Research on Cloud Computing in the Application of the Quality Course Construction

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Abstract. In order to solve the Four Problems in present quality course establishing and the redundancy in Cloud Service, this paper studies the effective ways of improving the Cloud Service, and also introduces the Chord algorithm into Cloud Computation. A multiple Chord loop model is constructed based on a master-slave structure system, and after analyzing the routing list of the nodes in the loops a new calculation formula of the routing list is put forward. As the study shows, the improved calculation decreases obviously in the average routing hops and average network delay, thus the effectiveness of resource searching is improved.

Keywords: Cloud computation · Course establishing · Chord algorithm

1 Introduction

With the popularity of Internet, network teaching is more and more enjoyed by the learners. Through the excellent courses construction, promote discipline construction and teaching reform in colleges and universities. Course of information construction has obtained certain achievements, but the four problems existing in the course construction: access, compatible, update, interactive, hindered the further development of exquisite course construction. How to make use of cloud computing technology to promote the development of the fine course construction, which is an important research significance. This paper mainly studies how to use cloud computing to solve the four problems and study the effective ways to improve the cloud service.

2 High-Quality Course Construction Problem

Since starting construction project, the major national fine course construction is developing, but there are still many problems in the curriculum resources application, outstanding performance at the four problems [1].

(1) Hardly access

The current number of fine courses online sharing is very handsome, but due to the different colleges and universities in the process of making excellent courses hard software and the use of the network language is not the same, especially dependent plug-ins. There is much broadband audio video content in the course, it is difficult for

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the visitors to the curriculum for curriculum resources effectively. The bandwidth of the part of the course website is limited, prone to access congestion and can't open the website. So the curriculum resource access difficultly is become a bottleneck problem of exquisite course application sharing [2].

(2) Difficultly update

According to the requirements of the department in charge of education, fine courses should be updated regularly, but only 20% of survey data show that the recent one year or so. Because of the course update control platform design is not convenient, the school's network management is responsible for the curriculum information update slowly. [3]

(3) Difficultly Compatible

Due to the lack of mandatory for material requirements of technical standard, the ministry of education of different colleges and universities in the process of making excellent courses hard software and the diversity of network language influence the universality and compatibility of courseware resources sharing, this is especially an obvious on the video file sharing. [4]Video file format is the lack of diversity, speed slowly, factors such as lack of restricted access to users in the course, ultimately affect the use effect of the curriculum resources.

(4) Difficultly interactive

Most of the courses are not possible to exchange the discussion for the users and lack of interaction, school-teachers are difficult to accurately grasp the students' feedback information, etc. Colleagues, download courses are mainly composed of self-study students, teachers and students lack of interactive learning atmosphere [5].

3 Cloud Computing in the Application of the Quality Course Construction

In order to solve the four problems in the construction of excellent courses, the application of cloud computing in the construction of excellent courses. Make full use of the advantages of cloud computing, can better play in the exemplary role of excellent courses, promote the co-construction and sharing of subject construction. The current cloud computing with powerful computing and storage capacity, the cloud chart as shown in figure 1. Based on the data storage center, the data information can be strictly and effective management and control, and has a very high safety and reliability connection properties [6].

3.1 Building Exquisite Course of Cloud Platform

Application of cloud computing in the construction of excellent courses does not need to data information platform to make many changes, which realize the integration of education resources to the greatest extent. The main role of cloud computing in the high-quality goods curriculum construction as shown in figure 2, high share technical advantages of cloud computing to the existing high-quality goods curriculum resources into a super resources "cloud" as a whole, make the high quality curriculum resources can be developed with equal sharing among colleges and universities in underdeveloped areas.

