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A Study on Virtualization and SOA Techniques in Cloud Computing

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Abstract: **Cloud computing has been envisioned as the next generation architecture of IT enterprise. Cloud computing moves the application software and data bases to the large data centers, where the management of the data and services may not be fully trustworthy. There are many benefits to using cloud storage, most notable is file accessibility. Files stored in the cloud can be accessed at any time from any place so long as you have Internet access. Another benefit is that cloud storage provides organizations with off-site (remote) backups of data which reduces costs associated with disaster recovery. Unfortunately, the biggest disadvantage to cloud storage is that users are limited by bandwidth. If your Internet connection is slow or unstable, you might have problems accessing or sharing your files. Organizations that require a large amount of storage may also find costs increase significantly after the first few gigabytes of data stored. There are two key elements at the core of cloud computing technology, which are: SOA (Service Oriented Architecture) and cloud virtualization, which are described in this paper. SOA facilitates cloud computing by making software easier to distribute in the cloud. It can be an alternative to virtualization in server-sharing, or it can use virtualization to improve performance and reliability.**

Keywords: **Cloud Computing, Virtualization, SOA**

I. Introduction

Several trends are opening up the era of Cloud Computing, which is an Internet-based development and use of computer technology. The ever cheaper and more powerful processors, together with the software as a service (SaaS) computing architecture, are transforming data centers into pools of computing service on a huge scale. The increasing network bandwidth and reliable yet flexible network connections make it even possible that users can now subscribe high quality services from data and software that reside solely on remote data centers. Moving data into the cloud offers great convenience to users since they don't have to care about the complexities of direct hardware management.

The pioneer of Cloud Computing vendors, Amazon Simple Storage Service (S3) and Amazon Elastic Compute Cloud (EC2) are both well known examples. While these internet-based online services do provide huge amounts of storage space and customizable computing resources, this computing platform shift, however, is eliminating the responsibility of local machines for data maintenance at the same time. As a result, users are at the mercy of their cloud service providers for the availability and integrity of their data. Recent downtime of

Amazon's S3 is such an example. Benefits of Cloud storage: No need to invest any capital on storage devices, No need for technical expert to maintain the storage, backup, replication and importantly disaster management, Allowing others to access your data will result with collaborative working style instead of individual work.

II. Cloud Storage

Cloud storage is defined as "*the storage of data online in the* cloud," wherein a company's data is stored in and accessible from multiple distributed and connected resources that comprise a cloud.

Cloud storage can provide the benefits of greater accessibility and reliability; rapid deployment; strong protection for data backup, archival and disaster recovery purposes; and lower overall storage costs as a result of not having to purchase, manage and maintain expensive hardware. There are many benefits to using cloud storage, however, cloud storage does have the potential for security and compliance concerns that are not associated with traditional storage systems.

Types of Cloud Storage

There are four main types of cloud storage — personal, public, private and hybrid;

PERSONAL CLOUD STORAGE

A form of cloud storage that applies to storing an individual's data in the cloud and providing the individual with access to the data from anywhere. Personal cloud storage also often enables syncing and sharing stored data across multiple devices such as mobile phones and tablet computers. Personal cloud storage is also frequently referred to as mobile cloud storage or pocket cloud storage.

Apple's iCloud, Google Drive, Windows SkyDrive and Amazon's Simple Storage Service (Amazon S3) are currently the most popular examples of personal cloud storage. Hard drive manufacturers are increasingly providing personal cloud storage services as well via offerings like the Western Digital MyBook Live and Seagate GoFlex lines of hard drives.

PRIVATE CLOUD STORAGE

Private cloud is the phrase used to describe a cloud computing platform that is implemented internal, that is within the corporate firewall, under the control of the IT department.

A private cloud is designed to offer the same features and benefits of public cloud systems, but removes a number of objections to the cloud computing model including control over enterprise and customer data, worries about security, and issues connected to regulatory compliance.

A form of cloud storage where the enterprise data and cloud storage resources both reside within the enterprise's data centre and behind the firewall. Also known as internal storage clouds, private cloud storage services are managed inside the data centre and as a result almost always carry higher capital and maintenance costs than public cloud storage services due to the enterprise needing to provide the data center space, network connectivity, power and cooling.

Private cloud storage does help resolve the potential for security and performance concerns while still offering many of the benefits of cloud storage such as scalability, reliability, rapid deployment and the option of management by a specialized cloud storage provider.

PUBLIC CLOUD STORAGE

A form of cloud storage where the enterprise and storage service provider are separate and the data is stored outside of the enterprise's data centre. With public cloud storage, or external storage clouds, enterprises and small businesses offload their data storage and archival / backup needs to a third-party cloud storage service provider, freeing them from the expensive costs of having to purchase, manage and maintain on-premises storage hardware and software resources.

