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The Basics of Cloud Technology

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Abstract: *A cloud refers to definite IT surroundings that's designed for the aim of remotely provisioning climbable and measured IT resources. The term originated as a image for the net that is, in essence, a network of networks providing remote access to a collection of localized IT resources. before cloud computing changing into its own formalized IT business section, the image of a cloud was usually wont to represent the net in an exceedingly sort of specifications and thought documentation of Web-based architectures.*

Keyword: *Information technology, cloud computing*

1. INTRODUCTION

Cloud computing is a paradigm of distributed computing to provide the customers on-demand, utility based computing services. Cloud users can provide more reliable, available and updated services to their clients in turn. Cloud itself consists of physical machines in the data centers of cloud providers. Virtualization is provided on top of these physical machines. These virtual machines are provided to the cloud users. Different cloud provider provides cloud services of different abstraction level. E.g. Amazon EC2 enables the users to handle very low level details where Google App-Engine provides a development platform for the developers to develop their applications. So the cloud services are divided into many types like Software as a Service, Platform as a Service or Infrastructure as a Service. These services are available over the Internet in the whole world where the cloud acts as the single point of access for serving all customers. Cloud computing architecture addresses diffculties of large scale data processing.

2. ARCHITECTURE

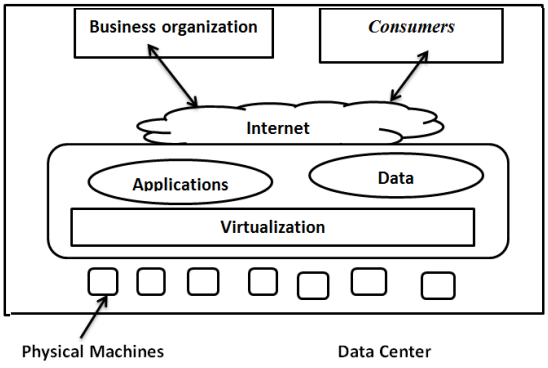

Figure 1 Architecture of cloud computing

The cloud providers actually have the physical data centers to provide virtualized services to their users through Internet. The cloud providers often provide separation between application and data. This scenario is shown in the Figure 1.

The underlying physical machines are generally organized in grids and they are usually geographically distributed.

Virtualization plays an important role in the cloud scenario. The data center hosts provide the physical hardware on which virtual machines resides. User potentially can use any OS supported by the virtual machines used.

Operating systems are designed for specific hardware and software. It results in the lack of portability of operating system and software from one machine to another machine which uses different instruction set architecture. The concept of virtual machine solves this problem by acting as an interface between the hardware and the operating system called as system VMs. Another category of virtual machine is called process virtual machine which acts as an abstract layer between the operating system and applications. Virtualization can be very roughly said to be as software translating the hardware instructions generated by conventional software to the understandable format for the physical hardware. Virtualization also includes the mapping of virtual resources like registers and memory to real hardware resources. The underlying platform in virtualization is generally referred to as host and the software that runs in the VM environment is called as the guest. The Figure 2 shows very basics of virtualization.

Here the virtualization layer covers the physical hardware. Operating System accesses physical hardware through virtualization layer. Applications can issue instruction by using OS interface as well as directly using virtualizing layer interface. This design

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enables the users to use applications not compatible with the operating system. Virtualization enables the migration of the virtual image from one physical machine to another and this feature is useful for cloud as by data locality lots of optimization is possible and also this feature is helpful for taking back up in different locations. This feature also enables the provider to shut down some of the data center physical machines to reduce power consumption.

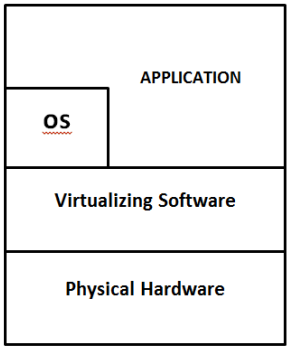
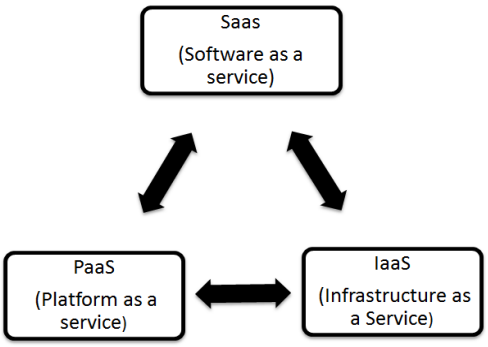


Figure 3 Virtualization basic

3. CLOUD SERVICES



3.1 SaaS (Software as a Service):

It is the upper layer of the stack and it permits clients to run applications from the cloud. SaaS is software that is developed over internet. It is a delivery model where the software and the associated data are hosted in a cloud environment by a third party such as Cloud Service Provider (CSP). It provides an application to customers either as a service on demand. It is mainly accessed through web portal and service oriented architecture based on some of the web service technologies E.g. - Google Apps, Zoho Office

3.2 PaaS (Platform as a Service):

This layer is responsible for executing the security frameworks. It gives an agent framework to the applications which are actualized on the cloud. E.g. - Google App Engine

3.3 IaaS (Infrastructure as a Service):

IaaS service provides the users of the cloud Greater fexibility to lower level than other services. It gives even CPU clocks with OS level control to the developers. E.g. - Amazon EC2 and S3 Cloud computing services shown in figure 4.

