



# The Construction of an Educational Information Public Service Platform Based on Cloud Computing

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**Abstract.** In the process of the development of education informatization in China, due to the impact of network transmission speed and server processing capacity, the education information platform has been unable to meet the learning needs of teachers and students. Education information public service platform is the core of education informatization support. With the arrival of the era of cloud computing, the informatization level of higher education will also be improved to a certain extent. The application of cloud computing will have a certain impact on education and promote the benign development and progress of education and teaching. Based on this, this paper will discuss the application of cloud computing and the construction of information public service platform to provide certain resources for the informatization of university education management platform, which is of certain help to the current higher education.

**Keywords:** Cloud computing technology · education informatization · education information public service platform

## 1 Introduction

With the advent of the computer era, the informatization level of higher education has also been improved to a certain extent. The application of cloud computing has had a great impact on the field of education, and is a deep-rooted important role and force. The development of cloud computing for the construction of education information public service platform provides a new train of thought, education information public service platform is the core part of education information support system, cloud computer has a high versatility, platform with the help of cloud computing constructed virtualization resources can easily realize resource sharing between different systems. Education information cloud service platform can provide learners with intelligent identification terminal equipment, personalized resources, intelligent learning management and intelligent recommendation, which is conducive to learners' learning anytime and anywhere.

## 2 The Concept of Cloud Computing

Cloud computing is a kind of to pay according to usage patterns, this model can provide convenient for the human the network access are available, and thus enter the configurable network, in the interactive process, only need to put a few can obtain corresponding resources management work. This is a kind of distributed computing. Parallel computing utility computing network storage virtualization (Fig. 1).

Load balancing hot backup capacity to save the traditional fusion product of computer and network technology development, is a kind of emerging commercial calculation model of cloud computing technology is in constant change, the definition of cloud computing is not true Popular speaking, a cloud of cloud computing is stored in the resources on Internet services group, which includes the server. When the local computer needs to obtain some resources, it needs to send out a demand information through the Internet, so as to obtain the resources it needs [2] (Fig. 2).

Commonly used structural data and algorithms are: Bloom filter. It can be used to retrieve whether an element is in a collection. The hash function in the Bloom filter is

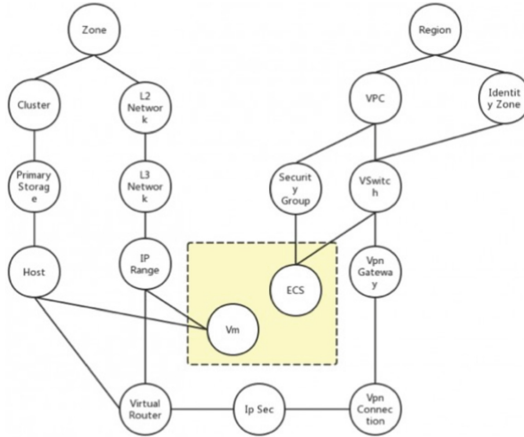


Fig. 1. Schematic diagram of the hybrid cloud

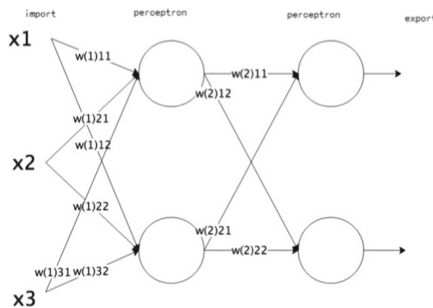


Fig. 2. Schematic diagram of the big data algorithm

assumed to be independently and uniformly distributed: each element is equally likely to hash to any of  $m$  bits, regardless of which bits the other elements are hash to. So for a certain bit, the probability that the position of an input object will still be 0 after  $k$  hash functions are hashed is:  $(1 - \frac{1}{m})^k$

The probability that after  $n$  inputs, this position is still not set to 1 is zero:  $(1 - \frac{1}{m})^{kn}$

The probability that this position is set to 1:  $1 - (1 - \frac{1}{m})^{kn}$

Then, in the check phase, if all  $k$  bits corresponding to a query element are set to 1, it can be judged to be in the set. Therefore, the probability of misjudging an element is:

$$(1 - (1 - \frac{1}{m})^{kn})^k$$

So,

$$\left(1 - \left(1 - \frac{1}{m}\right)^{kn}\right)^k = \left(1 - \left(1 - \frac{1}{m}\right)^{-m * \frac{-kn}{m}}\right)^k \sim \left(1 - e^{-\frac{nk}{m}}\right)^k \tag{1}$$

