

# Network Application in University Based on Cloud Computing

Pasham Sai Sumanth Reddy<sup>1</sup>, Danil<sup>2</sup>

<sup>1</sup>Undergraduate Student, Department of Computer Science,  
Saveetha School of Engineering, Saveetha University, Chennai, India

<sup>2</sup>Associate Professor, Department of Computer Science,  
Saveetha School of Engineering, Saveetha University, Chennai, India

**Abstract:** *Integration of colleges and universities continue to expand, how the network soft, hard resource deployment and configuration become a difficult problem. After analyzing the university network funding, regional differences, and the current life of the computer and use efficiency, In the cloud computing environment using virtualization technology, cost savings and improve the software and hardware efficiency in the use of network resources building programs have been proposed. Proven, cloud computing model in the university network construction costs, efficiency in the use, energy consumption, management and maintenance of superiority.*

**Keywords:** Cloud computing; private cloud; the university network resources

## 1. Introduction

Integrated management of colleges and universities, it comes to the school of thought, university culture, disciplines, organizational systems and human resources, hardware and software resources rational allocation of many important and complex interfaces. Integrated management must grasp the internal rules of each interface in the actual process of operation, in order to improve education quality and efficiency. With the in-depth application of information technology and network users, the dramatic growth of information, the original independent campus applications increasingly difficult to meet the needs of .Urgent need to use the concept of advanced technology development and integration of network hardware and software resources, infrastructure applications on top of the new generation of information technology facilities, the formation of a unified information management and integration services, improve efficiency, save money. The cloud-based university network resources designed to solve this problem.

## 2. The Concept of Computing

Cloud computing[2] is a computing model of the Internet anytime, anywhere on-demand convenient access to pools of shared resources (such as computing facilities, storage devices, applications, etc.), is a model of business computing. It distribution of computing tasks in the resource pool consisting of a large number of computers, various application systems based on the need for computing power, storage space, and information services. Cloud computing is virtualization (Virtualization), utility computing (Utility Computing), IaaS (Infrastructure as a Service), PaaS (Platform as a Service), SaaS (Software as a Service) concept of mixed, development from Parallel Computing, the development of distributed computing and Grid Computing.

Currently, many companies cloud computing infrastructure cloud computing platform [1]. Distributed File System (googleFile System (GFS), large distributed database

BigTable, programming mode Map Reduce, distributed lock mechanism Chubby system Google's cloud computing platform. IBM Tivoli Monitoring software (Tivoli Monitoring), IBMDB2 database, IBM Tivoli deployment management software (Tivoli provisioning manager), IBM WebSphere application server and open source virtualization software and open-source information processing software together constitute the IBM "Blue Cloud" computing platform. Amazon's Elastic Compute Cloud is hosted cloud computing platform, users can directly through the user interface of the remote operation uses, see the actual physical node. Although cloud computing system common in many ways, but still very large difference between the various systems and platforms, is necessary to continue research and exploration of cloud computing.

## 3. Cloud-Based Network Design Architecture

As cloud software services and application development platforms - PaaS (Platform as a Service), the one hand, it provides a platform to build and run the software as a service, at the same time, it is responsible for managing all the hardware and software resources. Various cloud computing platforms have different characteristics, so cloud computing design, hardware and system software, including multiple levels [3]:

### A. Software Platform

The software platform is commonly known as the IaaS infrastructure when the service (Infrastructure as a Service), It is primarily oriented to provide users with virtualized computer resources, storage resources, network resources. Including servers, network devices, storage devices, including all hardware facilities, it is a cloud computing data center.

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### B. Cloud Platform

The cloud platform is the platform when the service (Platform as a Service), to provide users with services

development tools and basic software (such as: databases, distributed operating systems, etc.). Cloud platform need to have the Java runtime, Web 2.0 application runtime, all kinds of middleware.

### C. Cloud Services

Cloud services can also be referred to as software service (Software as a Service), refers to on the Internet using a standard interface to access one or more software functions. Traditional "software as a service, it's a little different, the traditional system needs service provider's own provision and management of hardware platforms and system platform on the cloud computing platform cloud services, do not need to provide the hardware platform and cloud platforms. Customers via the Internet anytime, anywhere access to a wide range of services to the customer site is not required to install and debug software, configure the server operation.

## 4. Cloud-Based University Network Resources

Service Programs Advantage of cloud computing university network campus efficient, fast, intensive, saving management costs, improve the management level. Cloud computing platform for integration into the university network resources services program should cover the following areas [4].

