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CLOUD COMPUTING AND ITS APPLICATIONS

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Abstract:

Cloud computing is the development of parallel computing distributed, grid computing and virtualization technologies which define the shape of a new era. we explore the concept of cloud computing with grid computing. In this paper, We address the characteristics and applications. However, security and privacy issues present a strong barrier for users to adapt into cloud computing systems. We also investigate several cloud computing system providers about their concerns on security and privacy issues.

Keywords: Cloud computing, grid computing, security, privacy issues.

INTRODUCTION

Cloud computing is a complete new technology. It is the development of parallel computing, distributed computing grid computing, and is the combination and evolution of Virtualization, Utility computing, Software-as-a-Service (SaaS), Infrastructure-as-a-Service (IaaS) and Platform-as-a-Service (PaaS). Cloud is a metaphor to describe web as a space where computing has been pre installed and exist as a service; data, operating systems, applications, storage and processing power exist on the web ready to be shared. To users, cloud computing is a Pay-per-Use-On-Demand mode that can conveniently access shared IT resources through the Internet. Where the IT resources include network, server, storage, application, service and so on and they can be deployed with much quick and easy manner and least management and also interactions with service providers. Cloud computing can much improve the availability of IT resources and owns many

advantages over other computing techniques. Users can use the IT infrastructure with Pay-per-Use-On-Demand mode; this would benefit and save the cost to buy the physical resources that may be vacant.

The rest of the paper is organized as follows: We define architectural components such as Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS) and Data as a Service (DaaS). Then, we compare cloud and grid computing explain some popular cloud computing, we include few applications of cloud computing. We further explained about issues and challenges of cloud computing and Finally, we concluded.

Software as a Service (SaaS)

Cloud consumers release their applications in a hosting environment, which can be accessed through networks from various clients (e.g. Web browser, PDA, etc.) by application users. Cloud consumers do not have control over the cloud infrastructure that often employs multi-tenancy system architecture, namely, different cloud consumers' applications are organized in a single logical environment in the SaaS cloud to achieve economies of scale and optimization in terms of speed, security, availability, disaster recovery and maintenance.

Examples of SaaS include Sales Force.com, Google Mail, Google Docs, and so forth.

Platform as a Service (PaaS)

PaaS is a development platform supporting the full" Software Lifecycle" which allows cloud consumers to develop cloud services and applications (e.g. SaaS) directly on the PaaS cloud. Hence, the difference between SaaS and PaaS is that SaaS only hosts completed cloud applications whereas PaaS offers a development platform that hosts both completed and in-progress cloud applications. This requires PaaS, in addition to supporting application hosting environment, to possess development infrastructure including programming environment, tools, configuration management, and so forth. An example of PaaS is Google App Engine.

Infrastructure as a Service (IaaS)

Cloud consumers directly use IT infrastructures (processing, storage, networks and other fundamental computing resources) provided in the IaaS cloud. Virtualization is extensively used in IaaS cloud in order to integrate/decompose physical resources in an ad-hoc manner to meet growing or shrinking resource demand from cloud consumers. The basic strategy of virtualization is to set up independent virtual machines (VM) that are isolated from both the underlying hardware and other VMs. Notice that this strategy is different from the multi-tenancy model, which aims to transform the application software architecture so that multiple instances (from multiple cloud consumers) can run on a single application (i.e. the same logic machine). An example of IaaS is Amazon's EC2.

Data as a Service (DaaS)

The delivery of virtualized storage on demand becomes separate Cloud service - data storage service. Notice that DaaS could be seen as a special type IaaS. The motivation is that on-premise enterprise database systems are often tied in a prohibitive upfront cost in dedicated server, software license, post-delivery services and in-house IT maintenance. DaaS allows consumers to pay for what they are actually using rather than the site license for the entire database. In addition to traditional storage interfaces such as RDBMS and file systems, some DaaS offerings provide table-style abstractions that are designed to scale out to store and retrieve a huge amount of data within a very compressed time frame, often too large, too expensive or too slow for most commercial RDBMS to cope with. Examples of this kind of DaaS include Amazon S3, Google Big Table, and Apache DBase, etc.

COMPARISION BETWEEN CLOUD AND GRID COMPUTING

A comparison can be summaries as follows:

1) Construction of the grid is to complete a specified task, such as biology grid, Geography grid, national educational grid, while Cloud computing is designed to meet general application and there are not grid for a special field.