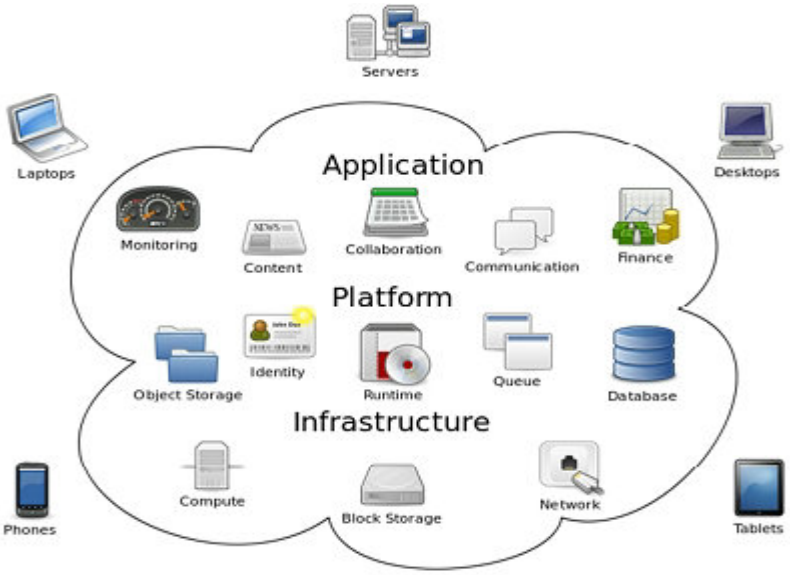

Fig. 1. Cloud computing

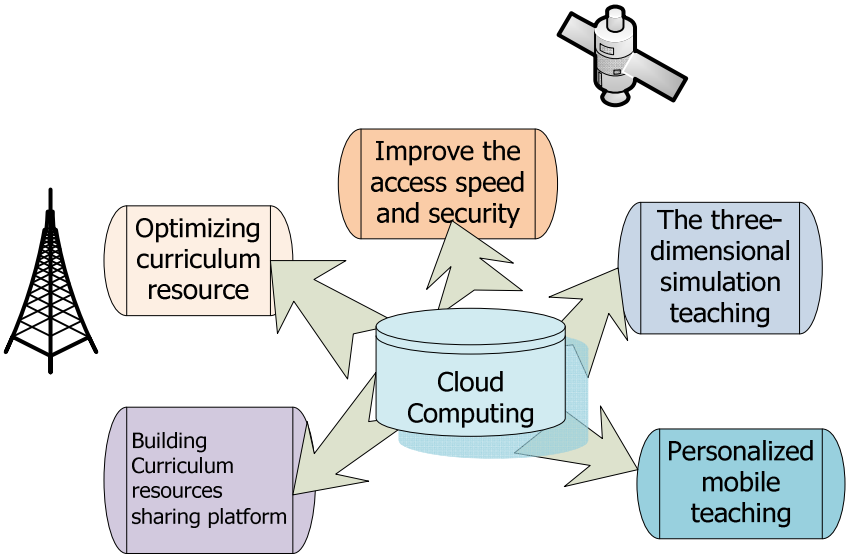

Fig. 2. Cloud computing application in curriculum construction

Appear easily in the construction process of different colleges and universities to build a course at the same time, the mutual relationship between their respective problems will lead to the same high quality courses construction, the use of cloud computing for excellent courses can give full play to the cloud computing sharing and optimization of the technological advantage, this can solve the problem of data redundancy and waste of resources [7].

Cloud computing can provide an integrated computing environment, all data are stored in the cloud, the user with access to the use of cloud computing can achieve the same working environment, user can choose according to their requirements in terms of curriculum resources. Cloud computing to build learning school teaching groups, users need to update a computer hardware and software upgrades, and only need to install a web browser on the computer, it is not affected by time and space limit to carry out teaching activities, implementation of personalized mobile excellent courses teaching.

3.2 Study Chord Algorithm

The application scope of excellent courses in order to meet the demands of the masses of users in a timely manner, improving the speed and security of the curriculum resource access is more and more important. The cloud computing Chord algorithm [8] can solve the problem of difficult access, but there is also some disadvantages, For example, the heterogeneity of nodes and redundant routing table is too large, when the network scale, these problems will seriously restrict the performance of the network resources in the search. So this article study Chord algorithm, on the basis of the original Chord algorithm to do a little improvement.