### A. Infrastructure services

Infrastructure services through the cloud platform for computing resources, storage resources, network resources or infrastructure support services. Is based on a wide range of access interconnection network. The aim is to integrate existing hardware and software resources, the resource pool design, dynamic virtualized resources through the cloud platform for various departments, these resources include the virtual machines, storage, load balancing, and virtual network. Involved the resource scheduling management system, unified management and scheduling data processing, storage, and other resources to achieve real-time monitoring of resource usage, comprehensive analysis, rapid deployment, dynamic expansion to achieve efficient use of resources, reduce energy consumption.

### B. Support software, service

Support software service departments can use the cloud platform application support software for the operating system, middleware, database and development tools, business application development and deployment services. The application functionality service is various departments directly using a variety of applications in the cloud platform service software, and business applications quickly. Cloud platform of unified planning, design, development and deployment of web systems, mail systems, instant messaging, electronic document transmission system, office systems and other common application services software.

### C. Information resources, information security services

Information resources services departments use the information provided on the cloud platform resource directory search tools, access to information resources sharing, query, exchange and other services to support device-independent security and privacy protection mechanism. For colleges and universities in terms of the

professional information resources services, paperless teaching, textbooks and resource sharing in the private cloud storage space, teachers and students in the class when the resource is downloaded to their computers to solve the part of the teaching of a continuing nature, repeated implementation problems due to equipment factors.

Information security service is to build a safe and controlled through a unified information security infrastructure, integrated use of security techniques to develop the full range of security systems and standards, based on the common platform for various departments to provide security services to carry out business applications. Give full consideration to the information security risks of cloud computing technology applications brought against possible data loss and leakage, shared technology vulnerabilities, the unsafe application programming interface and other issues, design appropriate security measures.

### D. Application deployment, operations support services

Analysis departments should use the different needs of the cloud platform, the classified design application deployment and service solutions, to develop service standards and norms through the establishment of a unified operating service system, to meet the demand for the various departments, in response to the prompt, safe and reliable operation security services. A graph within a graph is an "inset", not an "insert". The word alternatively is preferred to the word "alternately" (unless you really mean something that alternates).

**Table 1:** Network application in university based on cloud computing

| User access interface |   |                               |
|-----------------------|---|-------------------------------|
| SaaS                  | application functionality service Information resource            | Information Security Services |
| Paas                  | Application deployment, run security services                     |                               |
| IaaS                  | Cloud computing infrastructure services, Support software service |                               |

## 5. Design And Implementation of the University Network Resources Based on Cloud Computing

### A. Cloud computing network structure design [5]

Reasonable network architecture private cloud building into the university network resources building process, the full integration of existing hardware resources in schools, be seen from Figure 1 cloud computing platform through the existing network technology, make full use of the physical resources, virtualization technology introduced into the university system, the establishment of a database of resources based on the sharing of resources. User through the existing terminal, obtain the appropriate permissions to the cloud platform applications and registrations account the existing infrastructure on the cloud platform, to participate in the business and services. At the same time, reduce the user terminal processing burden, and sharing of teaching resources. Moreover, the cloud computing platform flexible rights management, each organization, management and authorized users of business data, data tracking and control, without having to worry about data security issues. In the

whole structure, the structures of the three networks: one as an off-campus access to the network through the internet to access the authentication server to access campus resources, as school access network (based on the actual application can be divided into multiple VLANs), and another as a virtual center management network and virtual machines dynamically migrate network. Combined with the requirements of the physical environment, the network card set in a different segment.

The network architecture shown in Figure 1 can use the server on which the virtualization management, while running the other servers in the above application. 7 server to take over the application of the above application and expansion of all other remaining servers. XenCenter unified management platform, a server installed XEN physical servers and virtual machines in a unified management console inside. A server dedicated to be the backup server, installs the backup management software, backing up virtual machines in a timely manner. Using third-party backup server backup process only takes up the backup server's resources, and does not take up any other machine resources.

Xen virtualization architecture, the decrease in the number of servers in half, saving hardware costs, and reduce server management, input cost. Xen virtualization architecture improves the quality of the data run. As data backup, data center server to improve data reliability, no distance limitations, to meet the data backup requirements. XEN virtual server an authorization can override a SUSE Linux Enterprise Serve and multiple clients SUSE Linux Enterprise Serve 4 server as XEN virtual server as XenCenterR and the backup server. Database servers and application servers are deployed in Xen virtual server, even if the hardware error, XenMotion function will also be automatically backed up to another virtual server, to improve the reliability of the data. Or damage to the system the XenCenter technology in the shortest possible time, so that the application system environment restored to health.

## B. Private cloud build step

The establishment of private clouds to meet the requirements of the university network server and storage resource sharing, improved utilization of existing network resources, reduce hardware costs and management complexity, and private cloud build steps are shown in Table 2.

