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Cloud Computing for University Laboratory Construction

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Abstract: Educational establishments continue to seek opportunities to rationalize the way they manage resources. cloud computing is to supply safe, quick, convenient data storage. It will make significant impacts in the construction of digital resources in college. This thesis firstly introduce its definition, theory of work and nature, and describe its applications at present, then analyze the problems that exist in the construction of information resources in college, finally study the applications of information resources construction in college in detail.

Keywords: Cloud computing; information resources construction; resources combination

1. INTRODUCTION

Cloud computing, the long-held dream of computing as a utility, has the potential to transform a large part of the IT industry, making software even more attractive as a service and shaping the way IT hardware is designed and purchased. Developers with innovative ideas for new Internet services no longer require the large capital outlays in hardware to deploy their service or the human expense to operate it. They need not be concerned about over provisioning for a service whose popularity does not meet their predictions, thus wasting costly resources, or under provisioning for one that becomes wildly popular, thus missing potential customers and revenue. Moreover, companies with large batch-oriented tasks can get results as quickly as their programs can scale, since using 1,000 servers for one hour costs no more than using one server for 1,000 hours. This elasticity of resources, without paying a premium for large scale, is unprecedented in the history of IT. As a result, cloud computing is a popular topic for blogging and white papers and has been featured in the title of workshops, conferences, and even magazines[6].

2. WHAT IS CLOUDCOMPUTING?

There seems to be many definitions of cloud computing around. Cloud computing refers to both the applications delivered as services over the Internet and the hardware and systems software in the data centers that provide those services[1]. The services themselves have long been referred to as Software as a Service (SaaS).a Some vendors use terms such as IaaS (Infrastructure as a Service) and PaaS (Platform as a Service) to describe their products.

- Infrastructure as a Service (IaaS): Products offered via this mode include the remote delivery (through the Internet) of a full computer infrastructure (e.g., virtual computers, servers, storage devices, etc.);
- Platform as a Service (PaaS): To understand this cloudcomputing layer one needs to remember the traditional computing model where each application managed locally required hardware, an operating system, a database, middleware, Web servers, and other software. One also needs to remember the team of network, database, and system management experts that are needed to keep everything up and running. With cloudcomputing, these services are now provided remotely by cloud providers under this layer;
- Software as a Service (Saas): Under this layer, applications are delivered through the medium of the Internet as a service. Instead of installing and maintaining software, you simply access it via the Internet, freeing yourself from complex software and hardware management. This type of cloud service offers a complete application functionality that ranges from productivity (e.g., office-type) applications to programs such as those for Customer Relationship Management (CRM) or enterprise-resource management[2].

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The line between “low-level” infrastructure and a higher-level “platform” is not crisp. We believe the two are more alike than different, and we consider them together. Similarly, the related term “grid computing,” from the high-performance computing community, suggests protocols to offer shared computation and storage over long distances, but those protocols did not lead to a software environment that grew beyond its community.

The data center hardware and software is what we will call a cloud. When a cloud is made available in a pay-as you-go manner to the general public, we call it a public cloud; the service being sold is utility computing. We use the term private cloud to refer to internal data centers of a business or other organization, not made available to the general public, when they are large enough to benefit from the advantages of cloud computing that we discuss here. Thus, cloud computing is the sum of SaaS and utility computing, but does not include small or medium sized data centers, even if these rely on virtualization for management. People can be users or providers of SaaS, or users or providers of utility computing. We focus on SaaS providers (cloud users) and cloud providers, which have received less attention than SaaS users. In some cases, the same actor can play multiple roles. For instance, a cloud provider might also host its own customer-facing services on cloud infrastructure [3,4].

3. METHODOLOGY

To demonstrate the viability of cloud computing for organizations (especially educational establishments) and its huge potential benefits, an introduction will be given in order to highlight the common economic issues associated with having an IT infrastructure. Furthermore, a number of general examples will be provided to demonstrate the emerging popularity of cloud computing with some educational and business establishments.