In most cases, public cloud storage can also be deployed much faster and with more scalability and accessibility than on-premises data storage. In addition to storing static data, public cloud storage services can often store live data generated by applications running on a company's on-premises resources.

HYBRID CLOUD STORAGE

A combination of public cloud storage and private cloud storage where some critical data resides in the enterprise's private cloud while other data is stored and accessible from a public cloud storage provider. With hybrid cloud storage, enterprises are able to mix and match cloud storage resources between local data centre infrastructure and scalable, on-demand infrastructure, with the cloud storage provider typically fully managing the cloud storage.

Hybrid cloud storage combines the advantages of scalability, reliability, rapid deployment and potential cost savings of public cloud storage with the security and full control of private cloud storage.

A. Benefits and Disadvantages of Cloud Storage

There are many benefits to using cloud storage, most notable is file accessibility. Files stored in the cloud can be accessed at any time from any place so long as you have Internet access. Another benefit is that cloud storage provides organizations with off-site (remote) backups of data which reduces costs associated with disaster recovery. Unfortunately, the biggest disadvantage to cloud storage is that users are limited by bandwidth. If your Internet connection is slow or unstable, you might have problems accessing or sharing your files. Organizations that require a large amount of storage may also find costs increase significantly after the first few gigabytes of data stored.

III. SOA with Cloud Computing

SOA is an architectural pattern for the development of distributed systems that transforms resources into software services. Benefits like increased agility and cost savings are already clear for companies around the world, and inevitably, SOA will be the dominant architecture in most large organizations. The adoption of SOA today will improve how IT is able to meet business in the future.

SOA and Cloud Computing can exist separately—neither depends on the other. However, they are complementary and can be very helpful to each other.

Cloud Computing provides a very flexible and scalable platform through processing external services, and not only offers advantages such as low cost, but also provides the ability to connect with customers, partners, and suppliers, as never seen before.

However, without SOA, organizations will face difficulties in using Cloud Computing because of the fact that the applications do not have a solid architectural foundation. The complexity of migrating to the cloud environment will be

too great, both conceptually and physically. The high scalability of Cloud Computing comes up against the application architecture and infrastructure available.

IV. Virtualization work in Cloud Computing

Virtualization plays a very important role in the cloud computing technology, normally in the cloud computing, users share the data present in the clouds like application etc, but actually with the help of virtualization users shares the Infrastructure.

The main usage of Virtualization Technology is to provide the applications with the standard versions to their cloud users, suppose if the next version of that application is released, then cloud provider has to provide the latest version to their cloud users and practically it is possible because it is more expensive.

To overcome this problem we use basically virtualization technology, By using virtualization, all severs and the software application which are required by other cloud providers are maintained by the third party people, and the cloud providers has to pay the money on monthly or annual basis in figure 1.

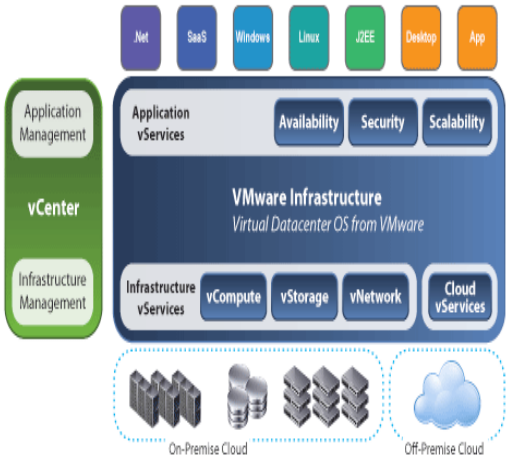

Figure 1. Example of Virtualization Cloud

V. SOA VS Virtualization Techniques in Cloud Computing

There are two key elements at the core of cloud computing technology, which are: SOA (Service Oriented Architecture) and cloud virtualization, which are described in further detail below:

SOA Architecture – this element of cloud technology allows organizations to access cloud based computing solutions with features that can be modified on demand, as business needs change. Service Oriented Architecture allows independent web services to communicate with each other via the Internet in real time, providing the flexibility that is required to rapidly reconfigure the service delivery for a specific cloud computing offering. SOA places the responsibility and costs of development, deployment and maintenance of web service components on the web services provider, which allows a web services consumer to access various web services without the expense or overhead that is associated with traditional methods of IT services delivery. SOA is a powerful technological component of cloud computing because it facilitates centralized distribution and component reuse, which significantly drives down the cost of software development and delivery.