Open source cloud, private cloud settings can be selected such as: OpenStack, Eucalyptus, abiCloud management software, you can create an administrative resources and can expand as needed. Enabling the system to a fast, simple and scalable way to create and manage large, complex IT infrastructure (including virtual servers, networks, applications, storage devices, etc.) to save costs and improve efficiency.

**Table 2:** Private Cloud Build a Flowchart of Steps

|        | <i>Construction Step</i>              | <i>Specific Measures</i>   |
|--------|---------------------------------------|--|
| Step 1 | Install the primary domain controller | New users, add roles, the establishment of ISO storage mirroring, VM virtual directory |
| Step 2 | Install the secondary                 | Written to the primary domain  |

|        | controller  | user name, password step3   |
|--------|---|---|
| Step 3 | Install a virtual machine                             | virtual machine: Monitoring node status, generate an alarm report SCVMM virtual machine: each node of |
| Step 4 | Configuring the storage                               | Configuring Storage Devices   |
| Step 5 | Configuration engage availability machine             | Create a cluster directory  |
| Step 6 | Migration of the physical host for the virtual server | Remotely connected to the server  |

## C. Open source cloud [6]

Use AbiCloud one major difference compared to other similar products in its powerful Web interface management. By dragging a virtual machine to deploy a new service, support VMware, KVM and Xen.

Operating environment: abiCloud of platform installation, there are two different components you want to install (server and cloud nodes).

Server Requirements: Linux (Ubuntu, CentOS), windows xp environment

Yun running Sun's Java environment JRE1.6 Wget (only when using linux) unzip (only when using linux) Node requirements: hypervisor support: virtualbox (2.2.x version) KVM (with libvirt) The XEN (with libvirt) Installation steps:

Step1. The download abiCloud-1.0.0.GA-community-windows-installer.exe

Step2. From the network to download the mysql- noinstall-5.1.31-win32.zip and apache-tomcat-6.0.18.zip the supporting version

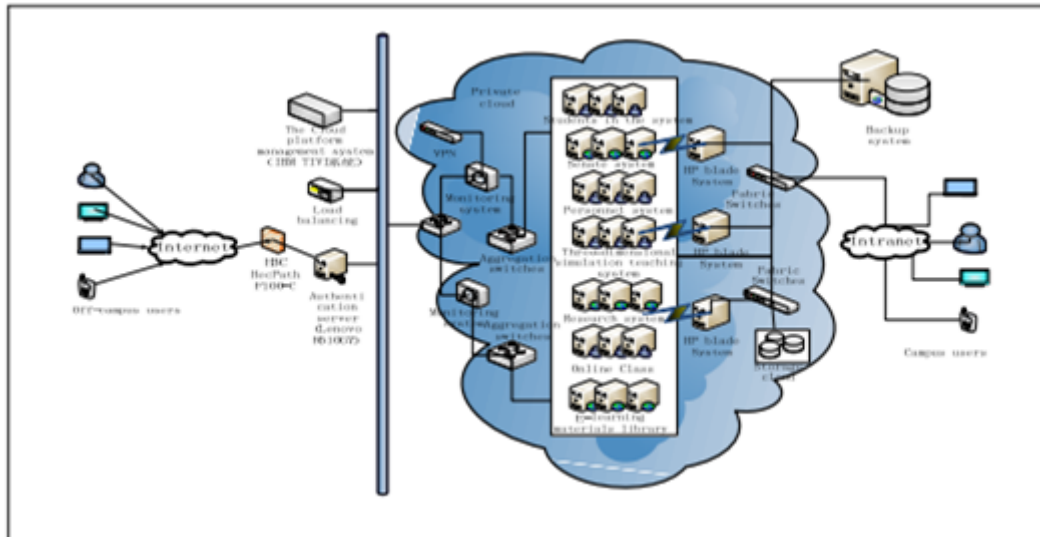
Step3. The installation JRE1.6 Step-by-step installation. Platform after installation is complete Abicloud can access the application, session stored in the database for user authentication. The platform Abicloud system administrators and enterprise cloud management, cloud users three roles. Access can choose a different cloud solutions, user management, infrastructure management, memory / processor / hard disk management, virtual data center management, the user can set according to different needs.

## 6. Summary and Outlook

In conclusion, through virtualization, without the limitations of hardware, Cloud computing platform can be extremely flexible to meet various needs. Based on the above characteristics, the cloud platform will be integrated into all walks of life, information management across all industries into a new stage, China Mobile "digital campus construction projects will greatly promote the pace of development of the university" cloud "will become the university network resources to optimize the use of another opportunity.

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**Figure 1:** Network-centric architecture diagram is based on a cloud computing platform