4. CASE STUDY

Four servers were select as test platform under the tested environment, the concrete disposition was as follows: HP Proliant DL380 G5, x Intel(R) Xeon(R) CUP 5110 1.60GHz and 4 GB Menory.

These four servers are serves for my student to do the innovation experiment. Each server installs an operating system, embarked a duty. Server utilization rate as follows:

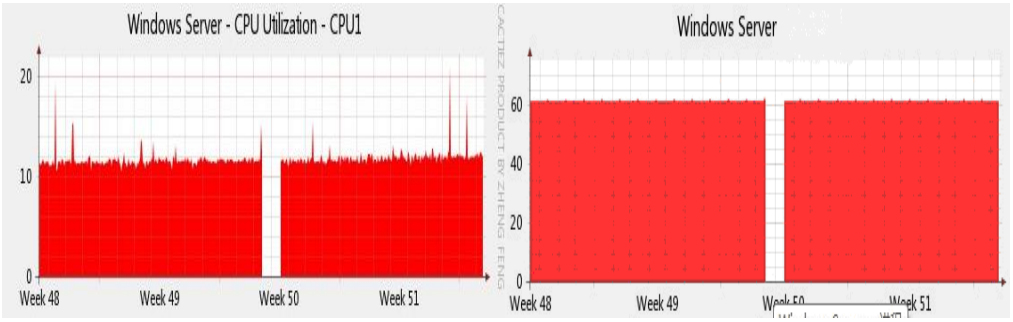

Figure 1. Server utilization rate

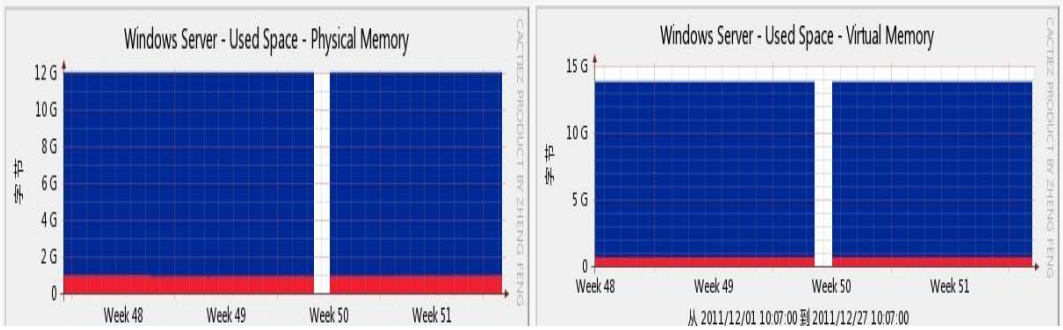

Figure 2. Windows server utilization rate

Builds the private cloud to calculate the platform，Use cloud computating software: VMware ESX 4.1.0, VMware vCenter 4.1 and VMware cSphere Client 4.1.

VMware, Inc. (NYSE: VMW) is a company providing virtualization software, founded in 1998 and based in Palo Alto, California, USA. The company was acquired by EMC Corporation in 2004, and operates as a separate software subsidiary. VMware's desktop software runs on Microsoft Windows, Linux, and Mac OS X, while VMware's enterprise software hypervisors for servers, VMware ESX and VMware ESXi, are bare-metal embedded hypervisors that run directly on server hardware without requiring an additional underlying operating system.