Cloud Virtualization is another important aspect of a cloud system that facilitates the efficient delivery of cloud computing services. The implementation of virtual computing resources in the cloud, that mimic the functionality of physical computing resources, serves as a flexible load balancing management tool that allows for the swift adjustment of computing services delivery on demand. Virtualization technology provides organizations with a tool that promotes high levels of availability, scalability and reliability; in terms of the cloud systems or cloud computing technology that an enterprise can access to meet its information technology needs. Virtualization is also a very important component of cloud computing technology for the purposes of disaster recovery and fail-over support.

VI. Implementation

Data centre modernization is the hottest topic of the new decade, but it's hard to plan for it effectively when so many different hot trends seem to be aimed at the topic. CIOs and IT planners report that senior management is easily confused by the relationships among three particular technology shifts -- virtualization, cloud computing, and Software as a Service (SaaS). Vendor marketing, which tends to link products and services indiscriminately to any hot trend, isn't making things easier.

The goal for all these technologies is the same: to contain or reduce the cost of supporting business operations using information technology. It's how these technologies achieve that goal which makes them different and which governs whether they can be deployed together or whether they will collide.

Benefits and challenges of virtualization

If SaaS is an application model, virtualization is a technology. As it's popularly used today, virtualization is any technology that allows resources to be viewed as "logical" and "physical." Applications are run on logical resources, and these are assigned to an optimum physical resource based on a variety of cost, performance and availability policies.

Virtualization is a technology that allows a physical server to appear to applications as multiple "logical servers." Many companies have purchased new servers for each new application they deploy, in some cases resulting in thousands of underutilized servers that have to be individually powered, cooled and maintained. With virtualization, a much smaller number of servers housed in concentrated data centers can replace the inefficient distributed mass of servers, often reducing costs by more than 50%.

The challenge of virtualization lies in the issue of utilization. If a server truly has excess memory, disk and CPU resources available, then virtualization can provide for server consolidation and savings. If resources are limited, then virtualization will affect application performance. Some users

have also found it difficult to manage virtual server farms, though tools from vendors like Cisco, HP, IBM, Microsoft, Oracle, and EMC/VMware are making that easier. Most report that virtualization does require more professional skill in house to manage. Companies that can benefit broadly from SaaS are less likely to benefit broadly from virtualization.

Cloud computing blends SaaS and virtualization

Cloud computing is in many ways a harmonization of SaaS and virtualization into a much broader and more flexible model. As a model for IT infrastructure, cloud computing -- or the private cloud -- provides a way for enterprises to structure their data centers to efficiently use server, storage, and network resources. Cloud computing can extend virtualization across a wide area network (WAN) to build a single virtual cloud data center. Because a cloud data center can include the servers and storage of multiple physical data centers, it provides a larger pool of resources for applications to share than would be provided by simple server virtualization -- further improving cost efficiency.

An older and in many ways more confusing technology cuts across all three of these modern software innovations -- service-oriented architectures (SOA). SOA is a software design and development methodology that componentizes applications into modular services that are then assembled in various ways to promote customization to worker needs and reuse of common software elements. SOA facilitates cloud computing by making software easier to distribute in the cloud. It can be an alternative to virtualization in server-sharing, or it can use virtualization to improve performance and reliability. Finally, SOA makes everything a service and thus supports the SaaS model, not only for complete applications but also for components of applications. As SOA principles remake applications, SOA will transform all three technologies.

SOA may be transforming, but from the user's perspective, cloud computing is harmonizing. Many would argue that cloud computing is the unification of virtualization and SaaS, but it's more complicated than that. There will be applications of virtualization that are not "cloud computing" for years to come, and there will also be SaaS applications that do not use virtualization in application hosting. All three technologies have their place in managing capital and operations costs for IT. But it does seem likely that cloud computing will become the overarching framework in which most virtualization is applied and that the majority of SaaS providers will employ cloud computing to serve their users most economically and reliably.

VII. Conclusion

There are many benefits to using cloud storage, most notable is file accessibility. Files stored in the cloud can be accessed at any time from any place so long as you have Internet access. Another benefit is that cloud storage provides organizations with off-site (remote) backups of data which reduces costs associated with disaster recovery. Unfortunately, the biggest disadvantage to cloud storage is that users are limited by bandwidth. If your Internet connection is slow or unstable, you might have problems accessing or sharing your files. Organizations that require a large amount of storage may also find costs increase significantly after the first few gigabytes of data stored. There are two key elements at the core of cloud computing technology, which are: SOA (Service Oriented Architecture) and cloud virtualization, which are described in this paper. SOA facilitates cloud computing by making software easier to distribute in the cloud. It can be an alternative to virtualization in server-sharing, or it can use virtualization to improve performance and reliability.

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