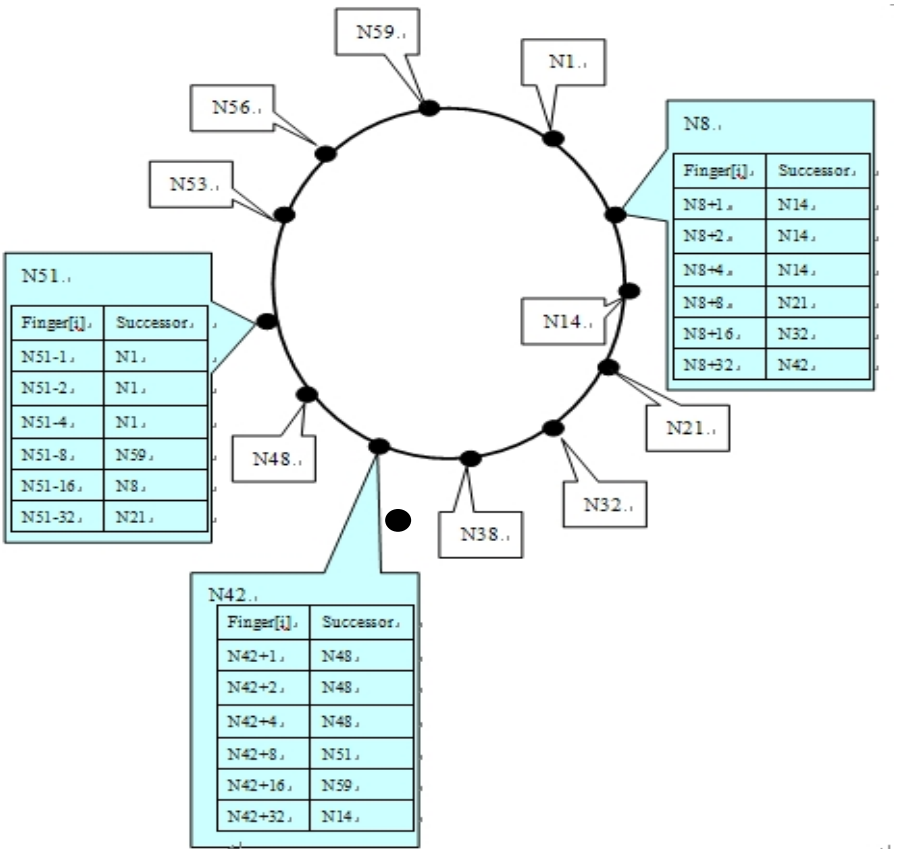

Fig. 3. Chord routing algorithms

From a macro perspective to look at the cloud computing network, because of the cloud computing network is composed of a number of cloud server together, we make a cloud server in the network, a node called cloud, as constitute the basic elements of network topology, and Chord link points. Basic structure of Chord routing algorithms such as figure 3, cloud node in the ability of processing data, storage, online there are differences in time and bandwidth.

Specific idea is: first of all, every cloud nodes in the network IP address, the same cloud nodes in the network number as a group, a Chord from the ring. And then in each group, a node evaluate the performance of the comparison of cloud, according to the result of the comparative evaluation, choose the best performance for super cloud node, and in the other group super cloud node according to the Chord algorithm of Chord main ring; Select performance after super node as a backup cloud node, in this super cloud node failure or leave the network, to take his work as new super cloud node. in order to facilitate description, we established in this definition the model for MC - Chord, concrete model structure as shown in figure 4.

