid computing, virtual storage, to realize the integration and sharing of hardware resources through the unified management and dynamic scheduling of computing resources and storage resources. [1] Cloud computing is calculating based on the Internet, it is like power supply, according to the needs of the shared resources, software and information, providing the computer and other equipment. [2] At present, although cloud computing has no unified definition, everyone has been a relatively uniform recognition for the service of calculation. They think that cloud computing services were classified into three types: (1) Infrastructure as a service (IaaS), which was formed by low-level hardware or virtual machine resources, it provides calculation, data storage and network communication etc.; (2) platform as a service (PaaS), it constructed in the cloud infrastructure, providing all kinds of cloud application software for the developers of cloud

application; (3) software as a service (SaaS), all kinds of application service based on cloud platform.[3]

#### B. The typical character of cloud computing

- Elastic service. The scale of the service can be expansion rapidly, to adapt the dynamic changes of the business load automatically. Users' resources were consistent with business needs, to avoid quality decrease and resource waste because server performance overload or redundancy. [4]
- Resources pooling. Resources make a uniform management with shared resources pool. Using virtualization technology, which will share resources to different users, they can see the placement, management and allocation strategies of resources clearly.
- On-demand service. Providing application program,data storage, infrastructure, and according to the needs of the user, distributing resources automatically, and it does not require intervention by the system administrator.
- The general access. Using all sorts of terminal equipment (such as PC, laptop computers, smart phones, etc.), the user can visit cloud computing services through the Internet at any time and place.[5]

### III. THE STATUS ANALYSIS OF CHINA'S REGIONAL EDUCATION INFORMATIZATION DEVELOPMENT

In china, we have made great achievement in education informatization through these years' construction and development. However, the difference of the regional economic development, the binary system of education investment, and development strategy of the pilot school, to result in the unbalance of China's education information regional development, private of the resources, information solitary, and generally speaking, there are existing in the following several problems.

#### A. The unbalance distribution of regional education information resources

For economic developed areas, there are better resources, and for most economic backward areas, due to the limited funds, they often faced the condition of the old equipment, insufficient resources; For the southeast coastal area,the

construction of urban education network, the allocation of education information resources and information technology ,there are great difference between the western region and towns.

*B. Regional education informatization construction speed slow*

Information technology rapid development, it required that the area can provide the latest information learning facilities for users, improving the user skills, to adapt to the development of new situation, required updated advanced facilities; it will bring great pressure in economic backward regional education informatization construction.

*C. Regional education hard and software duplicate construction*

There are relatively independent between the region hardware and software resources, in the process of construction they don't consider that other areas have already constructed in this field success or set up completely. In the area of construction, so repeated construction costs too much the human and financial resources.

*D. Regional education information sharing degree low*

Although the joint range of our country's education information are widening, let the information technology realize the cooperation in certain degree. However, the sharing degree of resources is still limited; software and hardware resources still can't realize the integration.

In the process of education information in our country, a series of problems caused repeat investment, the low of resource utilization, the great differences of teaching quality. Therefore, establishing a unified, open, shared regional education information platform, integrating the greatest degree、maximum range teaching resources, it will help reduce the cost of education, to improve the degree of regional education informationization construction.

IV. THE REGIONAL EDUCATION INFORMATION SERVICE PLATFORM ARCHITECTURE MODEL BASED ON CLOUD COMPUTING

*A. The overall framework of the regional education information service platform based on cloud computing*

The construction of the regional educational information related to information resources, network storage infrastructure, the servers to provide computing, the management platform as well as a variety of services and applications. According to the services cloud computing provide and the actual situation of the regional education information, the architecture of the regional education information service platform based on cloud computing can be roughly divided to the application layer, platform layer (include data layer), infrastructure layer, [4] shown in figure1.

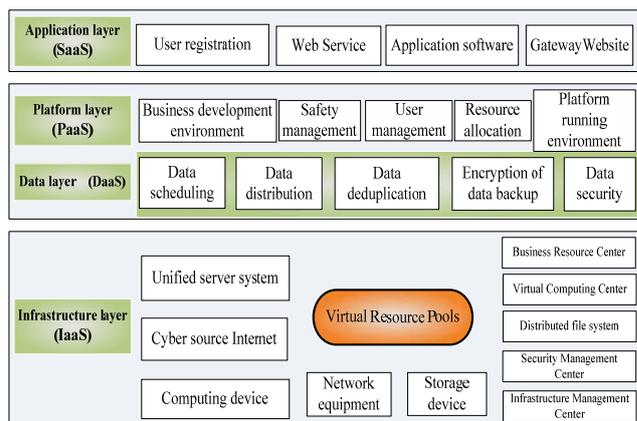


Figure1 The overall framework of the regional education information service platform based on cloud computing

