



E-Education using Cloud Computing

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ABSTRACT

This paper firstly introduces the characteristics and architecture of cloud computing, then characteristics of E-Education. By combining these two characteristics we can focus the application in order to improve the resources stability, balance and utilization to meet the demand for teaching and research activities and improves the value of E-Education.

Keywords: E-education, Cloud Computing, Architecture, Characteristics

1. INTRODUCTION

With the rapid development of modern knowledge society, there is an increasing demand of E-Education, that stress students' interaction when the availability of educational information and content is growing exponentially. National long-term plan of educational development and reform has point out that information technology has revolutionary impact on educational development [7].

Science entering into 21st century, with the rapid boom of computer network development, the information technologies is now more and more blended into our daily life. In the education field two main trends [5] can be observed: (1) constant evolution of IT infrastructure and (2) constant improvement of students' skills and knowledge of using IT resources. By implementing new computing architectures, such as cloud computing and service oriented architecture,

educational institutions are able to uniformly cover the whole organization with IT based services and e-education solutions.

2. CLOUD COMPUTING

2.1 The Concept of Cloud Computing

Cloud computing is a new supply pattern of computer infrastructure and application service, the metaphor [8] taking IT resources as a service to provide the means to some extent. Here IT resources include "applications, computing power, storage capacity, networking, programming tools, communications services and collaboration tools".

Though the definition of cloud computing is still not united and disputes still exist, a lot of common senses have been reached. On one hand, Google believes that cloud computing is to open standards and service-based, Internet centric, safe, fast and convenient data storage and network computing services [6]. Internet becomes the data center and computer center for each native. On the other hand, IBM believes that cloud computing is a virtual pool of computing resources, or a new mode of IT resources.

Cloud computing integrates all possible resources together and offer them to all users in the cloud. Besides, cloud computing developed from distributed computing and grid computing, combines grid computing, virtualization, Web 2.0, digitalization, storage, distributed technology, utility computing, IaaS, PaaS, SaaS, MSP, Internet integration, and trade service platform. This is illustrated in Figure 1. [2]

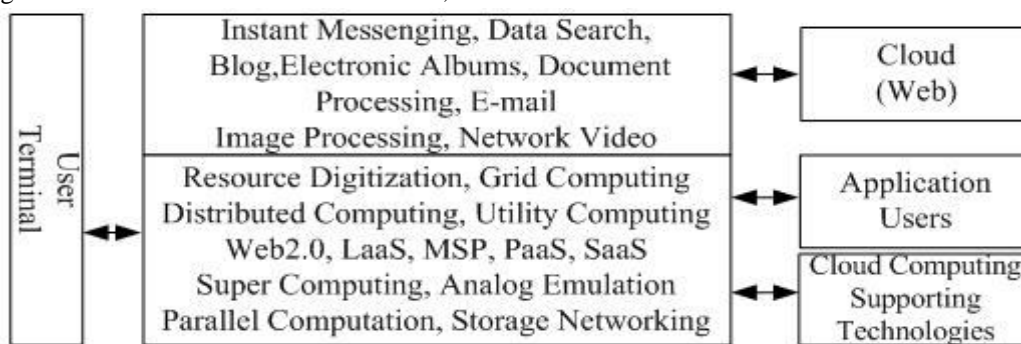


Figure 1: Cloud Computing Applications

Cloud computing is, in nature, the combination of server Virtualization Technology and IAAS (Infrastructure as a service), and it mainly offers the service in the form of computing resources after virtualizes the resources in some data center. Therefore, as is defined, in cloud computing local applications and clients are simplified and only equipped with a script-supporting browser, and then the function of pc is maximized.

2.2 The Characteristics of Cloud Computing

(1) In general cost is less and utilization is high. Cloud technology architecture can be more fully utilize the computing resources by using virtualization technology, due to reduction of the proportion of idle resources, thus achieving a lower application costs and higher return on investment.

(2) The provider’s computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. There is a sense of location-independence in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level

of abstraction. Examples of resources include storage, processing, memory, network bandwidth, and virtual machines. [8]

(3)The application service implementation and deployment are flexibility. A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service’s provider.

(4) Capabilities can be rapidly and elastically provisioned, in some cases automatically, to quickly scale out and rapidly released to quickly scale in. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be purchased in any quantity at any time.