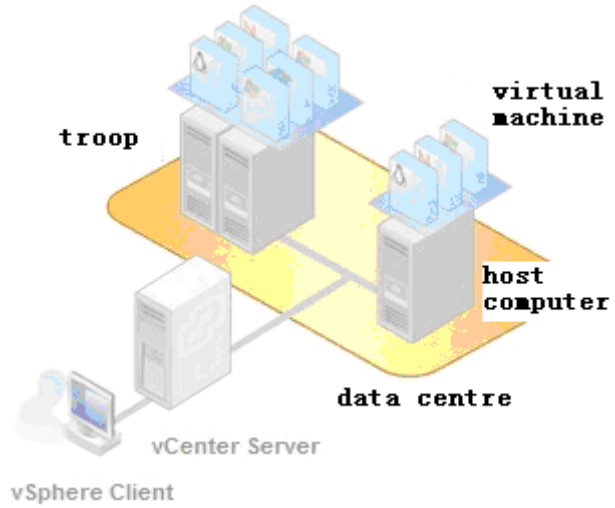

Figure 3. Private cloud platform

There are four servers in the experiment and each server hypothesized installs three operating systems, embarked three duties. Server utilization rate as follows:

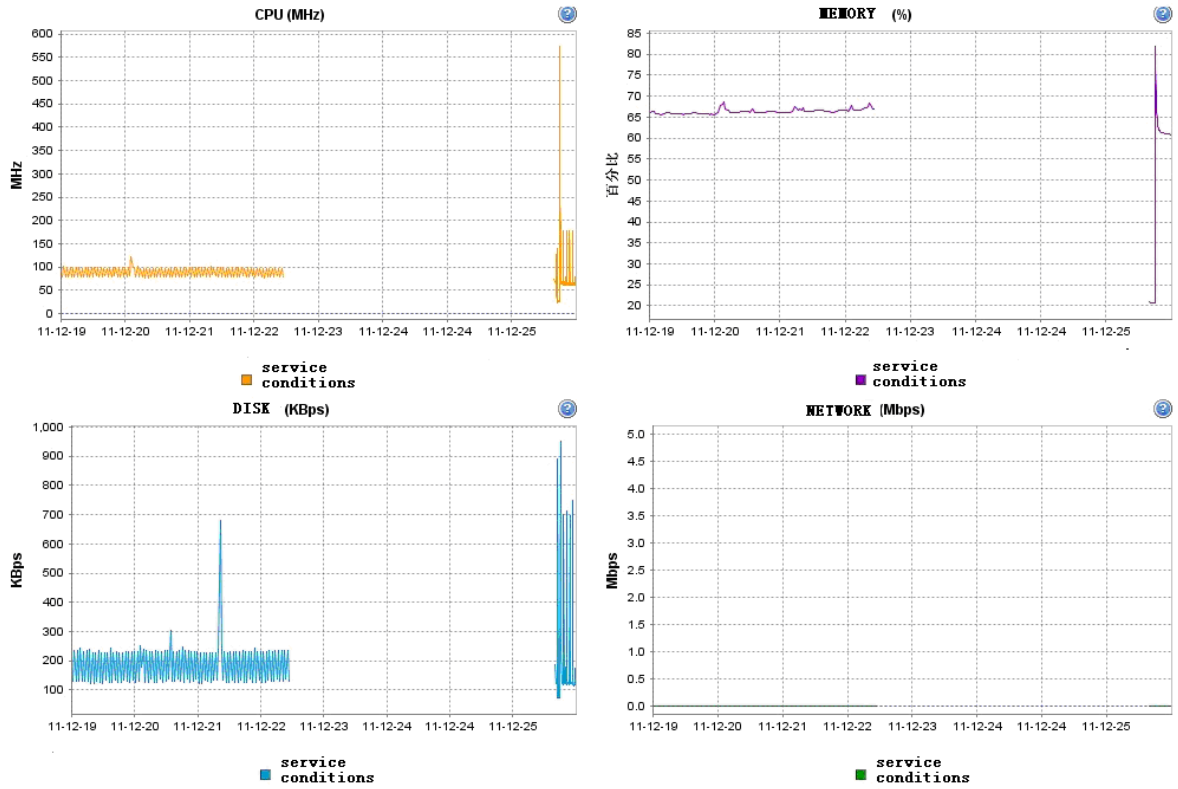

Figure 4. Server utilization rate using cloud computing

5. CLOUD CONCERNS

Cloud computing, as indicated above, is an emerging computing service paradigm. And, like other new services of this scale and complexity, there are bound to be fears, uncertainties and concerns about the technology's maturity. The most important of those concerns can be identified as those relating to control, vendor lock, performance, latency, security, privacy and reliability.

