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On Cloud Computing Technology in the Construction of Digital Campus

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Abstract. The current construction of digital campus can cause high investment, difficult management, low efficiency, high energy consumption, low availability and other issues. This paper proposed a construction architecture of cloud computing. Virtual resources is created on hardware for the Linux server system, using LVS as a load balancing software to realize the resource access control, VEPA instead of the traditional virtual machine to solve problems. The architecture can improve the performance of the digital campus platform, provide better service for the teachers and students..

Keywords: Cloud computing, SOA, Digital Campus, Virtualization Technology

1. Introduction

With the deepening of educational reform and the rapid development of information technology, the digital campus construction has become the core content of the modernization construction at home and abroad, and has gradually become a symbol of college comprehensive strength and modernization level.

How to solve the problem that digital campus construction exists in high investment, difficult management, low efficiency, high energy consumption, low availability and other issues, is a very important part in the digital campus construction. The emergence of cloud computing can be a very good solution to the problem. Using virtualization technology in cloud computing can greatly reduce the maintenance cost and improve the utilization ratio of resources. The user can customize the corresponding services, applications and resources according to their own needs or preferences, cloud computing platform can deploy resources, computing, service and application according to the users' needs.

2. Related Work

2.1. The Working Principle Of Cloud Computing.

Cloud computing which make the distributed computing, storage, service component, software and other resources together, based on the means of resource virtualization, provide convenient and efficient service for users, it can realize the distributed and parallel processing of the computation and storage .

In a typical cloud computing mode, the user switch on network through the terminal, put forward demand to the" cloud";" cloud" organize resources after accept the request, provide services for the "end" through the network.The function of the user terminals can be greatly simplified, many complicated calculation and processing will be transferred to the terminal to complete behind the "cloud".

2.2. Linux Clusters.

Cluster is a kind of parallel or distributed processing system, which is composed of a set of interconnected by multiple independent computer and work as a single integrated computing resources. These computers can be single or multiprocessor system (PC, workstations or SMP), each node (node) has its own memory, I / O equipment and operating system. Clusters is a single system for users and applications, it can provide low-cost, efficient, high performance and fast, reliable service.

2.3. Linux Virtual Server.

LVS which is based on the IP layer load balancing scheduling technology, in the operating system kernel space, balanced transfer TCP / UDP request of the IP layer to a different server, and the server automatically screen out fault, then a group of servers constituted a high performance, high availability virtual server.

The architecture of Virtual server are shown in figure 1.

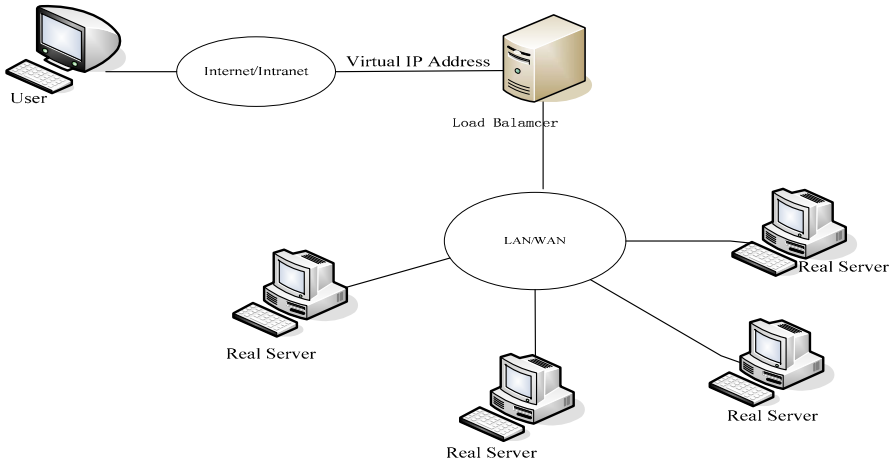

Fig. 1 The architecture of Virtual server

3. SOA

SOA is a component model, it can conduct distributed deployment, composition and use to loosely coupled coarse-grained application components through the network according to the needs . Using the IT architecture of SOA mode, the school can add new services or upgrade the existing service in accordance with the modular approach , in order to satisfy the new business needs, provide the choice which can provide services through different channels.

