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: Cloud Computing, E-Education

I] 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.

II] Cloud Computing

A. 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]
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 virtualizing 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.

B. The characteristics of cloud computing

(1) The lower overall cost and higher resource utilization. The use of virtualization technology, cloud technology architecture can be more fully utilize the computing resources, due to reduction of the proportion of idle resources, thus achieving a lower application costs and higher return on investment.

(2) Using of cloud computing architecture, the organizations can take the advantages of outsourcing to reduce the technical threshold of internal IT resources construction. Usually cloud service providers have professional technical support team to ensure the normal operation of cloud structure, which is more secure than selfbuilt IT infrastructure. [8]

(3) The application service implementation and deployment are flexibility. For the Internet application developers, the application development of cloud-based architecture means that no attention to the overall deployment of IT infrastructure, so you can focus resources on core business. As the various hierarchical of cloud computing services are transparent to each other, the choice of cloud infrastructure and cloud platforms can be "on demand", with greater flexibility.

(4) The terminal deployment is convenience. Application system based on cloud structure, its data storage and calculation, mainly in server and browser to achieve, thus saving the cost of deploying client-side input. For the end user, it also means that you can independent of the specific terminal (desktop or mobile terminal) and the operating system, as long as the access network, you can visit and use related services anytime and anywhere.

C. 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]
There, the Based management system layer is mainly to solve the sharing of computing resource, it can be used as the E-learning 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 mainly 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 learning 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.

III] Characteristics of E-Education

A. 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.

B. Characteristics of E-Education or E-Learning

E-Learning or Electronic Learning, is translated as "digital (based) Learning", "electronics (based) Learning", "network (based) learning", etc. The variety of perspectives of different translations: First, it emphasizes an Internet based learning; second, to emphasize electronic; third, to emphasize on E-Learning in joining digital content and network resources together, emphasize using technology to transform and guide the education. Some experts and scholars on the E-Learning gives a more comprehensive explanation: "E-Learning uses the Internet or other digital content for learning and teaching activities, which takes full advantage of modern educational technology provided with a new mechanism of communication and resource-rich learning environment to achieve a new way of learning "[2]. Among them, the key factors of E-Learning are reusing, sharing resources and interoperability. Compared with traditional teaching methods, E-learning is a good carrier of the content. Through a variety of teaching resources effectively organizing, sequencing, processing, it forms a web-based teaching and better than traditional teaching and learning environment, and is able to take full advantage of a variety of teaching resources. At the same time, E-learning for teachers and students, between students and students provides an interactive learning environment and it can effectively enhance students’ critical thinking and analytical skills, develop students self-learning ability. From the perspective of teaching resources, E-Learning is open. E-Learning for learners provides rich learning resources and selects learning materials and learning opportunities. This feature makes online education has more options than traditional education [3].

IV] 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.
A. The open framework for E-education cloud

The interoperable framework of e-Education cloud, can be introduced in Fig. 4; it has an open structure, can interoperate with external content and social service, it can interoperate with enterprise apps(such as CRM, ERP, Groupware, SharePoint, etc) and consumer apps(such as twitter, g-mail, YouTube, etc) at the data level by mapping mechanism. It has four layers: user experience, collaboration service, core service, and delivery platforms. This framework can make internal cloud and the external cloud interoperate with each other if you follow the standard.

V] Conclusion

Based on the above study, cloud computing platform can be widely used in distance education and the online training of business professionals. A lifelong learning environment should be built possibly to facilitate the development of information technology in education and ensure the further improvement of the quality of teaching and learning activities for changing the pattern of teaching.

VI] References

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