Essentially securing an Information System (IS), involves identifying unique threats and challenges which need to be addressed by implementing the appropriate countermeasures. Ultimately, the identified security requirements and selected security controls are introduced to the standard systems engineering process, to effectively integrate the security controls with the information systems functional and operational requirements, as well as other pertinent system requirements (e.g., reliability, maintainability, supportability) . Cloud computing due to its architectural design and characteristics imposes a number of security benefits, which include centralization of security, data and process segmentation, redundancy and high availability. While many traditional risks are countered effectively, due to the infrastructures singular characteristics, a number of distinctive security challenges are introduced. Cloud computing has "unique attributes that require risk assessment in areas such as availability and reliability issues, data integrity, recovery, and privacy and auditing". Security in general, is related to the important aspects of confidentiality, integrity and availability; they thus become building blocks to be used in designing secure systems. These important aspects of security, apply to the three broad categories of assets which are necessary to be secured, data, software and hardware resources. The cloud infrastructure proposes unique security challenges which need to be considered in detail[5].

Confidentiality refers to only authorized parties or systems having the ability to access protected data. The threat of data compromise increases in the cloud, due to the increased number of parties, devices and applications involved, that leads to an increase in the number of points of access. Delegating data control

to the cloud, inversely leads to an increase in the risk of data compromise, as the data becomes accessible to an augmented number of parties. A number of concerns emerge regarding the issues of multitenancy, data remanence, application security and privacy .

Multitenancy refers to the cloud characteristic of resource sharing. Several aspects of the IS are shared including, memory, programs, networks and data. Cloud computing is based on a business model in which resources are shared (i.e., multiple users use the same resource) at the network level, host level, and application level. Although users are isolated at a virtual level, hardware is not separated. With a multitenant architecture, a software application is designed to virtually partition its data and configuration so that each client organization works with a customized virtual application instance. Multitenancy, is relative to multitasking in operating systems. In computing, multitasking is a method by which multiple tasks, also known as processes, share common processing resources such as a CPU. Multitenancy, as multitasking, presents a number of privacy and confidentiality threats. Object reusability is an important characteristic of cloud infrastructures, but reusable objects must be carefully controlled lest they create a serious vulnerability. Data confidentiality could be breached unintentionally, due to data remanence. Data remanence is the residual representation of data that have been in some way nominally erased or removed. Due to virtual separation of logical drives and lack of hardware separation between multiple users on a single infrastructure, data remanence may lead to the unwilling disclosure of private data. But also maliciously, a user may claim a large amount of disk space and then scavenge for sensitive data.

Data confidentiality in the cloud is correlated to user authentication. Protecting a user's account from theft is an instance of a larger problem of controlling access to objects, including memory, devices, software etc. Electronic authentication is the process of establishing confidence in user identities, electronically presented to an information system. Lack of strong authentication can lead to unauthorized access to users account on a cloud, leading to a breach in privacy.

Privacy is the desire of a person to control the disclosure of personal information. Organizations dealing with personal data are required to obey to a country's legal framework that ensures appropriate privacy and confidentiality protection. The cloud presents a number of legal challenges towards privacy issues involved in data stored in multiple locations in the cloud, additionally increasing the risk of confidentiality and privacy breaches. Instead of its data being stored on the company's servers, data is stored on the service provider's servers, which could be in Europe, Asia, or anywhere else. This tenet of cloud computing conflicts with various legal requirements, such as the European laws that require that an organization know where the personal data in its possession is at all times.

6. Conclusion

We predict cloud computing will grow, so developers should take it into account. Regardless of whether a cloud provider sells services at a low level of abstraction like EC2 or a higher level like AppEngine, we believe computing, storage, and networking must all focus on horizontal scalability of virtualized resources rather than on single node performance.

7. ACKNOWLEDGMENT

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