2.3 Architecture of Cloud Computing

The architecture of Cloud computing platform can be divided into three layers; from the bottom to top it is followed by Based management system layer, Shared Service Interface Layer and Access Layer. The architecture model is shown in Figure 2. [1]

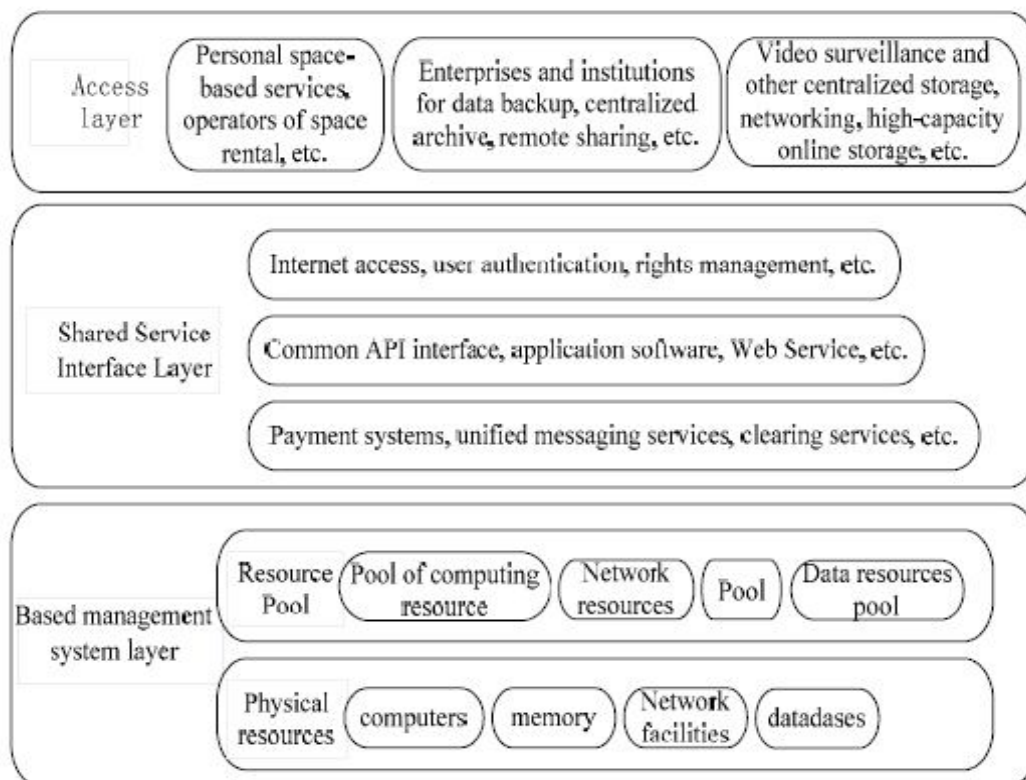


Figure 2: System Architecture of cloud computing

The Based management system layer is mostly used to solve computing resource sharing; it can be used as the E-education resource library. It includes hardware, storage, operating system and some other IT infrastructure and resource pool. It uses the hardware and software virtualization technology, coordinating action between the multi-level frameworks, to ensure stability and reliability of infrastructure.

At the same time it provides the basic network supported environment and provides the basic realization environment of service-oriented architecture, but also supplies the computing and storage capacity for the higher level. This layer ensures scalability and efficient use of resources for the cloud computing platform, provides computing resource, memory resource and data storage resource for the cloud computing application.

The Shared service interface layer is mostly to solve the manner in which the external provision of services, presents a powerful, high scalability, high availability of distributed applications for the users. And it is the Based management system layer's network expansion, involving unified management, distributed scheduling and security controls for large amounts of data or computing resources. This layer is a software system of an actual run of storage, maintenance and provision of data, it is a collection of objects of storage medium, processing and management system, and it is the E education web development/resource integration platform. In addition to the content network storage and maintenance, this layer also provides standard interfaces and content of the API for the higher layer. When resources in the library have a rich accumulation and a certain amount of knowledge systems, there is a need for resources package to form an independent resource platform to the upper access.

Access layer is the use of cloud computing means to achieve some specific applications; it is the last application platform to supply service for customer. It can divide into different application areas according to the specific needs of customers, such as office software service, personal space-based service and e-commerce and so on. At this level, cloud computing provides more convenient access to the E-learning resources.

3. CHARACTERISTICS OF E-EDUCATION

3.1 Current Status of Education

After years of construction, our construction of information technology in education has been made great achievements. Statistics show that IT investment in 2006, the total scale of education for the 30.48 billion [6], accounting for 68% of

hardware investment, the Education and Research Network covering 31 provinces, municipalities and autonomous regions of more than 200 cities, networking universities, teaching institutions and research more than 1,800 units, the user more than 2000 people, elected school curriculum, credit recognition, sharing of resources. And the various colleges and universities have set up their own campus network, digital libraries, and other modern educational information infrastructure, for basic education, "School Link" project will also be information of the level of primary and secondary education to a new level. So far the construction of educational information initially completed, but still we cannot meet the requirements of the development of education.

3.2 Characteristics of E-Education

In the 21st century, people have to learn more than ever before. Especially for global organizations, live classroom-based training is becoming too costly and cumbersome. Even if employees had the time to attend all the courses and seminars and to read all the books and reports they should to remain up-to-date in their area of work, the cost of such learning would be prohibitive. The need to transform how organizations learn points to a more modern, efficient, and flexible alternative: eLearning. The mission of corporate eLearning is to supply the workforce with an up-to-date and cost-effective program that yields motivated, skilled, and loyal knowledge workers.