4. TYPES OF CLOUD COMPUTING

Depending on the organizational structure, the provisional location and also based on their specific business, operational, and technical requirements the cloud services can be deployed in different ways. Mainly there are three primary cloud computing types .they are shown in figure 5.

- Private Cloud
- Public Cloud
- Hybrid Cloud

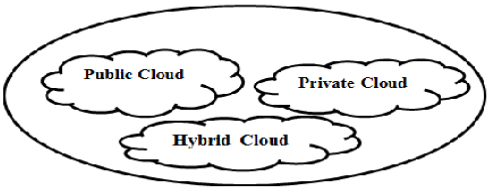


Figure 5 Types of Cloud Computing

4.1 Private Cloud

This type of cloud is maintained within an organization and used solely for their internal purpose. So the utility model is not a big term in this scenario. Many companies are moving towards this setting and experts consider this is the 1st step for an organization to move into cloud. Security, network bandwidth are not critical issues for private cloud.

4.2 Public Cloud

In this type an organization rents cloud services from cloud providers on-demand basis. Services provided to the users using utility computing model.

4.3 Hybrid Cloud

This type of cloud is composed of multiple internal or external clouds. This is the scenario when an organization moves to public cloud computing domain from its internal private cloud.

5. ADVANTAGES OF CLOUD COMPUTING

The following are some of the possible advantages of cloud computing:

5.1. Flexibility

There is a high rate of flexibility when using cloud computing because people can opt out of A using it whenever they want too. One of the A major benefit of cloud computing is that there is no limitation of place and medium. We can access our applications and data anywhere in the world, on any system. These are the main reasons, which attract people to use A this method.

5.2 Low Cost

Companies can save big by employing cloud computing as it eliminates cost for hardware and software. With cloud computing, company uses the resources of the hosting company to store their data and applications. Companies also pay for use of the software and programs by paying a subscription fee.

The cost of using cloud resources is very economical for resources such as centralized, real estate, bandwidth, and power. Users will also save money on software updates, management costs, and data storage costs. It is a cheaper way to maintain the software and it will save time, as the developers keep track of updates and maintain your programs while you use it.

5.3. Speed & Scales

Traditional methods to buy and configure hardware and software are time consuming. There is no need to purchase and setup hardware manually when using the cloud computing method. Cloud computing provides a rapid deployment model that enables applications to grow quickly to match increasing usage requirements. Depending upon their needs the user can quickly scale up or scale down.

5.4. Easier Management of Data and Information

Since all data are located on a centralized location, data are more organized making it easy to manage. All transactions are also recorded so management can easily track activities of their employees.

6. DISADVANTAGES OF CLOUD COMPUTING

Most of these disadvantages are addressed by cloud computing

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6.1. Scalability

Cloud computing by design supports scalability. The data centers have enough computing and storage capacity to cope up with the spikedemand.

6.2. Modifiable

Applications hosted in cloud can be modifiable internally without too much concern of the end users. Change in one place would rect in all the places inherently and it would be consistent.

6. 3. Data logging

This central facility can be very useful for locating any fault in the system. Logging can also be used for detecting unauthorized usage checking or detecting compromization.

6.4. Availability

Cloud services are well known for high availability. If any data center is down for any reason there is hot backup ready to work immediately. Virtual machine migration is used to great extend in this situation to facilitate load balancing in case of failure of some systems.

6.5. Reliability

Replication and migration of instances across data centers make the reliability of the system very high in the cloud scenario.

6.6. Physical disaster recovery

Backup policies can be very useful for physical disaster avoidance and this is inherent to the cloud system. Data is stored in different physical location so that hot backup can be provided whenever needed.

6.7. Policy management

Polices can be managed in a centralized fashion. This is helpful for introducing Government policies readily unlike the present scenario.

6.8. Legacy software

An already developed software can be moved to cloud with minor changes some times. So the Government doesn't incur cost for developing applications which it already has.

6.9. Pay model

Cloud providers' pay-as-you-use model enables the customer (Government) to reduce cost of deployment and control the usage.

6.10. Reduce power consumption –

Adaptation of cloud reduces power consumption in different offices and usage of power is on centrated in the data center only. But also that is not the concern of the government as those data centers are to be handled by the third party who provides cloud.

7. CONCLUSION

So, while cloud computing is really great and you're probably already using it, either for business of for personal means, here's what we've learned from taking a look at the pros and cons: Cloud computing is a really cheap way for companies to have all the resources they need in once place. It's a much better way to spread your resources, and it becomes easier to access things from longer distances.

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