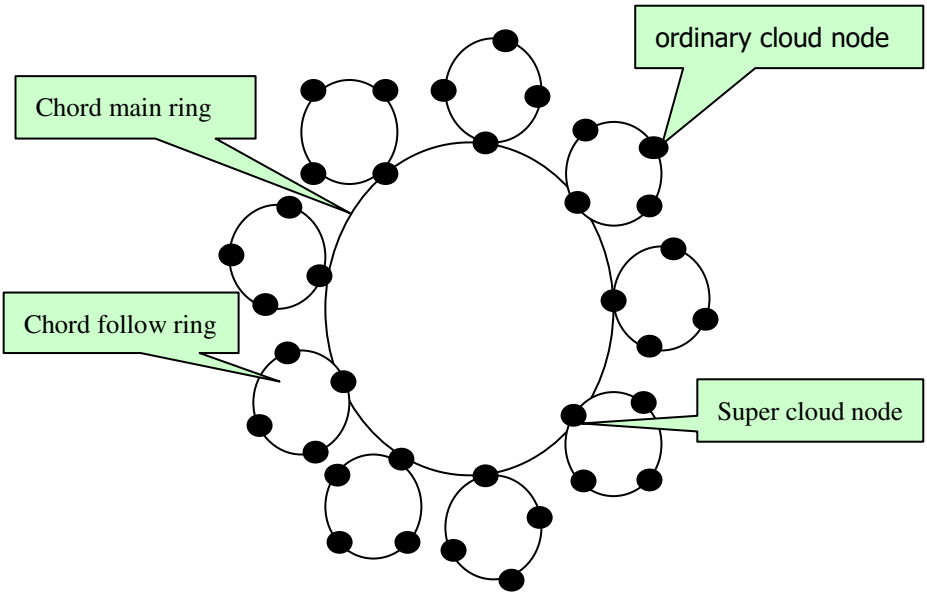

Fig. 4. MC-Chord

3.3 The Design of the Routing Table

In this model, the first super cloud node is the subordinate to the Chord from one member of the ring, so I need a table from the ring finger to show in each cloud node from the ring, the relationship between the super node is part of the Chord ring Lord of cloud, so you also need a main ring finger table to represent the main ring on the relationship between the various super cloud node. For ordinary cloud nodes, only need one from the ring finger to indicate where the relationship between the each cloud node from the ring. Considering the particularity of back-up cloud node, in addition to said

there is a node of the relationship between the ring clouds from the ring finger table, must also have a completely different and this group of super cloud nodes of the main ring finger table.

For each finger table above, in order to improve the routing efficiency, in this paper, on the basis of MC - Chord, finger table of node calculation formula is modified, the modified model is called the MFC - Chord. First of all, I consider it step by step, and the formula of introducing a parameter d, d said the distance between the current and subsequent cloud node. Due to the consistent hash function can make all the physical node roughly uniform distribution on the Chord ring, so any cloud node and its successor cloud node distance are roughly equal. The improved calculation formula is as follows:

$$\text{Finger}[j] = \begin{cases} (n+d) \bmod 2^m \cdots\cdots 1 \leqslant i \leqslant \left\lfloor \log_2^d + 1 \right\rfloor, j = 1 \\ (n+2^{i-1}) \bmod 2^m \cdots\cdots \left\lfloor \log_2^d + 1 \right\rfloor < i \leqslant m, j = i - \left\lfloor \log_2^d \right\rfloor \end{cases} \quad (1)$$

Figure 4 Chord ring as an example, shown in table 1 is a cloud node original finger table calculation formula of N1 finger table structure. Table 2 in (1) calculate the N1 finger table structure, including the parameters in the routing table finger formula d = 6. Contrast table 1 and table 2 shows that the improved N1 finger table without redundant information.

Table 1. The original Chord N1 finger table

Finger[i]	Successor
N1+1	N8
N1+2	N8
N1+4	N8
N1+8	N14
N1+16	N21
N1+32	N38

Table 2. Conclusion by type (1) N1 finger table

Finger[i]	Successor
N1+6	N8
N1+8	N14
N1+16	N21
N1+32	N38

Resources localization process

From the ring to find in the first place, if you can find the required resources, looking for an end to; Otherwise, and then to find between ring, until find relevant resources, the main steps are as follows:

(a) Cloud node query, first of all nodes in the cloud resource list query, if found direct return; Otherwise, turn to (b).

(b) In this cloud nodes belonging to a Chord from the ring shall be carried out in accordance with the routing policy lookup, if we can find the resources needed to deposit target cloud node, it returns the query results, or into (c).

(c) Whether the cloud node from the ring to belong to super node of cloud, if yes, are converted to (e); Otherwise to (d).

(d) This cloud node will request from the ring to belong to super cloud node。

(e) Super cloud nodes on the Chord ring Lord carried out in accordance with the routing lookup strategy to find the target from the ring's super cloud node, if successful, turn to the next step; Otherwise the query fails.

(f) Goals from the ring's super cloud node according to the routing lookup strategy in the node from the ring to find target cloud, if we can find, the query is successful, returns the query result; Otherwise, the query fails.

4 Conclusion

Based on the introduction of cloud computing in the construction of excellent courses, building the cloud service platform and optimizing the Chord algorithm in cloud computing, MC - Chord model was established. On the one hand, This model build a super node of cloud, solve the Chord system without considering the heterogeneity of the nodes, on the other hand the Chord routing table algorithm is improved, and reduce the redundant information routing table, expanded the coverage of the routing table. Experiment proves that the construction of excellent courses of cloud service platform can effectively solve the four problems in the construction of excellent courses. But a perfect quality courses cloud service platform structures requires more information resource and high configuration of the server hardware, need much money and skilled technical support. It is difficult to achieve a school. We need the government department report, enterprises and schools of cooperation to do together.

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