*1) Application layer*

The application layer is the highest level of the entire platform, which provides users with a simple software application services, as well as the user interaction interface. This layer also provides the portals of the regional education information service platform based on cloud computing. The interface of the regional education information service platform based on cloud computing is in a Web form and provide a service interface to the cloud platform users. The users are logged into the site and then can get the services they need

*2) Platform layer*

The platform layer in the core part of the regional education information service platform based on cloud computing, which is responsible for providing process management, resource deployment distribution, storage access, login and authentication, security and quality of the service, etc. The core service that the platform layer provides is a distributed computing cluster of regional education information, and the other services include parallel programming and development environment, the distributed storage management system of the structure and massive data, the distributed file system of the huge amounts of data, as well as the other management tools aid to realize cloud computing. The platform layer includes a data layer, which uses the database virtualization technology, through the Web middleware to manage and schedule the heterogeneous database of the various nodes. The Web middleware technology is the core of the data layer. Data layer uses the metadata harvesting technology in each basis points to re-create a form, so that the regional education information service platform based on cloud computing which depends on database can improve the speed and efficiency of access. The users can select any one middleware provided by the Web service interface. Regional users only need to install an integrated middleware, configure the network IP and then can easily expand the data-sharing network. Data layer is mainly responsible for data scheduling management, data distribution, the deletion of duplication data, data compression, data encryption and backup, data security, etc.

### 3) Infrastructure layer

The infrastructure layer is the base layer of the whole structure, that is, the infrastructure as a service, which determines the scope services and the capabilities of the regional education information. The infrastructure layer provides a virtual resource, such as virtual host, storage, network, database management, etc. Through the embedded cloud terminal technology, virtualization technology, the infrastructure layer can make a variety of resources in the network nodes access to the network, including various types of host, workstations or even PC, as well as the cluster system of the above models, large storage devices, databases or other devices, to fulfill the full interconnection of the various node resources, and use the server clustering technology of the regional education information cloud platform to unified scheduling management server nodes dispersed, virtual to a single server system, while constantly adding new servers and nodes, or delete unnecessary servers and nodes, in order to achieve high computational performance, satisfy and guarantee of the growing computing needs.

Every layer of the regional education information service platform based on cloud computing can make use of cloud computing services to build, and achieve the corresponding service provided by the regional education information, such as the use of the Software as a Service (SaaS) to build the automation and integrated management system, unified search platform and other application software of the regional education information; the use of the Platform as a Service (PaaS) to build a regional database and develop the application environment service platform; the use of the Data as a Service (DaaS) to build and integrate the literature database resources; the use of the Infrastructure as a service (IaaS) to build the storage and data center environment of the regional education information; the use of the hardware as a service to build a service cluster and form the effective elastic computing ability, and finally the formation of the cloud services architecture of the regional education information based on cloud computing.

#### B. The access mode of the regional education information service platform based on cloud computing

The regional education information service platform based on cloud computing take a regional educational cloud servers as the core, and dynamic deployment of virtual hardware server. Through the configuration the standard browser of a variety of terminal, such as PC, the iPad, mobile phones, tablet computers, the users can access to cloud computing services. Shown in figure 2.

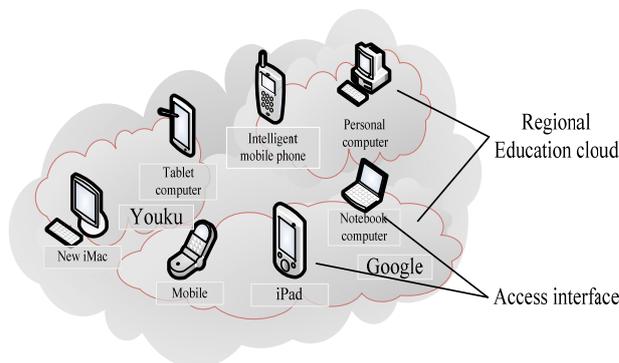


Figure 2 The access mode of the regional education information service platform based on cloud computing

In the regional Education cloud, the users use Gmail to send and receive mail, use Talk to contact with others, use Video player to play media files. Through the Web cloud, we can achieve the “Ubiquitous” access, share traffic and computing power with the users on the Web cloud and request and feedback dynamically. The drive of cloud computing is requested by the user, dynamic deployment of virtual hardware provides storage and computing power. Optimized for multi-functional load while deployed and is also responsible for data security and integrity. The server cluster running in the “cloud” provides users need resources based on cloud computing server control tasks. A variety of learning software tools they need are in the web cloud, reducing the installation trouble, so, if not your own computer, you can also use the software at any time.

### V. CONCLUSION

Regional Education cloud is the infrastructure of the regional education information, which provides the regional educational institutions, educators and users the information services for a variety of educational activities. The use of the unity, openness and sharing of the Regional Education cloud will help to address the unevenly distribute of the regional education resources, slow renewal rate and the low sharing, thereby increasing the level of regional education information.

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