Now calculating what  $k$  is for a given  $m$  and  $n$  can minimize the misjudgment rate. Let the function of misjudgment rate  $k$  be:

$$f(k) = \left(1 - e^{-\frac{nk}{m}}\right)^k \tag{2}$$

Simplified as  $f(k) = (1 - b^{-k})^k$ ,

Take the logarithm of both sides:

$$\ln f(k) = k * \ln(1 - b^{-k}) \tag{3}$$

Take the derivative of both sides with respect to  $k$ :

$$\begin{aligned} \frac{1}{f(k)} * f'(k) &= \ln(1 - b^{-k}) + k * \frac{1}{1 - b^{-k}} * (-b^{-k}) * \ln b * (-1) \\ &= \ln(1 - b^{-k}) + k * \frac{b^{-k} * \ln b}{1 - b^{-k}} \end{aligned} \tag{4}$$

Find the maximum value below:

$$\begin{aligned} \ln(1 - b^{-k}) + k * \frac{b^{-k} * \ln b}{1 - b^{-k}} &= 0 \\ \Rightarrow (1 - b^{-k}) * \ln(1 - b^{-k}) &= -k * b^{-k} * \ln b \\ \Rightarrow (1 - b^{-k}) * \ln(1 - b^{-k}) &= b^{-k} * \ln b^{-k} \\ \Rightarrow 1 - b^{-k} &= b^{-k} \\ \Rightarrow b^{-k} &= \frac{1}{2} \\ \Rightarrow e^{-\frac{kn}{m}} &= \frac{1}{2} \\ \Rightarrow k &= \ln 2 * \frac{m}{n} = 0.7 * \frac{m}{n} \end{aligned} \tag{5}$$

Put the  $k = \ln 2 * \frac{m}{n}$  into the  $p = \left(1 - e^{-\frac{nk}{m}}\right)^k$ .

Take the logarithm of both sides to get:

$$m = -\frac{n * \ln p}{(\ln 2)^2} \tag{6}$$

### 3 The Functional Structure of the Education Information Public Service Platform of Cloud Computing

#### 3.1 Platform Function

Education information public service platform is oriented to preschool education, basic education, higher education, vocational education and other education stages. It mainly has the following functions: Using cloud computing technology to effectively integrate various technologies and establish an education management information system covering the whole country; In terms of teaching application, the education information public service platform can provide students and teachers with high-quality teaching resources and related software tools, create an intelligent network teaching environment, and form an open and interactive information teaching mode (Fig. 3).

#### 3.2 Structural Module

Education information public service platform can provide users with comprehensive educational services, among which the information module mainly involves general news consultation and professional service information related to education [1]. Education departments can establish information service centers by relying on the educational information public service platform. The information distributed by the platform should be authoritative, accurate, timely and rich, which requires it to not only provide good opportunities for the public due to information services, but also to create a good atmosphere of public opinion for the development of education.

### 4 The Advantage of Cloud Computing in Promoting University Information Resources

#### 4.1 Provide Diversified Services

In terms of service content, the public service platform of education information can collect massive resources nationwide, so as to provide relatively rich services and resources

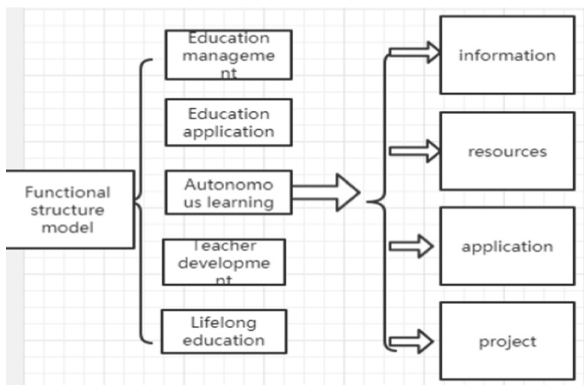


Fig. 3. A functional structure model

for users, realize the on-demand use of online learning resources and tools, and the service mode will become convenient and efficient. Cloud computing users can automatically obtain the services they need at any time, so that they can obtain the resources they need on the network [6]. In terms of access, as long as the device is connected to the network, users can access the cloud where the device logs in through any device, which has low requirements on the device (Fig. 4).