4. The Cloud Computing Based on SOAin the Application of Digital Campus

4.1. The characteristics of "cloud computing based on SOA".

SOA responds the structure change of “cloud computing services based on SOA architecture" through the manner of service management",to make corresponding adjustment for the existing structure.

SOA starts from the concept of architecture.The implementation of SOA are from the framework to technology, SOA can fully take into account the actual business of digital campus in the implementation process.

On-demand service design:Cloud computing service center will set up a huge pool of resources, including the storage resources and other resources, schools can call these resources according to the needs, ensure the effective utilization of resources.

Service scalability. " The cloud computing services based on SOA " will be expanded according to their requirements, cloud computing will compensate for SOA that the limitations on the service expansion.

4.2. The analysis of structure model.

In order to solve some problems that the traditional construction mode of the digital campus exists, this paper puts forward the digital campus architecture of the cloud computing which based on SOA, as shown in figure 2 .

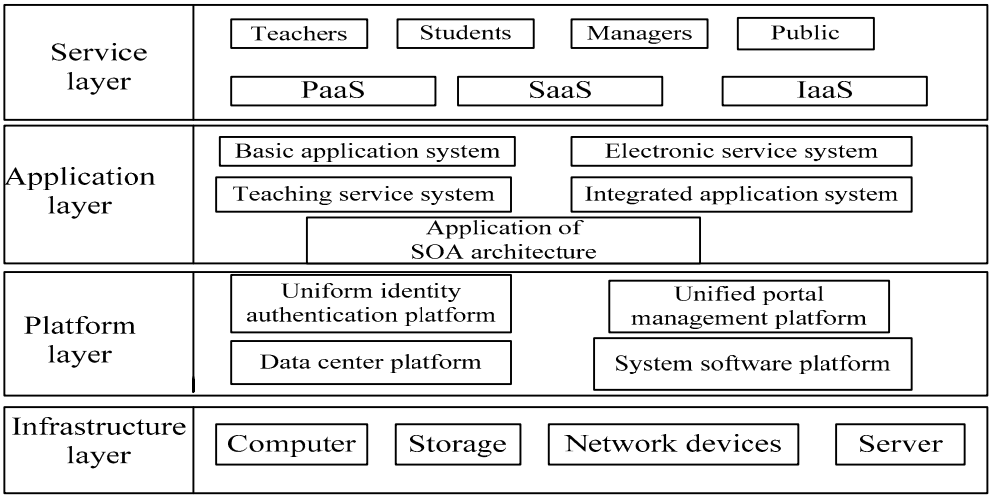

Fig. 2 The digital campus system structure of cloud computing based on SOA

From the figure we can see that the traditional architecture of the digital campus is divided into four layers: service layer, application layer, platform layer and infrastructure layer.

4.3. Service Layer.

The typical service model of cloud computing has three categories:"Software as a Service(SaaS)","Platform as a Service(PaaS)","Infrastructure as a Service(IaaS)".

Whether it is SaaS, PaaS, or IaaS, its core concept is to provide users with on-demand services. Digital campus users do not need to software vendor that maintain cloud computing. The services that users need don't come from local, but from the end of"cloud". The client only needs a computer that can connect to the Internet, preset the browser of " cloud operating system", software and hardware that users will applied is the cloud service form.

4.4. Application layer.

Through the application layer, the terminal user could not invest a lot of money to improve the local machine performance, proceed high strength calculation and large storage capacity that is far more than the upper limit of machine performance .In this paper the application layer use the SOA framework, because the combination of SOA architecture and cloud computing , can fully meet the needs of the digital campus users.

4.5. Platform layer.

The platform layer includes the unified identity authentication platform, unified management platform, data center platform and system software platform. The digital campus platform based on cloud computing is a powerful" cloud" network, connecting a large number of complicated network computing and service, can use virtualization to extend each server capacity, combinating their respective resources through the cloud computing platform, providing super computing and storage capacity.