The Internet can offer the logical solution for a company's education and training objectives. Approximately 80% of the professional workforce already uses computers on the job. Technical obstacles, such as access, standards, infrastructure, and bandwidth, will not be an issue in a few years. The growth of the World Wide Web, high-capacity corporate networks, and high-speed desktop computers will make learning available to people 24 hours a day, seven days a week around the globe. This will enable businesses to distribute training and critical information to multiple locations easily and conveniently. Employees can then access training when it is convenient for them, at home or in the office.

When delivered through technology based solutions, training is less expensive per end user due to scalable distribution and the elimination of high salaries for trainers and consultants. The biggest benefit of eLearning, however, is that it eliminates the expense and inconvenience of getting the instructor and students in the same place.

Web-based products allow instructors to update lessons and materials across the entire network instantly. This keeps content fresh and consistent and gives students immediate access to the most current data. Information can be retrieved

just before it is required, rather than being learned once in a classroom and subsequently forgotten.

Distance education can be more stimulating and encourage more critical reasoning than a traditional large instructor-led class because it allows the kind of interaction that takes place most fully in small group settings. Studies have shown that students who take online courses are typically drawn into the subject matter of the class more deeply than in a traditional course because of the discussions they get involved in [2]. This engagement is further facilitated by the fact that instructors do not monopolize attention in an online environment. Another study found that online students had more peer contact with others in the class, enjoyed it more, spent more time on class work, understood the material better, and performed, on average, 20% better than students who were taught in the traditional classroom.

4. E-EDUCATION IN CLOUD COMPUTING

In the age of cloud computing, all kinds of educational institutions in Jiangxi [2] province tend to function around the cloud computing environment. Many aspects are involved, such planning, implementation, operation and management. Cloud computing pattern converts capital expenditure into operation expenditure. Different educational institutions in Jiangxi province can purchase educational resources dynamically according to exact service condition. For in cloud computing funds for disposition of educational resources in advance are not a necessity, they could be used for admissions, teaching resource development and teaching management.

In this pattern, Jiangxi educational service will be provided in the form of cloud computing. At present, the basic form of resource provided by Jiangxi [2] educational institutions is digital computer files, and users have to download them from Internet. While in cloud computing pattern, the software will be integrated into educational resource pools (educational cloud), so that computing will be handled by relevant educational cloud software and the results be delivered to users.

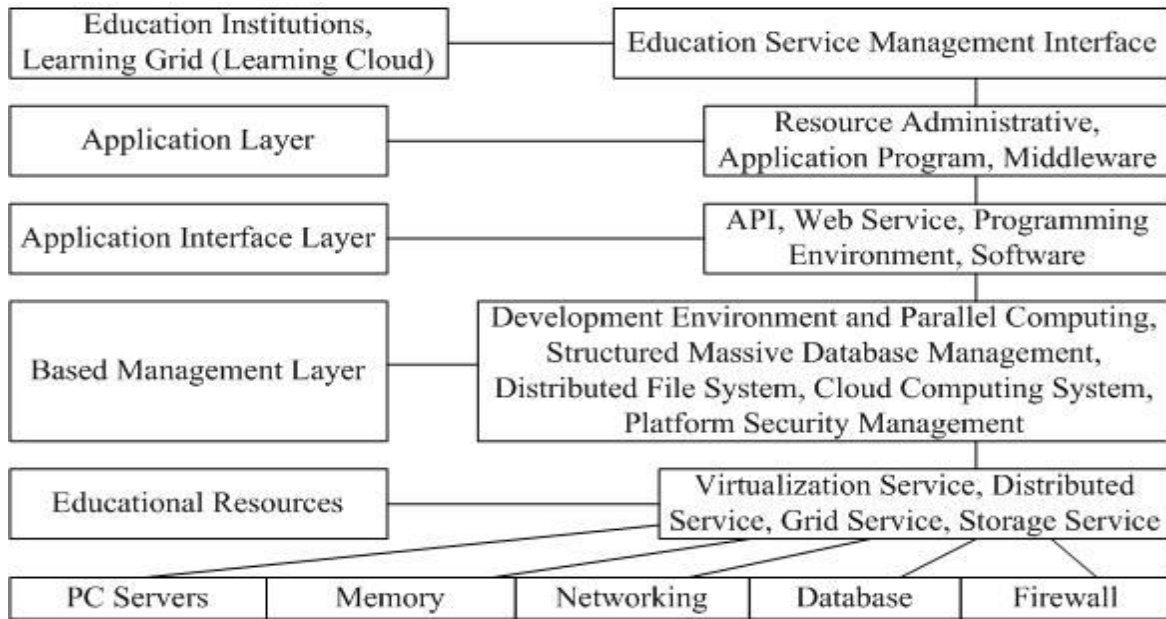


Figure 3: Basic Structure of E- Education Cloud

5. CONCLUSION

From this paper, we conclude that we can use cloud computing for distance education and the online training of business professionals. This is the lifetime pattern of educating people in very fast and easily.

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