#### 4.2 Ensure the Smooth Operation of the System

Higher education platforms have high requirements for the stability and reliability of the system. Cloud computing technology can provide a series of good guarantees for the operation of the system [8]. The distributed storage method adopted can automatically

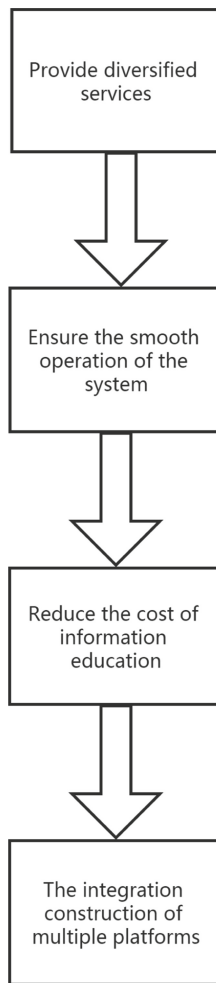


Fig. 4. Advantages of Cloud computing in promoting university information resources

allocate compute nodes according to the policy, and transfer and modify corresponding nodes in case of failure. In addition, cloud computing technology has good fault tolerance in the face of errors, and can self-repair in the face of some minor faults. In addition, centralized and unified management and maintenance mode will also play a certain role in the maintenance and stability of the entire system.

### **4.3 Reduce the Cost of Information Education**

Cloud computing is faced with a variety of information, which requires large-scale sharing in the face of such huge data, so as to effectively improve the operation efficiency of hardware resources and save energy consumption, reduce the construction and operation cost of education information public service platform, and also help to some extent the cost of hardware maintenance. So far, cloud services have generally adopted a flexible charging model with lower prices, which can provide a reference for the platform in terms of capital operation.

### **4.4 Promote the Integration of Multi-platforms**

Education information public service platform depends on large-scale network platform to operate, which contains complex structure features of different variety of small system of cloud computing general high, with its constructed virtualization resources to reduce the resource sharing between different systems and application sharing, reduced to between each system structure and changes in computing power requirements. In addition, the super elastic expansion capability contained in cloud computing also provides technical support for the scale of platform construction.

## **5 Construction Planning of the Education Information Public Service Platform of Cloud Computing**

### **5.1 Planning of the Educational Information Public Service Platform**

The architecture mode of regional cloud meeting and business cloud are adopted between the education information public service platform, and the interconnection between each cloud. Finally, the public education general cloud realizes the centralized deployment of the hardware and software of the system through the infrastructure layer, application development layer and service sharing, as shown in the Fig. 5:

The general cloud not only provides a wealth of services, but also conducts certain scheduling and unified deployment of headquarters resources. According to the needs of construction, a variety of ways are incorporated into the specific education stage, relying on academic institutions and social groups and other infrastructure projects that have gradually been established in China National basic education resource network, which can be deployed on the education information public service platform for the service content on the business cloud [9].

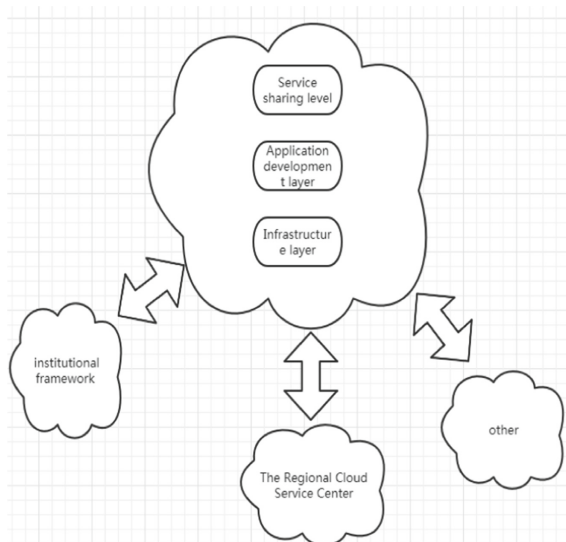


Fig. 5. System planning model

## 5.2 Facilities Construction of the Educational Information Public Service Platform

The cloud of the education information public service platform is formed by the integration of resources of virtual computing, including some carriers such as servers and memory. These sites that store resources realize the integration and sharing of hardware devices through the resource collection and aggregation system, and finally hand them over to the general cloud for unified management. Terminal refers to the cloud equipment connected by the user. Cloud computing technology reduces the requirements of the system for the terminal configuration, and improves the interaction and mobility of the platform services. Users only need to log in certain devices on any platform that can provide educational public services to easily obtain the corresponding resources.

## 6 Conclusion

Education information public service platform is the core part of the education information support system, and is the basic platform environment to carry out the education information service and application. Education information public service platform is the carrier and presentation tool of education public service. It takes educational institutions, enterprises, students, teachers and the public as the service objects, and presents educational services to users through the form of information, resources and application to use education management, teaching application, independent learning and teacher development, so as to achieve the goal of serving the national holographic and serving education informatization. This paper beneficially explores the application of cloud computing in the education information public service platform, and makes due contribution

to the university education information management system. With the help of advanced cloud computing technology for the integration of educational information resources and systems, so as to build a unified platform serving the education industry. This has a good role in building a public information public service platform for cloud computing.

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