4.6. Infrastructure layer.

The infrastructure layer includes hardware and software resources which support platform. Hardware includes computer, storage equipment and network equipment. Software includes storage, application and provided to the related services to the users. In cloud computing era, the local computer is no longer as traditional computer that need hard disk of enough space, high-power processors and large memory capacity, only need some of the necessary hardware equipment such as network equipment and the basic input and output equipment.

4.7. System Design and Implementation.

Virtual resources is created on hardware for the Linux server system, to build a Cluster tends to cloud system with the LVS. LVS as a load balancing software realize the resource access control, the end user only feel a virtual application server, the response server of the actual back-end can connect through the high-speed LAN.

We use SOA architecture as a support platform of digital campus system, it can solve the problem such as complicated college information service, distributed information resource, many users. The SOA architecture integrate distributed heterogeneous application systems in a unified application platform, to achieve a highly integrated application system, making the digital campus has broad scalability and adaptability.

5. Key Technology

5.1. Data center virtual machine network access technology.

This design uses VEPA to solve the problems of traditional virtual machine, The core idea of VEPA is that all the network traffic which the virtual machine generate delivered to the physical switches which connected to the server for processing, even on the virtual machine flow of the same server, will also be handling in the external physical switches. Specifically shown in figure 4.

5.2. Storage virtualization area.

Virtual storage technology make all the storage resources logically mapped into a whole, the application server which face is just a separate storage volume of good mapping, and do not control the underlying specific types of storage arrays, users do not need to care about how the storage array allocated space, processed data, only need to unified manage the storage volume of virtualized. It is logically assigned a space, the specific allocation of physical storage space adjust the size based on the application, do not waste space resources.

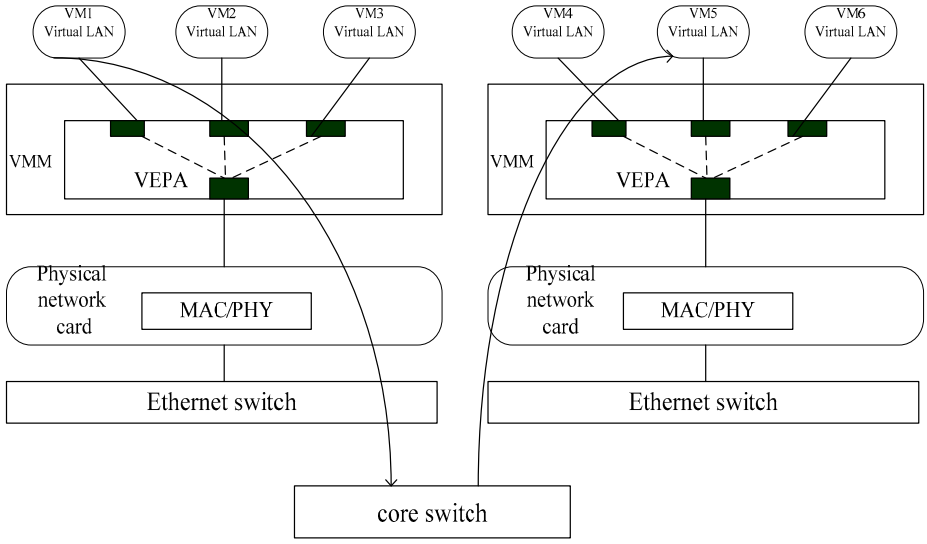

Fig. 4 the working principle of VEPA

6. Summary

Cloud computing based on SOA in the digital campus application, can well solve the problems that the IT infrastructure of digital campus face,through virtualization technology to build a Cluster tends to cloud system, and then use load balancing to re-mix of computing resources, well reduce the management difficulty of complexity environment,while also solve "with the need to provide"of computing resource, The approach of "service delivery " provide computing resources for the application, greatly improving the utilization rate of resources, reduce energy consumption, and improve the security of the entire system and high available capacity.

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