2) Grid emphasizes the "resource sharing" to form a virtual organization. Cloud is often owned by a single physical organization (except the community Cloud, in this case ,it is owned by the community), who allocates resources to different running instances.

3) Grid aims to provide the maximum computing capacity for a huge task through resource sharing. Cloud aims to suffice as many small-to-medium tasks as possible based on users' real-time requirements. Therefore, multi-tenancy is a very important concept for Cloud computing.

4) Grid trades re-usability for (scientific) high performance computing. Cloud computing is directly pulled by immediate user needs driven by various business requirements.

5) Grid strives to achieve maximum computing. Cloud is after on-demand computing – Scale up and down, in and out at the same time optimizing the overall computing capacity.

APPLICATIONS

There are a few applications of cloud computing as follows:

1) Cloud computing provides dependable and secure data storage center.

2) Cloud computing can realize data sharing between different equipments.

3) The cloud provides nearly infinite possibility for users to use the internet.

4) Cloud computing does not need high quality equipment for the user and it is easy to use.

ISSUES IN CLOUD COMPUTING

More and more information on individuals and companies is placed in the cloud; concerns are beginning to grow about just how safe an environment it is? Issues of cloud computing can summarize as follows:

Privacy

Cloud computing utilizes the virtual computing technology, users' personal data may be scattered in various virtual data centers rather than stay in the same physical location, users may leak hidden information when they are
accessed cloud computing services. Attackers can analyze the critical task depend on the computing task submitted by the users.

Reliability

The cloud servers also experience downtimes andslowdowns as our local server.

Legal Issues

Worries stick with safety measures and confidentiality of individual all the way through legislative levels.

Compliance

Numerous regulations pertain to the storage and use of data requires regular reporting and audit trails. In addition to the requirements to which customers are subject, the datacenters maintained by cloud providers may also be subject to compliance requirements.

Freedom

Cloud computing does not allow users to physically possess the storage of the data, leaving the data storage and control in the hands of cloud providers.

SECURITY AND PRIVACY ISSUE

Cloud computing can provide infinite computing resources on demand due to its high scalability in nature, which eliminates the needs for Cloud service providers to plan far

ahead on hardware provisioning. Many companies, such as Amazon, Google, Microsoft and so on, accelerate their paces in developing cloud computing systems and enhancing its services providing to a larger amount of users. we investigate the security and privacy concerns of current cloud computing systems provided by an amount of companies. As cloud computing refers to both the applications delivered as services over the Internet and the infrastructures (i.e., the hardware and systems software in the data centers) that provide those services. Based on the investigation security and privacy concerns provided by companies nowadays are not adequate, and consequently result in a big obstacle for users to adapt into the cloud computing systems. Hence, more concerns on security issues, such as availability, confidentiality, data integrity, control, audit and so on, should be taken into account.

Cloud computing systems can achieve the following five goals together

Availability

The goal of availability for cloud computing systems(including applications and its infrastructures) is to ensure its users can use them at any time, at any place. As its web-native nature, cloud computing system enables its users to access the system (applications, services) from anywhere. This is true for all the cloud computing systems (DaaS, SaaS, PaaS, IaaS, etc.) can be accessed at any time, the cloud computing system should be severing all the time for all the users (say it is scalable for any number of users). Two strategies, say hardening and redundancy, are mainly used to enhance the availability of the cloud system or applications hosted on it.

Confidentiality

It means keeping users' data secret in the cloud systems. There are two basic approaches (physical isolation and cryptography) to achieve such confidentiality, which are extensively adopted by the cloud computing vendors.

Data integrity

In the cloud system means to preserve information integrity (not lost or modified by unauthorized users). As data are the base for providing cloud computing services, such as

Data as a Service, Software as a Service, Platform as a Service, keeping data integrity is a fundamental task.

Control

In the cloud system means to regulate the use of the system, including the applications, its infrastructure and the data.

Audit

It means to watch what happened in the cloud system. Audit ability could be added as an additional layer in the virtualized operation system (or virtualized application environment) hosted on the virtual machine to provide facilities watching what happened in the system. It is much more secure than that is built into the applications or into the software themselves, since it is able watch the entire access duration.

CONCLUSION

This paper discussed the architecture and popular platforms of cloud computing. It also addressed challenges and issues of cloud computing in detail. In spite of the several limitations and the need for better methodologies processes, cloud computing is becoming a hugely attractive paradigm, especially for large enterprises. Cloud Computing initiatives could affect the enterprises within two to three years as it has the potential to significantly change IT.

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